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The Implementation Path of Government's Responsibility on Local Water Pollution Control: A Case Study of Typical Karst Areas in Guizhou†

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Abstract

This article reviews the characteristics of water environment resources, water pollution situation, government governance methods, and governance effects in typical karst areas of Guizhou Province. Through the government's governance measures and problems in the process of water pollution control, it analyzes the problems of laws and regulations, government concepts, and environmental accountability mechanisms in various government departments in karst areas, and proposes corresponding countermeasures, this will enable local governments to better fulfill their environmental responsibilities.

Keywords: Guizhou Province, Karst areas, Water pollution control, Government responsibility, Water pollution

Introduction

During the literature review process, it was found that research on water pollution control mostly focused on relatively local aspects such as water pollution control technology, water environment management system, and cross-border water pollution joint governance, lacking comprehensive analysis and exploration from the perspective of the government. Dmdsa et al. (2020) argue that it is necessary to develop a Water Resources Policy (PNRH) and corresponding water resource management tools. The research on water pollution and water environment in karst geomorphic areas focuses on the distribution of pollution sources, water resource management, water quality evaluation and prediction, which was written earlier and lacks guidance on water pollution control in specific areas. Takić et al. (2017) proposed that according to the European Union Water Framework Directive (WFDEU), the actual problem of water ecosystem pollution requires ecological classification. In maintaining the balance of regional ecosystems, the water environment in Guizhou Province plays a crucial role, and the construction of water ecological environment has become a top priority in the city's ecological civilization construction work. Li et al. (2022) found that governments can reduce regulatory costs and achieve a win-win situation between economic and environmental performance by increasing public active participation and improving environmental regulatory measures. The Guizhou Provincial Government has done a lot of work in promoting regional water security and improving the regional water environment through a sound institutional framework and a series of effective measures, which has important reference value for future water pollution prevention and control work. Song (2018) believes that the government has achieved significant results in sewage treatment, but there is still a need to continue optimizing countermeasures in promoting economic structure transformation and upgrading, strengthening urban sewage treatment management, and strict water environment management system. Studying how to further implement the government's responsibility for water environment governance in Karst Plateau areas is of great practical significance for accelerating the development and construction process of Guizhou Province.

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Therefore, this paper takes the implementation of government responsibility in water pollution control in Karst Plateau areas of Guizhou Province as the research object. Through questionnaire surveys and interviews, the difficulties in implementing water pollution control policies, as well as strategies and suggestions to address related issues, were explored, continuously improving the government's role in the water pollution control system.

The research mainly focuses on the specific area of karst areas in Guizhou Province and the specific perspective of the government's comprehensive responsibility implementation for water pollution control. The research questions of this article are as follows:

1) What are the characteristics of water resources and pollution in typical karst areas of Guizhou Province?

2) What effective measures should be taken to enable local governments to better fulfill their environmental responsibilities?

Literature analysis

Zhang (2022) conducted a detailed analysis and discussion on emergency response methods and measures for sudden water pollution incidents, in order to control the harmfulness and adverse effects of sudden water pollution, and protect water sources from infringement and pollution. Hou et al. (2022) evaluated the effectiveness of the Water Pollution Prevention and Control Law in eight aspects since its implementation on January 1, 2018. It is proposed to focus on the overall planning of the basin, the improvement of river length assessment, and the improvement of water environment quality, and form a systematic synergy in four aspects: Management system, law enforcement ability, Source water protection, and pollution prevention. Zhu (2022) analyzed traditional cross regional water pollution governance from the perspectives of power and interests. Vadivelu (2017) pointed out that the government's soil and water conservation subsidy intervention policy is one of the key strategies for watershed development. Pan et al. (2022) used the China Environmental Protection Interview (EPI) launched in 2014 as a Natural experiment to assess the short-term and long-term impact of EPI on water pollution. Ren et al. (2022) argue that land use/land cover (LULC) conditions can have a profound impact on the water quality of rivers, lakes, and other water bodies in catchment areas. Nadzir (2017) believes that in terms of regulation, the government has a responsibility to protect people's right to access clean water. However, on the ground, it found that the government did not fully protect people's right to clean water. The government still understands the state's control of water as formulating policies, establishing regulations, and conducting management and supervision.

