

## INNOVATIVE APPROACHES TO SMALL WATERSHED MANAGEMENT: THE M RIVER EXPERIENCE IN HUBEI PROVINCE

Chen Wei Gang<sup>1</sup>, Liu Xin Hu<sup>1</sup>, Zhang Mei Ling<sup>1</sup>

### Article Info

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### Abstract

In the wake of the rural revitalization strategy, substantial strides have been taken in the sphere of rural economic and social development. However, this progress has been accompanied by a surge in challenges, notably, sluggish environmental oversight, an extensive development paradigm, disorderly administration, and an entrenched urban-rural divide. Responding to this pressing context, Hubei Province convened a dedicated conference to deliberate upon the pilot initiative for the comprehensive management of small watersheds. This initiative, centered on the management of 'small watershed water bodies', serves as a strategic foray into the broader ambition of holistic management. Its overarching goals are to catalyze a shift in the rural development model, foster seamless urban-rural integration, and propel the modernization of governance systems and capacities. At the core of this endeavor lies the imperative of ensuring ample and secure water resources, crucial for both industrial agriculture and the creation of a habitable environment. Addressing water body management at its source necessitates the prioritization of small watersheds that feed into larger ones. A small watershed, typically encompassing a self-contained, enclosed natural catchment area of around 50 square kilometers, functions as a comprehensive ecological, productive, and residential entity. These watersheds generally traverse one or two counties, exhibiting a unique blend of scale management within the basin and intricate human-nature interconnections. With these attributes, small watersheds are ideally suited for comprehensive management initiatives. Consequently, in July 2023, Hubei Province will embark on a groundbreaking pilot program, focusing on five small watersheds, including the M River. This initiative stands as a pioneering effort to chart a path toward effective governance.

<sup>1</sup> Wuhan Polytechnic University, School of management, Wuhan, 430048, Hubei, China

## **1. Introduction**

Since the implementation of the rural revitalization strategy, great progress has been made in rural economic and social development, but problems such as lagging environmental governance, extensive development model, chaotic management and overall planning, and urban-rural dual structure have become increasingly prominent. In this context, Hubei Province held a special meeting to study the pilot work of comprehensive management of small watersheds, taking 'small watershed water body management' as a small incision to implement the grand strategy of 'comprehensive management', aiming to lead the transformation of rural development model, promote the integration of urban and rural development, and promote the modernization of governance capacity and governance system. Taking the water treatment of small watershed as the breakthrough point, because of the production of industrial agriculture and the construction of livable environment, it is necessary to have sufficient and safe water resources. In order to solve the problem of water body management from the source, the first thing is to manage the small watersheds that flow into the large watershed. Small watershed refers to a relatively independent and closed natural catchment area with a catchment area of 50 square kilometers. It is a complete ecological, production and living unit, usually flowing through one or two counties. Whether it is the size of the scale management involved in the basin, or the human and natural links within the region, it is fully equipped with the overall conditions for comprehensive management. Therefore, in July 2023, Hubei Province will take the five small watersheds, including the M River, as the pilot areas of the first batch of small watershed comprehensive management to explore the road of governance.

## **2. Basic information**

The M River small watershed is one of the first five small watershed comprehensive management pilots in the province. It is a national strategic water source area, ecological protection and maintenance area, and urban-rural dual integration area. Water quality safety is very important. The river basin is 43.3 kilometers in length and 157.5 square kilometers in scope. It spans two district administrative units of S city, involving 20 villages (communities), 110,000 people (agricultural population 10,000), 2 reservoirs and 16 main tributaries. Taking water as the context, from south to north, it is ecological area, agricultural area and urban area. Mountain, water, village, field, garden and city are integrated. It is a complete living unit and effective spatial coordination unit. The pilot project is typical, representative and exemplary.

## **3. Research methods**

### **3.1. Literature review method**

The literature review method aims to integrate the information that has been considered and studied in the specific field of the current research topic, and systematically demonstrate, summarize and comment on the efforts of authoritative scholars on this topic. Before this research, the team collected a large amount of relevant data from the fields of water quality protection, green industry and other fields to which the research belongs. By reading and analyzing the latest developments in current water governance issues and research topics, team members have summarized and organized relevant academic opinions or suggestions.<sup>[1]</sup>

### **3.2. Semi-structured interviews**

The semi-structured interview method is an interview form between the non-structured and the fully structured, and it is also an informal interview form based on a thick-line interview outline. In this interview, the interviewer can flexibly make the necessary adjustments according to the actual situation of the interview. This interview takes water governance as the theme to deeply understand the views and attitudes of the interviewees, provide detailed information, and also ensure a certain degree of comparability and reliability of the data.

