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Holistic governance and meta-analysis on the sustainable ecological environment protection of the Lijiang River basin in China

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ABSTRACT

Humans and nature are a natural community of destiny, dialectically united in their pursuit of sustainable development. The invaluable contribution of ecological and environmental resources to enhancing human life is undeniable. As there are still problems, in particular unclear rights and responsibilities of multiple subjects in the systemic management of the Lijiang River basin, this research aims to explore the current dilemmas of ecological environmental protection in the Lijiang River basin, and to improve the dilemmas from three elements, naming policy, authority and responsibility, and ecological environmental protection. This research conducts a case study on the systemic management of the Lijiang River Basin, employing questionnaires and interviews as primary research instruments. The questionnaire was answered by administrative law enforcement and judicial departments, experts, university students, and villagers along the river basin. Five individuals participated in interviews to gather feedback on the holistic governance of the Lijiang River Basin. The findings highlight the ecological and environmental protection dilemmas in the Lijiang River Basin and propose effective solutions based on the holistic theory from three perspectives. In terms of policy, the solution encompasses strengthening systematic planning, complementing overall planning, and focusing on macro support. In terms of authority and responsibility, the solution enlists strengthening intergovernmental communication and coordination, readjusting the organizational structure of departments, and strengthening the cooperation of multiple subjects. In terms of ecological environmental protection, the solution comprises strengthening risk prevention and resistance, focusing on prevention and supervision, and enhancing comprehensive repair capabilities.

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1.0 INTRODUCTION

Watershed resources are of major strategic significance. They are not a single concept, but a collection of natural resources, environmental resources, and socio-economic resources. Nowadays, the interdependence between humans and nature is constantly rising. Continuous pollution and ecological disruption by humans in the watershed result in significant damage to its environmental health. On the other hand, people's growing need for a better life has increased, which is also reflected in the demand for a beautiful ecological environment for human habitation. Human beings and nature are typically a unity of contradictions, and this dialectical relationship affects sustainable development.

Every discipline must address sustainable development, which is a common global theme and a major issue. To explore how to reduce human damage to watershed ecosystems and how to rationally exploit watershed resources and protect the ecological environment, ecologists have created the concept of watershed ecology and incorporated it as a new field of ecological research (Shang & Gao, 2001). In response to these challenges, ecologists have introduced the concept of watershed ecology, while scholars in environmental science have developed the field of watershed environmental economics (Feng, Luo & Lv, 2010).

According to some scholars, the fragmented governance model in certain regions contradicts the integrity and systemic nature of the watershed ecological environment, which will have negative implications for environmental governance in the long run (Peng & Li, 2019). The construction of ecological civilization in China's watersheds in the new era must integrate holistic thinking into the whole process of exploitation, utilization, governance, distribution, and protection. The government needs to promote the construction of ecological civilization in watersheds with systematic and comprehensive measures (Xu & Zhi, 2021). Experts in the field of environmental law have suggested that solving basin problems requires addressing core issues such as the establishment of basin institutions and coordination mechanisms. For instance, the Yangtze River Protection Law determines its basic positioning as a comprehensive law and basin law (China Law Society, 2020).

As the world's largest karst landscape area, the Lijiang River basin is not only the soul of Guilin's beautiful landscape but also the headwater to nurture generations of Guilin people. The new era's Guangxi construction must focus on protecting the Lijiang River and promoting ecological restoration and environmental pollution management. In recent years, the Lijiang River has achieved a series of accomplishments, and ecological protection continues to improve, but some arising problems remain.

In recent years, the Lijiang River has achieved notable success in ecological protection. However, challenges persist, including lags in updating relevant policies and regulations, as reported in the implementation of the Regulations on the Protection of the Ecological Environment in the Lijiang River Basin (China's National People's Congress, 2022). At the same time, the Guilin Ecological Environment Protection Plan (2022-2035) also proposes to establish a good legal standard system, accelerate the revision of the Regulations on Ecological Environment Protection in the Lijiang River Basin of Guangxi Zhuang Autonomous Region, formulate the Special Plan for ecological environment protection in the Lijiang River Basin, and build a legal norm system for ecological environment protection with Guilin characteristics (Guilin Municipal People's Government Office, 2023).

In the process of protection and management of the ecological environment in the Lijiang River Basin, there is a phenomenon of unclear rights and responsibilities of multiple subjects. The Water Conservancy Department is in charge of illegal sand and gravel quarrying, the Agriculture and Rural Department is in charge of illegal farming, and the Ecology and Environment Department is in charge of water quality testing. However, the restoration of the nature reserve has led to insufficient horizontal synergy and resulting in a status quo of shirking and blurring of responsibilities between departments. In addition, the ecological environment department is responsible for the restoration of a nature reserve, and the natural resources department is responsible for the ecological restoration of rocky mountains. Furthermore, the

administrative areas under the jurisdiction of the two administrative departments and the division of responsibilities are not clear, leading to conflicts of interest. Zhang & Cai (2023) revealed that although the Guangxi Guilin Lijiang River Scenic Area Management Committee has the functions of coordination, guidance, supervision, and assessment, it is still difficult to take measures to coordinate the contradictions among various departments. The management committee encounters problems with insufficient horizontal coordination and the status quo of shuffle and vague responsibilities between departments.