Research method

Questionnaire method: In this paper, the public was used as the survey target of the questionnaire. By setting questions on the water environment situation in Guizhou Province, water pollution prevention and control, and the specific responsibilities of government departments in water pollution prevention and control, the survey respondents' knowledge and concerns about water pollution prevention and control in the karst area of Guizhou Province were obtained.

Interview method: The interview method refers to the research method of obtaining the interviewees' views, opinions, and experiences on the research questions through face-to-face interviews with interviewers and people related to the research content. The interview survey is mainly to supplement the relevant content that cannot be obtained from the questionnaire survey, which is a very important part of this paper to give the reader a preliminary understanding from which we can know how the local government implements its responsibilities in the process of water pollution control, understand the whole process, and summarize the results achieved.

Questionnaire research sample

The purpose of government governance is for the people, who feel the most genuine and have the most say in the process. The questionnaire focuses on the collection of public opinion in the karst areas of

Guizhou Province. As it is a region-specific survey, the survey sample was drawn from residents of Zunyi, Tongren, Anshun, Bijie, and Liupanshui. The questionnaire was conducted in an online format and distributed from May to August 2022. The questionnaires could be collected at the end of the research. The excel file of the returned sample was exported from the online platform of Questionnaire Star, showing 383 returned samples, excluding 5 invalid questionnaires and 378 valid questionnaires, with a valid questionnaire efficiency rate of 98.7 %.

As this was a targeted questionnaire, the samples came from 5 typical karst areas, namely Zunyi, Tongren, Anshun, Bijie, and Liupanshui. Descriptive statistics of frequencies were conducted through Excel Pivot or SPSS, yielding a sample size for each region.

Interview survey samples

The sample for the interview survey in this paper is the staff of the environmental protection department, who are the implementers of the policy, are aware of the whole process of policy operation, and promote policy design and implementation so that the policy solutions they propose can be promoted and work on a wider scale. Therefore, by conducting interviews with the staff of the environmental protection department, it is possible to obtain first-hand information on the implementation of policies in water pollution management. The Department of Ecology and Environment of Guizhou Province is the administrative body for water pollution management, and by the end of 2021, the number of provincial environmental protection system agencies was 20, with a total of 833 staff at the end of the year. Interviews were conducted with a random sample of five of these people to gain a practical understanding of the details and obstacles encountered in the implementation of water pollution control policies and to obtain the real thoughts of key people in the work of water pollution control

Result

Data collection and analysis

Questionnaires are distributed to survey respondents through an online platform at www.wjx.cn (Questionnaire Star). Questionnaire Star is a professional online questionnaire survey, examination, assessment and polling platform, the platform has online questionnaire design, questionnaire distribution, questionnaire data collection, custom reports, survey results analysis and other functions, with the obvious advantages of fast, easy to use, low cost, widely used by a large number of enterprises and individuals, is the earliest and currently the largest online questionnaire research, examination and polling platform in China. Since its launch in 2006, users have published more than 25.33 million questionnaires and collected more than 1.655 billion responses, maintaining an annual growth rate of more than 100 %. The platform covers more than 90 % of universities and research institutes in China and is the most authoritative questionnaire, examination and polling tool.

Data collection and statistical analysis are conducted using Excel and SPSS tools, i.e. the data obtained is entered into Excel and the data collection samples are coded for statistics.

1) Questionnaire design

According to the distribution of karst areas and the distribution of water environment in Guizhou Province, with reference to the regional population, ethnicity, language and cultural conditions, and with due consideration to the level of regional economic development and the operational accessibility of the questionnaire collection, the citizens of www.wjx.cn, Tongren, Anshun, Bijie and Liupanshui were targeted to distribute the Questionnaire on the Status of Water Pollution and Prevention Work in Guizhou Province.