#### 4. Main issues

After years of protection and development, the watershed ecology has improved significantly, the water quality has continued to improve, and there is a certain foundation for economic development, public facilities, social governance and other aspects, but there are also some shortcomings.

First, there is a gap between water quality protection and the requirements of strategic water sources. The upstream water quality remains Class II all year round, but the coverage of rural domestic sewage treatment facilities is incomplete and the treatment capacity is insufficient. There is a risk of excessive ammonia nitrogen and total phosphorus in some branch ditches during the flood season. In the middle reaches of the industrial park, the factory is built first and then the district is built, and the production is first and then the life. The self-built house pipe network is not perfect, the rain and sewage diversion is not complete, and the old factory has industrial wastewater and domestic sewage mixed discharge. There are hidden dangers in geological disasters and flood control, and the water quality is vulnerable to the impact of flood season. Although a lot of money has been invested, it is still insufficient, and the whole basin has great pressure to reach the standard during the whole period.<sup>[2]</sup>

Second, the pressure of industrial green transformation is greater. More than 80 % of the watershed is ecological land. The upstream is mainly based on traditional agricultural planting and breeding and rural tourism. Nearly half of the population goes to cities to work, and the transformation path of ecological industry is not wide. The industrial structure of the middle reaches is single, mainly commercial vehicles and auto parts, and the transformation of automobile ' five modernizations ' is not fast enough. The recycling of water resources, the cascade utilization of energy, the comprehensive utilization of waste in the park are insufficient, and the economical and intensive utilization is not enough, and there is still a certain gap with the standard of green recycling park.<sup>[3]</sup>

Third, the integration of urban and rural development is not enough. The factor flow, personnel interaction and resource linkage between urban and rural areas are not close enough. In 2022, the per capita disposable income ratio of urban and rural residents is 2.7 : 1. The integration of village resources is insufficient, the industrial integration is not enough, the natural resources have not been well utilized, the human resources need to be further explored, and the construction and development of villages also lack the cultivation of characteristic industries. A large number of young and middle-aged rural labor force outflow, lack of industrial development subject ; farmers ' activities show a trend of decentralization and individualization, which is difficult to cope with market shocks ; agriculture has not yet been effectively integrated with the secondary and tertiary industries, and there are deficiencies in the connection between agricultural products and the market.

Fourth, there is fragmentation in planning and construction management. Small watershed management involves development and reform, water conservancy, environmental protection, agriculture, forestry, construction, planning, land and other departments to participate. Each department has different responsibilities and responsibilities, and pays attention to its own field. Sharing between departments is not smooth, lack of information exchange and communication mechanism. There is a lack of unified leadership and coordination agencies to focus on coordination, and there is a lack of communication and coordination channels for departments.

Fifth, the integration of agriculture, forestry, water and soil systems is insufficient. First, the use and management of water resources are not coordinated, and there are conflicts and competition in the use of water resources in various fields, such as the contradiction between agricultural irrigation and domestic water use. Second, there is a contradiction between land use and protection. There is a contradiction between the demand for land resources and land protection in agricultural farming and urban and rural construction. Third, the ecological environment

protection is not coordinated, and there is an inconsistency between the ecological environment marketing and environmental protection needs of agricultural and forestry activities. Fourth, natural disaster prevention and control supplement, unreasonable planning and construction of farmland water conservancy facilities, destruction of forestry resources may increase the risk of floods.

## **5. Solving measures**

The advancement of any work must adhere to the problem orientation and grasp the main contradictions. On the whole, carrying out water body management is the basis for the implementation of other measures, and finding the right development path in combination with the existing conditions of small watersheds is the key to carrying out comprehensive management. Specifically, it can be summarized into five aspects : coordinating development planning, controlling the safety bottom line, determining the spatial pattern, promoting green development, and formulating action plans.

### **5.1. Overall development planning**

Coordinating development planning is to adhere to the working methods of overall consideration and highlight overall planning and planning coordination. Under the method of basing on the whole, grasping the key part and optimizing the system, we should make full use of the existing land, talents and capital resources, ' let what place to do ', ' let what people can do ', ' spend money on the blade '.