There are disputes over interests in the Lijiang River basin between ecological environmental protection and material and economic development. Local laws and regulations in the Lijiang River Basin have made it obligatory for the relevant government departments to protect the idyllic scenery on both sides of the Lijiang River. However, to pursue economic benefits, farmers also have the right to plant orange-coloured crops such as sugar oranges, which has led to the destruction of the green tones of the two sides of the Lijiang River, depriving it of its 'mountain green' karst character. Fu revealed that conflicts such as these continue to exist, seriously hindering the ecological protection in the Lijiang River basin (Fu, 2023).

Based on the above shortcomings, this paper intends to fill in the current research gap about the current predicament of ecological environment protection in the Lijiang River Basin. The current predicament encompasses the existence of a lag in the relevant policies and systems, and some laws and regulations are not updated in time. Consequently, the division of rights and responsibilities in the field of law enforcement is not clearly outlined, making it difficult to form a long-term management model. Additionally, in the process of ecological environmental protection and management, conflicts of interest often occur because of the different needs of the rights and interests.

This research aims to explore the current dilemmas of ecological environmental protection in the Lijiang River basin from the perspective of holistic governance theory, an innovative idea to adapt to the development of the times and improve the efficiency of governance, focusing on three elements: policy, authority and responsibility, and ecological environmental protection.

Therefore, the objectives of the research are:

(i) to explore the status of policy planning, collaborative sectoral governance, and sustainable development of the Lijiang River Basin in Guilin, China.

(ii) to propose a holistic governance perspective for more effective management of the Lijiang River Basin.

Notwithstanding, this research proposes ways to solve the existing problems of the watershed in terms of the proposed elements. The following section enlists scholars' reviews on the existing role that holistic theories have played in the areas of building service-oriented communities, addressing agricultural poverty, explicating the community of life between humans and nature, and addressing the fragmentation of rural environmental governance.

2.0 LITERATURE REVIEW

The literature search was conducted through the China Knowledge Network Database with the following rules: the paper selects the core of Peking University and CSSCI articles, with collative governance as the subject term, targeting the time range of the last decade (2013-2023). In total, more than 700 academic journal articles were retrieved. According to the visualization analysis, the keywords with high attention include fragmentation, big data, river chief system, urban governance, public service, and multiple subjects. Administrative management, environmental science and resource utilization, and agricultural economics accounted for 52.41% of the total. In addition, Oceanography, Water and Hydroelectric Engineering, and other subjects related to ecology and environment were also discussed.

As a model for the application of holistic theory, the whole government overcomes the shortcomings of traditional bureaucracy and New Public Management, fully realizes interdepartmental cooperation and communication, and is more coordinated within the government. Networked governance using available information technology has been hailed as a new form of public sector management, which has played an important role in government reform in Western countries (Lan et al., 2015).

In the field of service-oriented community governance, at the community level, the fragmentation of living space leads to the diversification of community types: at the resident level, the stratification of interest structures leads to the individualization of community residents' lives, which turns out as a fragmentation dilemma. Scholars fully utilize the core ideas of coordination, integration, division of labour, and collaboration with the theory of holistic governance concept, providing the principles for community governance in the new era (Yang et al., 2015).

In terms of agricultural poverty, some scholars proposed ideas. Firstly, establishing a sound mechanism of coordination and cooperation for precise poverty alleviation emphasizes the coordination and integration of subjects. Secondly, improving the various fragmentation phenomena in the process of resource allocation for precise poverty alleviation, innovating a mechanism of governance synergy. Holistic governance theory includes elements such as coordination, integration, public responsibility, information technology, and citizens' needs. Through these elements, it provides a new analytical idea for the sustainable development of precise poverty alleviation in China's rural areas. (He & Chen,2017)

Within the field of harmonious coexistence of humans and nature, a community of life between humans and nature has become the latest expression of the holistic ecological concept. In this regard, some scholars explored a new concept of the legal system for wildlife protection through a holistic perspective and put forward a new path for wildlife protection in China in terms of holistic animal protection legislation, comprehensive habitat protection, expansion of protection content, and innovation of protection means (Zhou & Jiang,2022). In terms of China's fragmentations of rural environmental governance, some scholars pointed out that holistic governance theory can guide the transformation of rural environmental governance mode, to forge a new path in the four dimensions of goal, organization, market, and society (Zheng & Chen,2022).

Through the literature search and the above analysis, it is easy to find that the concept of holistic governance is being or will be applied in some fields. Whether it is the initial local application of the concept in Western countries or the ongoing exploration of holistic governance in various fields in China, it is undoubtedly an innovative idea to adapt to the development of the times and improve the efficiency of governance.

At the same time, the concept of holistic governance fully emphasizes the concepts of networked governance, interdepartmental communication, collaborative governance, coordination and sharing, and integration of authority and responsibility. As Perry Hicks pointed out in Holistic Government, holistic governance involves government agencies achieving effective integration and coordination through full communication and cooperation, consistent and continuous policy objectives, and mutually reinforcing policy implementation means to achieve the goal of cooperation (Ye,2012). Holistic theory turns the fragmented model into organic unity and achieves centralized management, systematic governance, and holistic development in continuous coordination and integration.