Due to the geographically diverse distribution of the sample respondents, restrictive conditions were set in the questionnaire items in this paper in order to obtain a suitable sample. Specifically, respondents were asked whether they lived in the region (including Zunyi, Tongren, Anshun, Bijie and Liupanshui). If the answer is ‘No’, the questionnaire will not be completed and you will be returned to the thank you page. If the respondent selects ‘yes’, they can continue to participate in the survey, which will allow us to obtain real and reliable data from the survey sample in the Karst region, and to analyse the different

interpretations of the local government's responsibility for water pollution by people of different ages and with the same level of education.

The questionnaire covers three main sections: Some basic information about the respondent, information about water pollution and the perception of the government's water pollution management.

In terms of the respondents' personal information, it mainly involves information about the respondents' gender, age, educational background and city of residence. There are 4 questions in this part of the questionnaire.

The second part of the questionnaire is about basic information on water pollution. These include: 1) residents' concern about water pollution; 2) awareness of the sources of water pollution; 3) whether their daily lives are affected by water pollution; and 4) the channels through which residents obtain information about water pollution. This part of the questionnaire consists of 6 questions.

The third part of the questionnaire consists of questions related to the government's water pollution control, including 1) the extent to which the government attaches importance to water pollution, 2) the measures taken by the government to control water pollution, 3) whether residents are involved in water pollution control, 4) the ways in which residents are involved in water pollution control, 5) how effective the government is in controlling water pollution, and 6) how residents view the government's role in water pollution control. This part of the questionnaire consists of 9 questions.

Descriptive statistical analysis

In this survey, a total of 383 questionnaires were ultimately collected, excluding 5 invalid questionnaires. There were 378 valid questionnaires, and the effective rate of the valid questionnaire was 98.7 %.

Table 1 Descriptive analysis of the sample (n = 378).

Characteristics	Items	Frequency	Percentage
Gender	Male	126	57.1 %
	Female	162	42.9 %
Age	18 - 25	55	14.6 %
	26 - 35	87	22.2 %
	36 - 45	128	33.9 %
	46 - 55	28	20.6 %
	＞ 55	33	8.7 %
City	Zunyi	99	26.2 %
	Tongren	75	19.8 %
	Anshun	81	21.4 %
	Bijie	64	16.9 %
	Liupanshui	59	15.6 %

Among the 378 people surveyed in this survey, 216 were males, accounting for 57.1 % of the total number of respondents, and 162 were females, accounting for 42.9 % of the total number of respondents.

In terms of age, it can be seen that the main participants in this questionnaire survey are residents aged 26 to 55, who are also the main force of public participation in collaborative water pollution control.

Among them, residents aged 36 to 45 are the most, accounting for 33.9 %, followed by residents aged 26 to 35, accounting for 22.2 %, and people aged 46 to 55, accounting for 20.6 %.

This article is a targeted survey, with samples from prefecture level cities in karst areas of Guizhou Province, including Zunyi, Tongren, Anshun, Bijie, and Liupanshui, all of which are typical karst areas. Among them, 26.2 % of the residents come from Zunyi, 19.8 % from Tongren, 21.4 % from Anshun, 16.9 % from Bijie, and 15.6 % from Liupanshui.

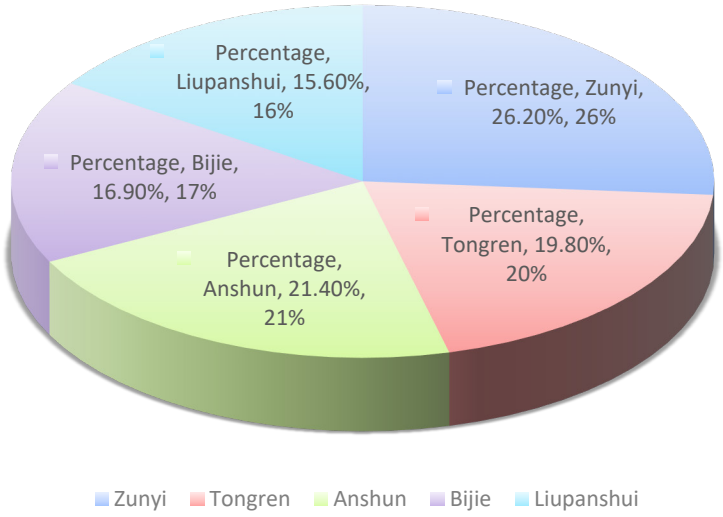

Figure 1 Questionnaire sample area (N = 378).