The core of overall planning is to coordinate the spatial layout of small watersheds. The spatial layout planning is reasonable and clear, and the planning of other fields has a clear direction. It is necessary to combine the background advantages and industrial characteristics of local mountains, water, forests, fields, cities and towns, systematically consider the relationship between production, life and ecology, and form a general map of basin development. The general plan clearly defines the ecological protection area, agricultural production area, urban development area, villagers ' residential area, tourism and leisure area, forestry conservation area, etc., so as to achieve one policy for one river and adjust measures to local conditions.

Planning, coordinating, and establishing a small watershed management working group is a good starting point for establishing a written governance mechanism led by the government and jointly participated by the whole society. The existing plans of township, water conservancy, environmental protection, agriculture, forestry, construction, planning, land and other departments are sorted out and optimized to break the division of departmental responsibilities, study and judge the conflict of interests of departments, and realize the coordination of resources, funds and implementation subjects.

### **5.2. Control the safety bottom line**

The overall planning of small watershed is a multi-party overall planning with water as an opportunity. The management of water is the core of the overall development of small watersheds. It is necessary to start from the source of water and the source of pollution, and resolutely adhere to the bottom line of water protection. It adheres to the working idea of " point, line and surface, " takes pollution sources as " point " and rivers as " line " to drive the improvement of " surface " in the basin. If we focus on pollution sources, we can reduce non-point source pollution by implementing agricultural water circulation projects, reduce industrial production pollution through closure, rectification, relocation, and management, and solve the problem of domestic sewage through pipeline treatment and decentralized treatment. Taking the river as the line, it is based on the water surface, starting from the upstream of the basin, and carrying out segmented treatment according to the order of upstream-midstream-downstream. On this basis, the comprehensive improvement work along the slope bank is carried out, and the ecological transformation and restoration of natural barren slope and vertical hard slope are carried out, and the natural leisure greenway and small wetland park on both sides of the river basin are carried out. It is necessary for us to fully implement the river and lake chief system, subdivide the responsibility of the basin, and guide the

public to participate so that we can fully mobilize college students, volunteers and other groups to participate in ecological and environmental protection activities such as water quality testing, river beach cleaning, and environmental protection publicity. Bottom line control results are included in the assessment, and 'one-vote veto' is implemented for major events and major risks. Multiple measures are taken to drive the improvement of the entire basin.

### **5.3. Determine the spatial pattern**

Different small watersheds have different natural resources, human resources, production technology and production methods, thus forming different natural characteristics and economic and social characteristics. It is necessary to divide the space in the small watershed into different types according to local conditions and classification, and determine the control content of each type in ecological security, food security and geological disasters, as well as the development guidance of industrialization, informatization, urbanization and agricultural modernization. Through adhering to the point-line-surface combination method of grasping points, connecting lines, and extending surfaces, we can form a county-town-village system, and build traffic network lines such as roads, paths, and greenways that connect points and points, points and surfaces. Furthermore, it expands the ecological and economic functions of ecological spaces such as wetlands, reservoirs, fish ponds, and production spaces such as industrial parks and basic farmland.

### **5.4. Promoting green development**

Through adhering to the principle of intensive conservation, improving the efficiency of water, energy, land and other factors in urban enterprises, we can implement the green low-carbon recycling transformation of the park, build a number of green recycling demonstration projects, further promote the co-construction and sharing of public infrastructure, and reduce the energy consumption of industrial unit GDP. We should give full play to the advantages of characteristic planting industry in small watersheds, optimize the transportation system, build an integrated resort area of agriculture, culture and tourism in one village, one product, promote the integrated development of the first, second and second industries, and effectively solve the urban-rural dual structure. Taking the front and back of the house and the improvement of the living environment as the starting point, we should seize the nose of the construction of rural houses and promote the improvement of the living environment of contiguous villages.

### **5.5. Develop an action plan**

Through the development of the project library, according to the three aspects of production, life and ecology, the implementation department, time plan and implementation requirements of each project are clarified, and the comprehensive management of small watersheds is promoted through the implementation of the project. In the process of implementation, we should adhere to the working concept of joint creation, build a governance platform led by party building, led by the government, with the participation of the masses, businesses, associations and various social subjects, give full play to the power of multiple subjects, build and share industries and public services, and narrow the gap between urban and rural quality of life.

## **6. Conclusion**

The M River small watershed in S City is one of the first five small watershed comprehensive management pilots in Hubei Province. The upstream is the national strategic water source and ecological protection and maintenance site, the middle reaches is the agricultural production area, and the downstream is the industrial park of urban automobile, emergency equipment and other related manufacturing industries. It has good typicality and demonstration in the comprehensive management of small watersheds. By exploring its governance plan, it has certain reference significance.

## References

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