Some scholars conclude that the holistic theory is based on the needs of citizens as the governance orientation, information technology as the governance means, and coordination and integration responsibility as the governance mechanism. The river basin is a regional combination based on the premise and foundation of water. It is a life community of human beings with mountains, rivers, forests, fields, lakes, grasslands, and sand in a certain time and space range. It is also a complex of various natural factors and interest relations, with distinct systematisms (Qin, 2021). It is easy to see that the core view of

coordination and cooperation in the theory of holistic governance is highly compatible with the natural feature of systemic watershed ecological environment management and has strong matching applicability.

3.0 RESEARCH METHOD

This section discusses the details of the methodology of the research. This research is a case study of the systemic management of the Lijiang River Basin. Based on China's domestic holistic governance practice in various fields, it is deduced that the holistic theory can be applied practically and feasibly to improve the governance efficiency of the current society. As various ecological environmental elements interact, the watershed system is an interrelated and interdependent network. The main purpose of the holistic theory is to guide the coordination and integration of fragmented problems. Coordination is a process of communication, sharing information, and forming consensus among various elements. Consolidation, on the other hand, is the integration of various elements through 'coordination' to eliminate contradictions, solve problems, reach consensus, and form a unified goal.

As for the Lijiang River Basin, policy elements such as systematic planning of policies and plans, authority and responsibility elements such as cooperation among administrative departments, and ecological environmental protection elements such as reconciliation and resolution of conflicts of interest among environmental protection rights and interests, need to be coordinated and integrated through the holistic theory. In this research, the holistic governance theory is strategized to propose possible improvements for ecological environmental protection in the Lijiang River basin from policy, authority, and responsibility, and finally, ecological environmental protection elements.

3.1 Sampling description

Generally, the samples of this research were divided into 3 groups as illustrated in Table 1. Firstly, personnel from administrative law enforcement and judicial departments. In particular, the law enforcement officers of the Comprehensive Law Enforcement Sub-bureau of Guilin Lijiang River Scenic Area are responsible for guiding, coordinating, and supervising the Lijiang River Basin to carry out the ecological environmental protection and comprehensive management work of the Lijiang River Basin and other operational work. On the other hand, the judges of the People's Court for Ecological Environmental Protection of the Lijiang River Basin in Guilin also meet the research needs of this research. The officers of government departments were contacted as survey samples. There was a total of 65 officers, including57 law enforcement officers and 8 court officers. 18 of them were selected through simple random sampling to participate in this research.

Secondly, experts from universities located along the Lijiang River were selected. Those with doctoral degrees or senior titles specializing in environmental resources and protection law, administrative law, and administrative management were prioritised for the selection. Ecological environmental protection requires professional and scientific advice for policymaking from a professional point of view, so the sample was targeted at universities and research institutes in the cities where the Lijiang River Basin is located. Subsequent trips were made to the Faculty of Law and the Faculty of Management at the universities located in the Lijiang River Basin to explain the research and meet the experts. In the two universities located in the Lijiang River Basin, 46 experts were specializing in management. Apart from that, 84 experts specialized in law, making up a total of 130 people. Out of the total, 36 of them were selected through simple random sampling to participate in this research.

Thirdly, the sample included the public, mainly university students majoring in law and management in the Lijiang River region and villagers living along the Lijiang River basin. The sample of university students was selected from the students supervised by the aforementioned experts, who had similar research interests. Out of the 4 clusters, one of the clusters which was made up of 50 management and law students were selected as the samples of the third group.

In addition, the villagers along the Lijiang River were also selected as they were more versed in the development of the Lijiang River. The local villagers were contacted through the head of the village. According to the head of the village, there were 60 permanent villagers, living in the upper stream of the Lijiang River, in Gongping Township, Lingchuan County, Guilin City. 16 of them were selected using a simple random sampling method to participate in this research. In terms of the number of samples selected, the public is the biggest beneficiary in ecological environmental protection, hence yields the largest sample size. The improvement and construction of an ecological environment not only require the guidance of the government but also require the public to become the promoters and supporters of ecological environmental protection.

Table 1. Respondents of the research

Respondents	Frequency
Personnel from administrative law enforcement and judicial departments	18
Experts	36
Public: University students	50
Public: Villagers	16

3.2 Research instrument

The questionnaire used in this research was adapted from He et al. (2021). The Cronbach alpha coefficient of the reliability test of the questionnaire was 0.973, indicating its credibility. The result of the credibility test was satisfactory, affirming the questionnaire's suitability for further data analysis. In particular, the questionnaire includes the demographic profiles of the respondents and the three main parts as stated below. Part 1 investigates the respondents' understanding of the Lijiang River environmental protection-related policy planning. It includes three items on policy elements: naming duly revision of relevant protection legislation, economic and ecological convergence planning, and upstream and downstream planning of the Lijiang River basin. As for each item, the feedback is elicited in four levels of ratings, namely good understanding, fair understanding, poor understanding, and no understanding.

Part 2 explores the current phenomenon of enforcement powers and responsibilities. The first item assesses respondents' awareness on the existence of fragmentation of authority and responsibility, with ratings categorized as aware, unaware, and neutral. The second item surveys the respondents' feedback relating to the three aspects: fragmentation of authority and responsibility, insufficient synergy in administrative law enforcement, and insufficient coordination between law enforcement and judicial departments. The frequency of agreement is calculated for each of these three aspects.