Cognition of water pollution

Obtain residents' awareness of water pollution through a questionnaire.

Residents' attention to water pollution

Among the residents' concerns about water pollution, 267 people are more concerned, accounting for 70.63 % of the total number; 82 people were particularly concerned, accounting for 21.69 % of the total number, while 29 people expressed no concern, accounting for 7.67 %. This indicates that residents are generally concerned about water pollution.

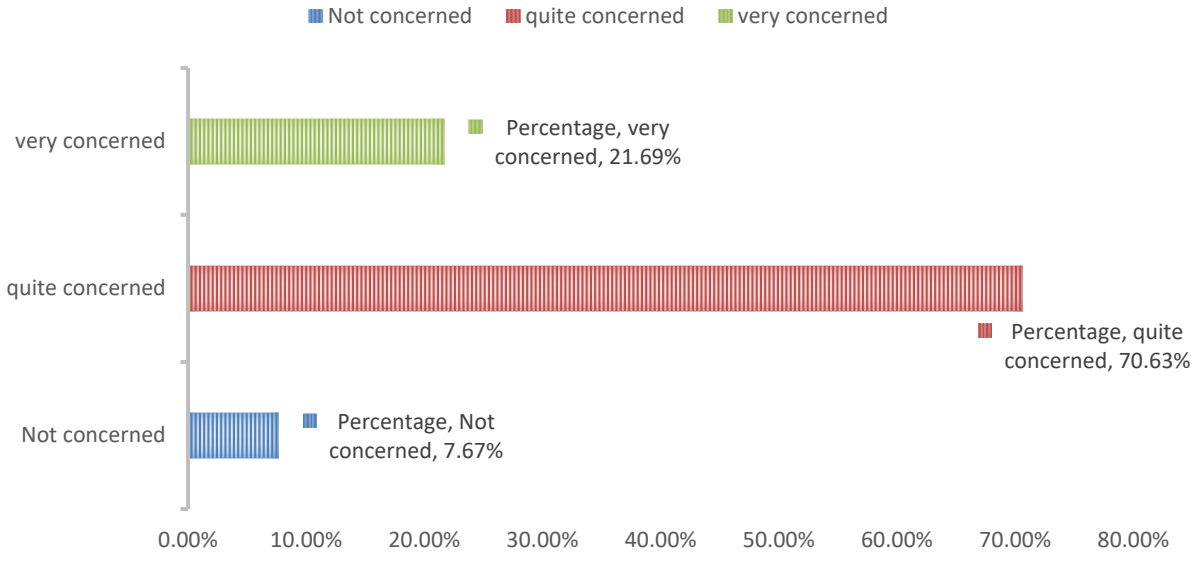

Figure 2 Residents' concern about water pollution (N = 378).

Considering the severity of water pollution in the area

Due to its unique geomorphic structure, karst areas are prone to water pollution while lacking water, making water management difficult. Through a survey of residents from different karst areas, understand their views on the level of water pollution in their area. According to the survey results, nearly half of the residents (179 people) believe that the water pollution in their area is relatively serious, accounting for 47.35 %. 151 people believe that the water pollution in their area is not serious, accounting for 39.95 %. In addition, 12.70 % of the residents believe that the water pollution in their area is very serious.

