Study on Innovation Mechanism of Ecological Compensation in Diversified Basins------A Case Study of Xin'anjiang River

Pan Gao

Zhejiang Sci-Tech University, Zhejiang, China, 310018

Keywords: Diversified watershed; Ecological compensation; Innovation mechanism; Xin'anjiang River; Bayesian network

Abstract: Since the reform and opening up, the domestic social economy has made a breakthrough in quantity and a qualitative leap, and the level of domestic residents has improved very well. However, the problem of watershed pollution in many places in China is also becoming more and more serious, and water resources tend to be tense. The illegal discharge of domestic sewage, pesticides, and industrial wastewater, has caused the problem of water pollution to increase and the water quality to decline. At the same time, excessive grazing and deforestation have reduced the ability of conserving water sources upstream, and the problem of soil erosion has gradually increased. In this context, combining with the case of Xin'anjiang River, the author studies the innovation mechanism of ecological compensation in diversified basins.

1. Introduction

The upstream of the basin has the function of conserving water sources, which can play a good role in ecological protection and water quality protection. In the whole area of ecological security and the use of water resources, the upstream area can not be invested in polluting industries, and should pay more attention to human and material resources, and in-depth consideration should be made from the perspective of environmental protection and ecological construction. Studying the ecological compensation of river basins can play a better role in the construction of ecological civilization, form a good orientation for ecological compensation construction, and provide a new and unique vision in the design of systems and frameworks. Ecological compensation project in Xin'anjiang River, the first pilot project for the successful ecological compensation of cross-border watersheds in China, is to restrict pollution from the source in the practical stage of harnessing. With the conviction that lucid waters and lush mountains are invaluable assets proposed by General Secretary Xi Jinping, the local government transaction is regarded as a new market mechanism, and has played a flexible and effective role in ecological compensation. The overall water quality of the basin is stable and has a positive effect on peer governance. The author studies the innovation mechanism of ecological compensation in diversified basins by combing the case of Xin'anjiang River.

2. Research on Innovation Mechanism of Ecological Compensation for Diversified Watershed at Home and Abroad

The definition of ecological compensation in China is similar to that of payment for ecological services in the world. Foreign scholars insist on the mode of maintaining water quality and quantity in the upstream and compensating in the downstream, and trade in water ecological services in the basin. Basin water resources ecological compensation mechanism is defined as a payment system for basin ecosystem services. It is earlier in foreign countries than in the domestic in understanding, research and development of ecological compensation mechanism. This system has similar views among foreign scholars, that is, it is a trading system based on the principle of voluntary market. At the same time, upstream and downstream should understand each other and communicate with each other reasonably. In order to establish a more perfect ecological compensation mechanism, each

  DOI: 10.25236/iciss.2019.084

object needs to be figured out, the subject and object need to be clarified to analyze and solve the main contradictions.

3. Analysis of the Current Situation of Ecological Compensation in Diversified Basins of Xin'anjiang River

Xin'anjiang River is located in Anhui and Zhejiang Provinces. It is the source of Qiantang River, which ranks the third largest river system in Anhui Province. Specifically, the total length of Xin'anjiang River is about 600 km, including about 360 km in Zhejiang Province, 240 km in Anhui Province and more than 600 tributaries, with a total area of 110,000 km^2. With the help of funds and schemes in Anhui and Zhejiang provinces, the ecological problems in Xin'anjiang River Basin have made progress in stages. In terms of environmental benefits, water environment quality is stable and preferred, water quality of Qiandao Lake has been significantly improved; pollution has been continuously reduced, and power pollution has also been effectively improved; construction of ecological environment has been further improved, and areas such as woodland, water body, grassland have also been improved. Combining the green industry system economically, the unification of green ecology and development has been further realized. In addition, the pilot of the Xin'anjiang River Basin has been successfully reported by many media. Agencies such as CCTV, People's Daily and Xinhua News Agency have highly evaluated the success of Xin'anjiang River Basin pilot project, which has played a very positive role in guiding the ecological compensation of the whole country.

However, there are still some problems in the ecology of the Xin'anjiang River Basin. (1) The compensation method is relatively simple. It lacks the mechanism of transferring water rights, and talent training for counterpart cooperation. (2) The implementation period of compensation is short. The period of signing agreement is generally two to three years, which is relatively short. The capital investment is insufficient, and the scope of compensation is relatively small, and no safeguard mechanism has been established. (3) The compensation standard is not perfect, and there is no unified standard. The ecological service value and protection cost are not reflected in detail. (4) The basin system is insufficient, lack of systematic design and overall layout of landscape forests.

4. Research on Innovation Mechanism of Ecological Compensation for Diversified Watershed Combining Xin'anjiang River

To innovate the ecological compensation mechanism of the Xin'an River Basin, the first principles to be followed are "Who benefits, who compensates" and "Who harms, who compensates". On the compensation model, the simulation is performed with the improved bidirectional dynamic compensation model. After fully considering the dynamic characteristics of water quality, they are classified and the corresponding water quality of different types of structures is compensated. So, the dynamic model of continuous improvement of targets across the Xin'anjiang River basins across the two provinces can compensate for the ecological improvement and continuous improvement of water quality in different levels. The three models can be closely linked and combined, and the contradiction between ecological compensation and ecological protection will be better compensated. While the water ecological environment is gradually improved, it can also better compensate the subject and object and obtain a win-win ecological compensation.