Part 3 investigates respondents' attitudes towards ecological environmental protection. The first item elicits feedback about the public attitude towards ecological compensation standard, categorised into four ratings: very important, important, slightly important, and neutral. On the other hand, the second item aims to investigate the public attitude towards the relationship between economic and ecological development. The rating comprises economy as slightly more important than ecology, ecology as slightly more important than economy, both economy and ecology are equally important, and others.

To explore the holistic governance perspective of more effective management of the Lijiang River Basin, expert interviews and a meta-analysis of articles are conducted. Five experts were interviewed concerning policy elements and elements of authority and responsibility, and their suggestions were elicited. Additionally, a meta-analysis of articles was conducted to explore the ecological environmental protection element, referencing three articles.

In particular, the interview questions about policy elements are illustrated below.

Item 1: What is unique about river basin governance?

Item 2: Given the uniqueness, how can we plan the ecological management of the Lijiang River Basin from the perspective of policies and regulations?

Consequently, the interview question about authority and responsibility element is shown below.

Item 3: The governance of the Lijiang River involves multiple parties with conflicting and cooperative relationships. How can the governance network be effectively operated?

Apart from that, a meta-analysis of ecological environmental protection elements is summarized in Table 2.

Table 2. Literature analysis from the perspective of ecological compensation

Stage	Aspect	Article Reference	Idea
Before the process of ecological compensation	Source of funds	1. Research on establishing and perfecting ecological compensation mechanism in Lijiang River Basin (Zhang, 2020) 2. Study on the legal system of ecological compensation in Lijiang River basin (Qin, 2020)	1. Financial funds 2. Regular special funds
During the process of ecological compensation	Compensation mode	1. Research on establishing and perfecting ecological compensation mechanism in Lijiang River Basin (Zhang, 2020) 2. Study on the legal system of ecological compensation in Lijiang River basin (Qin, 2020)	1. Compensation funds shall be paid directly to the compensator 2. Provide the compensated party with advanced technology, equipment, or preferential policies
After the process of ecological compensation	Regulatory measures	1. Study on the legal system of ecological compensation in Lijiang River basin (Qin, 2020) 2. The realistic dilemma and optimization path of the horizontal ecological compensation mechanism in the Lijiang River Basin (Song, 2023)	1. Establish a special management organization for ecological compensation in the Li River Basin 2. Establish a platform for information sharing and work management of horizontal ecological compensation in the Lijiang River basin

3.3 Data collection method

The questionnaire was distributed from June 2022 to September 2022, to the university students, experts, personnel of administrative law enforcement and judicial departments, and the villagers. The 'Questionnaire Star' online data platform facilitated the questionnaire process. This data collection process took about 4 months and focused on aspects including policy planning, sectoral operational cooperation, ecological compensation, and sustainable development of the Lijiang River Basin.

As for the Administrative Law Enforcement and Judicial Judges, the researchers sent letters to the relevant departments, and contacted, and approached the officers for the data collection process. Both parties agreed on the time to meet, further discussed the research conducted through talks, and administered the online questionnaire to the selected respondents. The respondents answered the online questionnaire, and the feedback was collected. Apart from that, the interview was conducted with five experts. At the same time, they were invited to fill in the online questionnaire. Their feedback was then collected.

Experts from universities, specializing in environmental resources and protection law, administrative law, and administrative management, were briefed about the survey's purpose before answering the online questionnaire. They then answered an online questionnaire and submitted their feedback.

University students, majoring in law and management, were gathered during an evening lecture, and a cluster was selected for the survey. Selected respondents were briefed about the survey's purpose before filling in the online questionnaire. Then, they filled in the online questionnaire and submitted their feedback.

Researchers visited people along the Lijiang River during the weekend, contacted the head of the local villages, and, through conversation, were led to the villager's homes to administer the questionnaire. They were briefed and informed of the way to answer the questionnaire. The questionnaire was then collected by the researchers.

A total of 160 questionnaires were sent out, either online or physically, and 137 questionnaires (85.6% of the total number of questionnaires) were returned. Out of the 137 questionnaires received, 120 (87.6% of the total number of returned questionnaires) were valid and used for further analysis, meeting the needs of the study.

3.4 Data analysis method

The data were analysed by using SPSS version 26. Descriptive statistics including frequency, mean and percentage were used to determine the respondents' understanding of Lijiang River environmental protection-related policy, their perception of current existence of authority enforcement powers and responsibilities of the phenomenon, and their attitudes towards the ecological environmental protection.

4.0 FINDING

The findings were divided into two sections. The first section presented the survey results on policy planning, departmental collaborative governance, and sustainable development at the Lijiang River Basin. The second section elaborated on the holistic governance perspective for more effective governance of the Lijiang River Basin, based on expert interviews and literature analysis.

4.1 Holistic governance perspective through survey

Demographic profiles of survey respondents, as outlined in Table 3, encompassed gender, age group, and highest education status. Among the 120 respondents, there were 63 male respondents compared to 57 female respondents. The distribution of the respondents based on age group showed that there were 58 respondents (48.3%) aged between 18 and 25 years old, 39 respondents (32.5%) were between 26 and 40 years old, 11 respondents (9.2%) aged between 41 and 60 years old and 12 respondents (10.0%) were more than 60 years old. In terms of the highest education status, out of the total respondents, 12 held secondary school qualifications, 58 had a bachelor's degree, 24 had a master's degree, and 26 had attained a Doctor of Philosophy (PhD).