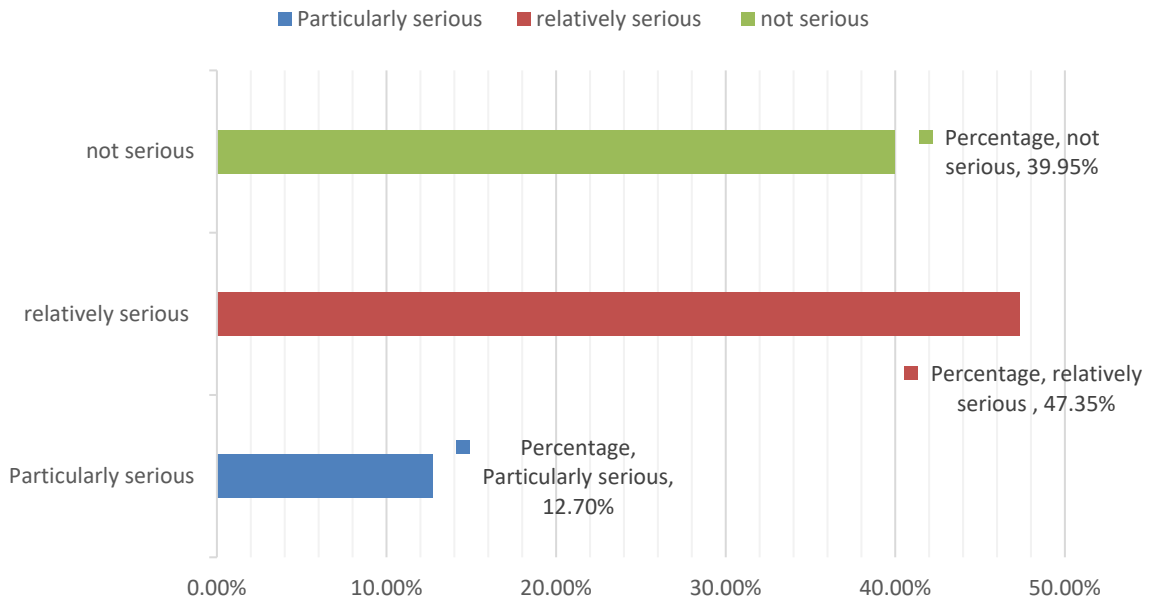

Figure 3 Residents' views on the level of water pollution in their district (N = 378).

Table 2 Views of residents in different locations on the level of local water pollution (N = 378).

Degree of concern	Liupanshui	Bijie	Anshun	Tongren	Zunyi
Particularly serious	0.26 %	0.79 %	3.44 %	3.70 %	4.50 %
Relatively serious	5.56 %	3.70 %	14.29 %	9.52 %	14.29 %
Not serious	9.79%	12.43 %	3.70 %	6.61 %	7.41 %

Further comparative investigations were conducted in the areas where residents are located, and it was found that the residents who believe that water pollution is very serious in the area mainly come from Zunyi, Tongren, and Anshun. Among them, the proportion of respondents from Zunyi is 4.5 %, the proportion of respondents from Tongren is 3.70, and the proportion of respondents from Anshun is 3.44 %. The highest proportion of residents who believe that water pollution is relatively severe also come from these areas. Based on the actual situation, it was found that Zunyi is located in the Wujiang River Basin. Direct discharge of domestic sewage and large-scale cage fish farming have led to pollution of the Wujiang River, extreme decline in water quality, and excessive total phosphorus, which are also the reasons for the ecological decline in the area. As an important production area for precious metals, Tongren faces difficulties in effectively treating the direct discharge of wastewater from a large number of mines. The technology for treating rust water in abandoned mines still needs to be innovated, making the treatment difficult. As a water scarce city, groundwater is the main source of water supply in Anshun City. In recent years, due to the unreasonable discharge of industrial "3 wastes" and urban residents'

domestic sewage and garbage, groundwater in the urban and suburban areas has been polluted to varying degrees. The main sources of pollution are sewage discharge from industries such as living, medical, chemical, pharmaceutical, slaughtering, and food processing, as well as pesticide and fertilizer application in agricultural production, Therefore, the investigation results are consistent with the actual situation.