When classifying water quality, the principle of ladder structure should be followed, and ecological compensation for water quality such as Class I water, Class II water, Class III water, and Class III water. For example, if the local section water quality meets the standards of Class II water, the ecological compensation amount is differentiated; but if it is lower than the standard, the damage compensation is implemented in upstream areas. In addition, more detailed guidelines on the concentration and type of pollutants can be developed, and the construction of composite contracts can be carried out to further improve the ecological compensation mechanism.

The innovation mechanism of diversified ecological compensation also needs to be analyzed scientifically according to the local actual situation. This paper classifies and compensates for various environmental changes of water quality and quantity in Xin'anjiang River Basin, and at the same time accurately compensates for the losses caused by environmental protection in the upstream area and the losses caused by environmental destruction in the downstream area. A diversified ecological compensation mechanism is constructed through Bayesian network structure learning and parameter learning.

Based on the above improved model, bidirectional dynamic chain compensation can be added. In the process of water quality research, if water quality in the downstream areas wants to reach the standard, the water quality must be better, and water in the downstream areas must be compensated by that in upstream areas. Bidirectional dynamic chain compensation is inspired by watershed management in Hong Kong, Guangdong and Jiangxi. In the management of Xin'anjiang River Basin, the whole basin is divided into five sections, among them three sections in Anhui Province and two sections in Zhejiang Province. According to the specific calculation formulas of water volume and implementation plan in different regions, the compensation amount and percentage will be calculated, and new compensation amount will be obtained. Compared with the original compensation standard, bidirectional dynamic chain compensation fully considers the specific changes of water quality, the characteristics of upstream and downstream water volume, the concentration, investment, and the degree of water environmental hazards, and redefines the compensation unit price and compensation weight. The whole scheme has been further optimized.

After the actual model is established, the basin can be further ecologically compensated based on the Bayesian network model. The Bayesian network model has very rational reasoning for uncertain and probabilistic events, and has a more scientific answer to the decision-making of multi-factor control problems. This model mainly consists of three parts, namely representation, reasoning and learning. After establishing such a model, the economic value analysis and the ecological value quantification of the whole water quality and the dynamic change of water quantity are combined. After combining the two principles, the compensation of the capital chain is required, and the damage caused by the downstream area needs to be compensated that in upstream areas accurately. It has truly realized the ecological compensation mechanism of diversified watersheds. The Bayesian network model can also evaluate the situation and afterwards, conduct practical analysis from the perspective of decision makers. Besides, social development, policy effectiveness, external effects and internalization, and predict the changing trend of the environment are compared. And it is predicted that this kind of watershed ecological compensation policy not only combines its economic means to exert its own value, but also facilitates the intuitive evaluation of decision makers.

5. Conclusion

Diversified watersheds should use Bayesian network model to consider many factors based on economic principles and combined with local realities under the leadership of the government, and finally establish a diversified and innovative ecological compensation mechanism.

References

[1] Wang Tao, Wang Qinhua. S*uggestions on Science and Technology Support for Ensuring the Red Line of Ecological Protection of Qilianshan Mountain in Gansu Province* [J]. Desert of China, 2019, 39 (01): 10-14.

[2] Liu Jinhong, Kong Deshuai, Jin Leshan. *Study on the Spatial Selection of Ecological Compensation Area: Taking the Transfer Payment of Key Ecological Function Areas in Qinghai Province as an Example* [J]. Journal of Ecology, 2019, 39 (01): 57-66.

[3] Wang Mingming, Meng Chengcheng. *The Interactive Mechanism of Sci-tech Innovation and Cultural Consumption and Its Impact on the Transformation and Upgrading of Cultural Industry: Based on the Perspective of Supply-side Reform* [J]. Taxation and economy, 2019, 223 (02): 53-58.

[4] Zeng Xiangang, Duan Cunru, Yu Huiyi. *Research on the Mechanism of Influence of Social Capital on Ecological Compensation Performance: Taking Xilingol League Grassland Ecological Compensation as an Example* [J]. China Environmental Science, 2019, 39 (02): 433-442.

[5] Sun Xuejiao, Zhu Yifan. *Research on the Cooperative Development Mechanism of Scientific and Technological Innovation and Financial Services: A Multi-Case Study from the Evolutionary Perspective of China's Science and Technology Financial Platform* [J]. Financial Development Research, 2019 (1).

[6] Yang Xue, Liu Cheng and He Yucheng. *Research on the Mechanism of Business Model Innovation to Enterprise Performance from the Perspective of Dynamic Capabilities: Taking Listed Companies in Manufacturing Industry as an Example* [J]. Industrial Technology Economy, 2019, 38 (02): 122-130.