As for the policy elements, the descriptive statistics were shown through the frequencies and percentages (refer to Table 4). In terms of duly revision of relevant protective legislation, out of a total of 120 respondents, the majority 53.33% (n=64) rated poor understanding, while 34.17% (n=41) rated fair understanding. Only 7.50% (n=9) rated no understanding and 5% (n=6) rated good understanding.

Table 3. Demographic profiles of the respondents

Demographic		Frequency	Percent	Cumulative Percent
Gender	Male	63	52.5%	52.5%
	Female	57	47.5%	100%
Age Group	18-25	58	48.3%	48.3%
	26-40	39	32.5%	80.8%
	41-60	11	9.2%	90%
	61+	12	10%	100%
Highest Education Status	Secondary School	12	10%	10%
	Bachelor Degree	58	48.3%	58.3%
	Master Degree	24	20%	78.3%
	Doctor of Philosophy (PhD)	26	21.7%	100%

Table 4. Policy elements

Item	Rating	Frequency	Percentage
Duly revision of relevant protective legislation	Good understanding	6	5.00%
	Fair understanding	41	34.17%
	Poor understanding	64	53.33%
	No understanding	9	7.50%
Economic and ecological convergence planning	Good understanding	21	17.50%
	Fair understanding	59	49.16%
	Poor understanding	28	23.30%
	No understanding	12	10.00%
Upstream and downstream planning for the Lijiang River basin	Good understanding	14	11.67%
	Fair understanding	43	35.83%
	Poor understanding	55	45.83%
	No understanding	8	6.66%

In terms of economic and ecological convergence planning, 49.16% (n=59) responded that they had a fair understanding and 23.30% (n=28) had a poor understanding, with these two ratings being the most dominant. Apart from that, 17.50% (n=21) rated good understanding, and 10% (n=12) rated no understanding. In terms of upstream and downstream planning for the Lijiang River Basin, 45.83% (n=55) rated poor understanding and 35.83% (n=43) with fair understanding, with these two ratings being the majority. 11.67% (n=14) rated good understanding and 6.66% (n=8) rated no understanding.

With regards to authority and responsibility elements, Tables 5 and 6 show the feedback of the respondents in frequencies and percentages. Firstly, the respondents' opinion on the issue of whether there is fragmentation of authority and responsibility of government was analysed. 75.83% (n=91) were aware, 9.16% (n=11) not aware and 15.00% (n=18) expressed neutrality.

Table 5. Authority and responsibility elements (N=120)

Item	Rating	Frequency	Percentage
Existence of fragmentation of authority and responsibility	Aware	91	75.83%
	Not aware	11	9.16%
	Neutral	18	15.00%

Consequently, in-depth results were obtained from 91 respondents who rated "aware" of the existence of fragmentation of authority and responsibility. Among the reasons for the fragmentation of authority and responsibility, 90.10% (n=82) of the respondents believed that it was because of the incomplete information sharing and communication channels between departments. Additionally, 85.71% (n=78) believed that it was because their development interests neglected the overall interests and 75.8% (n=69) believed that it was due to the discontinuity of the jurisdiction in the environmental protection inspection.

Table 6. Authority and responsibility elements (N=91)

Variable	Item	Frequency of Agreement	Percentage
Fragmentation of authority and responsibility exists	Information-sharing and communication channels between functional departments are not fully established	82	90.10%
	Local law enforcement ignores the overall interest due to its development interests	78	85.71%
	Discontinuity in the jurisdiction of the environmental protection inspection	69	75.80%
Insufficient synergy in	Lack of clarity in the provision of enforcement powers and the existence of overlapping competencies	84	92.30%

administrative law enforcement	Underutilization of interdepartmental communication and sharing channels	79	86.80%
	Inadequate capacity for multidimensional intersectoral coordination	76	83.50%
	Inadequacies of the law enforcement team	68	74.70%
Insufficient synergy between law enforcement and the judiciary	Lack of clarity in the definition of protection obligations between departments	77	84.60%
	Weak integration of planning and management between the administrative executive and judicial departments	71	78.02%
	Lack of interdepartmental awareness of synergistic protection	65	71.42%

As for the survey on the reasons for the lack of synergy in the field of administrative law enforcement, 92.30% (n=84) of the respondents believed that it was due to unclear provisions on law enforcement powers and the existence of overlapping competencies, 86.80% (n=79) believed that it was due to the underutilization of interdepartmental communication and sharing channels, 83.50% (n=76) believed that it was due to the lack of multidimensional intersectoral coordination, and 74.7% (n=68) of the respondents attributed it to the inadequacies within the law enforcement team.

With regards to the survey on the reasons for the lack of synergy between law enforcement and judicial departments, 84.60% (n=77) of the respondents believed that it was caused by the unclear definition of the protection obligations between departments, 78.02% (n=71) believed that it was caused by the weak integration of planning and management between the administrative executive and judicial departments, and 71.42% (n=65) believed that it was caused by a lack of awareness of synergistic protection between the departments.

Table 7. Ecological environmental protection elements

Item	Rating	Frequency	Percentage
Public attitudes towards ecological compensation standards	Very important	42	35.00%
	Important	33	27.50%
	Slightly important	29	24.16%
	Neutral	16	13.33%
Public attitudes toward the relationship between economic and ecological development	The economy is slightly more important than the ecology	25	20.83%
	Ecology is slightly more important than the economy	24	20.00%
	The economy and ecology are equally important	67	55.83%
	Other	4	3.30%

Concerning the ecological environmental protection elements, Table 7 shows the feedback of the respondents in frequencies and percentages. In terms of the public's attitude towards ecological compensation standards, 35% (n=42) rated it very important, 27.50% (n=33) rated it important, 24.16% (n=29) rated it slightly important and 13.33% (n=16) rated neutral.

In terms of the public's attitude towards the relationship between economic and ecological development, the majority (55.83%) believed that both are equally important, and those who perceived that the economy is slightly more important account for 20.83% (n=25) and those who believed the ecology is slightly more important account for 20.00% (n=24).

4.2 Holistic governance perspective based on expert interviews and literature analysis

Policy elements

Item 1: What is unique about river basin governance?

Out of a total of five interviewees, three-quarters of the interviewees had similar views. First is the concept of integrity. The basin contains various ecological elements such as mountains, rivers, forests, fields, lakes, grass, and sand. The basin's natural ecology is characterized by integrity, systematization, and internal laws. The second opinion centers on synergy. Watersheds often involve different administrative jurisdictions, but their boundaries are different from the division of traditional administrative regions, involving the upper and lower reaches of the river, the left and right banks, and the surrounding areas. Therefore, this unique geographical arrangement can lead to fragmented governance. The third viewpoint is about complexity. The river basin is a complex region composed of natural geography and economic and social development. The river basin ecosystem is the material basis for human survival and development and regional economic sustainable development.

Item 2: Given the uniqueness, how can we plan the ecological management of the Lijiang River Basin from the perspective of policies and regulations?

All five interviewees believed that the government has implemented ecological management continuously through the "Li River Ecological Protection and Restoration and Enhancement Project Program (2019-2025)" (hereinafter referred to as the "Project Program"). The Project Program includes six major projects: Li River ecological protection, Li River ecological restoration, urban ecological enhancement, industrial ecological enhancement, Li River ecological protection and restoration and enhancement of key support. These systematically promote the ecological management of Lijiang River. The Ecological Environmental Protection of the Lijiang River Basin of Guangxi Zhuang Autonomous Region should be revised in a timely manner. The Master Plan for Ecological Protection of the Li River Basin in Guilin (2022-2035) to be issued by the Guilin Municipal Government, along with policies and regulations such as the 'Guilin Lijiang River Scenic Area Master Plan (2013-2025)', serves to achieve the three-level policy guarantee of autonomous regions, Guilin City, and scenic spots. It helps to coordinate the overall planning of Guilin City and the overall planning of relevant townships along the river, aligning water conservancy, forestry, land, and scenic area construction.

Authority and responsibility elements

Item 3: The governance of the Lijiang River involves multiple parties with conflicting and cooperative relationships. How can the governance network be effectively operated?

Four out of five interviewees shared the same viewpoint. In the process of ecological management of the Lijiang River Basin, government agencies, social organizations, enterprise departments, industry organizations, and the public have an impact on the evaluation, formulation, and implementation of policies. The government can improve the efficiency of governance only by forming a joint force with other parties in the governance network. Specifically, the government should transfer power to other governance networks, especially strengthen the voice of the party in the weak position of the governance network and promote the balanced interaction of the governance network. For example, the policy roundtable will openly and transparently publicize the issues, engaging enterprise organizations and the public with a particular focus on coastal people and tourists. Experts and scholars in the field of ecological environmental protection will ensure the right to information, the right to provide suggestions and the right to oversee the main party of the governance network. Each party of the governance network has different views on the same policy and can give full feedback on the implementation of the policy, such as whether there are problems in the implementation of the policy that are not realized when the policy is formulated, whether there are deviations in the implementation of the policy, and whether the implementation of the policy is ineffective.

A mechanism of government subsidies and market-based ecological compensation should be established. The scope of ecological governance rights and responsibilities should be standardized at the legal level, and a supervisory and evaluation mechanism should be established to ensure the implementation of ecological law enforcement responsibilities and the healthy operation of law enforcement. The compensation mechanism of ecological beneficiaries to ecological protectors should be explored accordingly. For example, the extraction of ecological compensation funds from the entrance tickets, and

other scenic spots and their use to provide ecological compensation and livelihood subsidies. The other suggestions encompass strengthening the construction of a corporate environmental responsibility system, managing and restricting through self-regulation and legal regulation, and setting up a green production research and development fund in a diversified way involving government, enterprise, and finance, to promote intelligent, green and high-end production methods.

The use of an "intelligent platform" can effectively monitor ecological resources, habitat, and biodiversity in a comprehensive manner, and set up red lines to warn other departments early. In this way, relevant departments can communicate promptly, share data, and strengthen their ability to collaborate, identify problems, and make powerful decisions without wasting resources. For example, the Qixing district procuratorate launched the Li River judicial protection big data linkage platform, which is an innovative initiative to achieve visibility in the field of prosecution. In conclusion, it may also be appropriate to actively promote the use of such big data platforms from the core area to the whole basin in the future.

4.3 The narrative framework of interview findings

In summary, the narrative framework of interview findings is shown in Figure 1. The collaborative governance of the Lijiang River Basin is divided into two elements: policy element and authority as well as responsibility element. As for the policy element, the policy system planning encompasses unique governance features and policy measures. The comprehensive management of ecological environment protection in the Lijiang River Basin needs to be systematically planned. The unique river basin governance includes three features. First is integrity. The basin contains various ecological components. The second is synergy. Watersheds often involve different administrative jurisdictions. The third is compound. The river basin is a complex region consisting of natural geography, economic and social development.

Concerning policy measures, the government should continue to implement the Guilin Lijiang River Ecological Protection and Restoration Improvement Project (2019-2025). The ecological management of the Lijiang River is systematically promoted through the 'six major projects' entailing comprehensive management, ecological protection and restoration, industrial upgrading and so on. Besides, the government should implement the three-level policies of autonomous regions, prefecture-level cities, and scenic spots. Apart from that, the government should timely revise the Guangxi Zhuang Autonomous Region Lijiang River Basin Ecological Environment Protection Regulation, promptly publish the Master Plan for Ecological Protection of the Li River Basin in Guilin (2022-2035) and align it with policies and regulations such as the Guilin Lijiang River Scenic Area Master Plan (2013-2025).

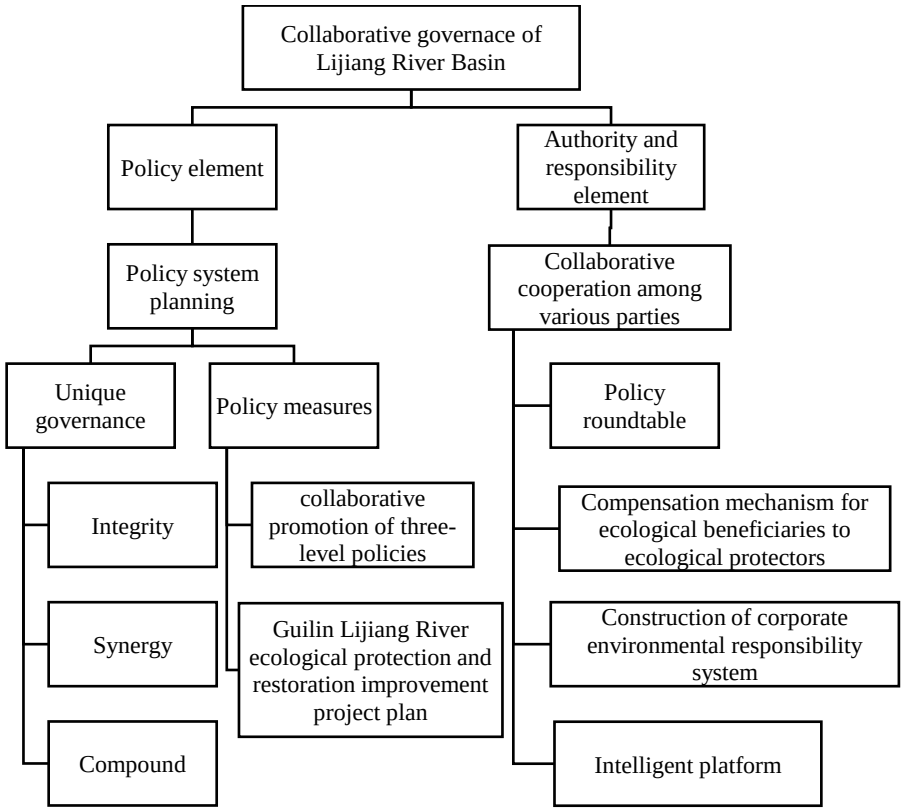

Fig. 1. Narrative framework of interview findings

Concerning the authority and responsibility element, the various parties should work together to promote the ecological management of the Lijiang River Basin. Firstly, the policy roundtable, wherein the government transfers the power to other governance networks to ensure the right to know, the right to make suggestions and the right to supervise the main party of the governance network and promotes the balanced interaction of the governance network. Secondly, the compensation mechanism between ecological beneficiaries and ecological protectors can be established by standardizing authorities and responsibilities and strengthening supervision and evaluation. Further, the ecological beneficiaries may extract some legal benefits to compensate ecological protectors. Thirdly, the construction of a corporate environmental responsibility system. This can be done through management and restraint in the form of self-regulation and legal regulation and setting up green production R & D funds in diversified ways such as among government, enterprise, and finance institutions. Fourthly, an intelligent platform, can be developed through comprehensive dynamic monitoring of ecological resources, living environment, biodiversity, the establishment of early warning red lines, timely collaboration and communication between departments and data sharing.

4.4 Ecological Environmental Protection Elements

Based on a meta-analysis, of a total of three articles, two express similar perspectives. Taking the coordinated promotion of economic development and ecological protection in the Lijiang River basin as the starting point, the government actively strives for financial support from the central government and Guangxi and incorporates the ecological forest area and water resources protection area in the national project database and sets up special funds. The compensation model of blood transfusion is adopted, combined with the characteristics of economic development in the Lijiang River basin and the local area, and the government takes the lead to actively introduce market means and engage multiple suppliers of

social forces. The government can make good use of government funds and special funds, vigorously develop ecological agricultural production, ecological cultural and tourism industries, and energy conservation and environmental protection industries to promote the ecological transformation of resource-based industries and the popularization of green industrial technologies in the Lijiang River Basin.

Accordingly, the two articles also share similar viewpoints: a special management organization for ecological compensation in the Lijiang River basin, an information sharing and work management platform for ecological compensation in the Lijiang River basin are established to strengthen upstream and downstream, internal, and external coordination, as well as the source and management of funds, and monitoring and management of the water ecological environment in the basin. This action serves to ensure the reasonable operation of ecological compensation in the Lijiang River basin.

5.0 CONCLUSION AND DISCUSSION

Under the guidance of the holistic theory, this study investigated the current scenario of policy planning, cooperation between administrative departments, and environmental protection rights in the Lijiang River Basin through the administration of a questionnaire, expert interviews, and literature analysis. The following viewpoints were proposed concerning the holistic protection and governance of the ecological environment in the Lijiang River Basin.

In conclusion, to systematically plan the comprehensive management and restoration of ecological and environmental protection in the Lijiang River Basin, the government must adhere to green development as the core driving force, strengthen the public, systematic, dynamic, and sustainable nature of the policies, and pay attention to standardizing the comprehensive management system of the Lijiang River, rational allocation and utilization of water resources, and coordinated management, development and protection of the Lijiang River.

The government should build an effective communication and collaboration platform for the government, enterprises, social organizations, experts and scholars and the public, and promote the establishment of a collaborative and co-governance mechanism for diverse subjects with clear rights and responsibilities, avoid conflicts of interest among diverse subjects, gather consensus and improve comprehensive governance capacity.

Environmental protection in the Lijiang River Basin involves not only the preservation of water ecology and the natural environment of water resources but also multiple factors such as tourism development and economic development in the river basin. It promotes governance and regional development, ecological protection and resource exploitation and utilization, environmental protection, and economic and social operation in the way of coordination, benefit sharing, and risk sharing.

Concerning policy elements, the Lijiang River basin is rich in tourism resources, and the economic income of the villagers in the rural areas of the basin is greatly affected by the environmental protection and tourism development of the Lijiang River. Therefore, Rural governance in the Lijiang River basin should be closely aligned with the concept of "integrated protection and restoration", and rural development, tourism development, environmental protection, and human settlement ecology should be promoted in concert.

The sustainable development of the villages in the Lijiang River basin is closely related to the ecological environment protection of the river. Based on the rural revitalization strategy, it is necessary to accelerate the implementation of rural construction actions, utilize holistic governance thinking, and strengthen holistic governance models and governance mechanisms.

With regards to authority and responsibility elements, the Lijiang 5G big data platform should avoid departmental protectionism, standardize the division of co-construction and sharing rights and responsibilities between departments, update relevant data promptly, open up data barriers, and do a good job in information coordination between various departments.

Li and Gu (2021) pointed out that other regions also face the dilemma of fragmented governance information. For example, since all administrative regions and governments at all levels have information platforms, there is a horizontal and vertical intersection, and a lot of time and money are consumed due to daily construction and operation. The mastery of information and data determines the reshaping of the power structure, which not only reduces the utilization rate of resources on the surface but also creates hidden dangers in the division of power among various departments.

Concerning the ecological environmental protection elements, to develop the tourism real economy, it is necessary to establish an effective management mechanism and coordinate the conflicts between economic development and environmental protection. In recent years, the west bank of the Lijiang River in Guilin City Qixing District Zhujiang village, has had beautiful scenery, attracting many tourists to visit and play, Yushan Bridge to Nanzhou Bridge a section of the riverbank, Lingchuan County Dawei Town South village and Youma Beach and other river basins have become popular local camping sites. The problems caused by disorderly management, such as littering, open-air barbecue, incomplete cleaning of abandoned aquaculture cages, and random access of motor vehicles to the beach, have seriously affected the natural landscape of the Lijiang River and the ecological environment along the coast.

In response to the above problems, the relevant departments have taken improvement measures. First, a barbecue area was set up at the edge of a swimming pool away from the Li River. Staff patrol from time to time to clean up litter left by campers. Second, collect management fees from the public, and hire cleaning personnel from the surrounding countryside to clean the beaches in time. Third, listen to the views and suggestions of tourists, through the addition of public toilets, garbage collection equipment, indicator ICONS, designated camping sites, etc., to guide everyone to choose camping sites more reasonably and better maintain natural features. At present, from the legal point of view, there is still a lack of specific protection and management regulations on the shoreline of the Lijiang River Island, especially the systematic regulations on environmental protection for the development of minority tourism areas.

Fu (2023) pointed out that relevant government departments have forcibly protected the pristine green landscape along the banks of the river basin, while local villagers have planted many crops in pursuit of economic benefits, thus destroying the green tones of the idyllic scenery on both sides of the river, which conflicts with the balance of government and public interests.

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8.0 CONFLICT OF INTEREST STATEMENT

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9.0 CONTRIBUTION OF AUTHORS

All authors made significant contributions to this article. All authors contributed to the design of the research, the questionnaire, the interview, and the write-up.

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