Source of water pollution

Although the sources of water pollution are diverse, almost everyone believes that they come from industrial wastewater and domestic sewage. Of course, there are also other reasons, such as the impact of upstream rivers, construction waste, and so on.

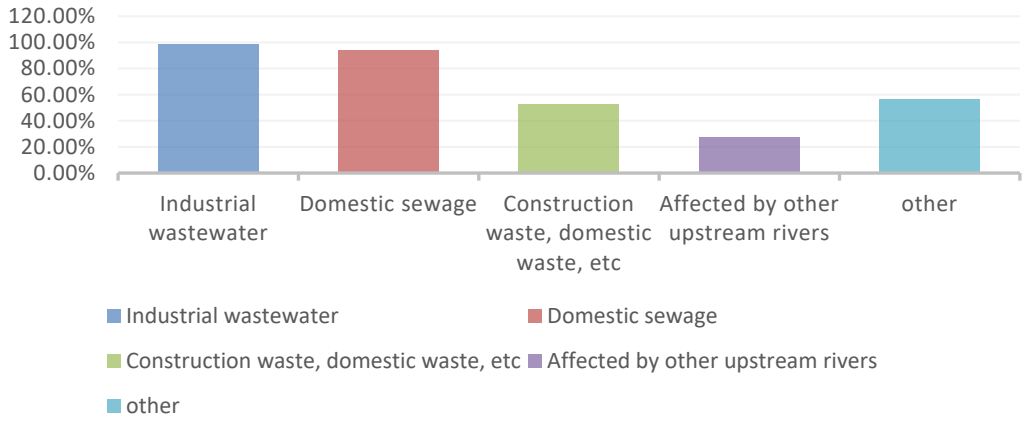

Figure 4 Residents' views on the sources of water pollution (N = 378).

Is daily life affected by water pollution

Almost all of the surveyed people believe that their lives have been more or less affected by water pollution, mainly in terms of living health, production health, physical and mental health, climate conditions, environmental beautification, ecological balance, and other aspects. In the survey on whether residents have been involved in water pollution control, 72.22 % have been involved, but a further 27.78 % have not been involved in control.

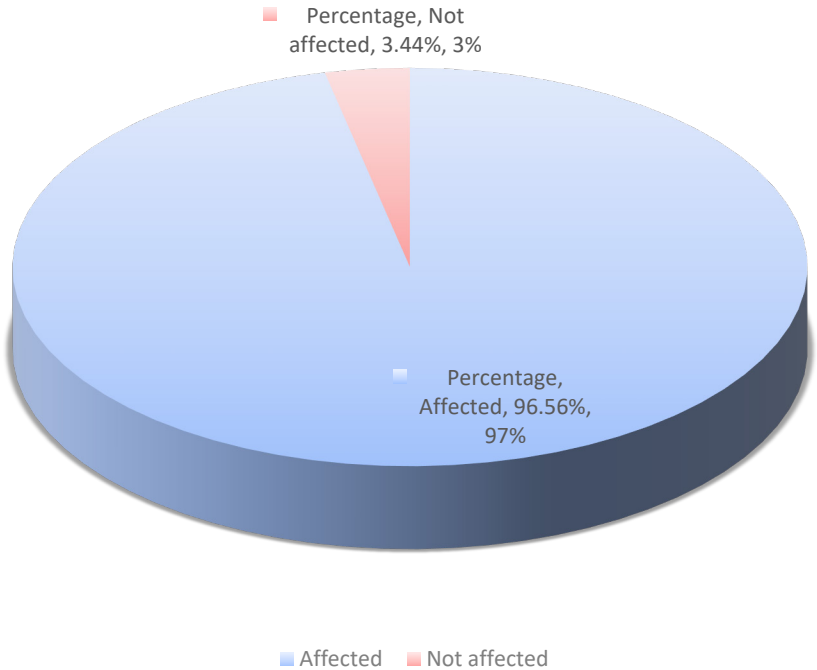

Figure 5 Has your life been affected by water pollution? (N = 378).

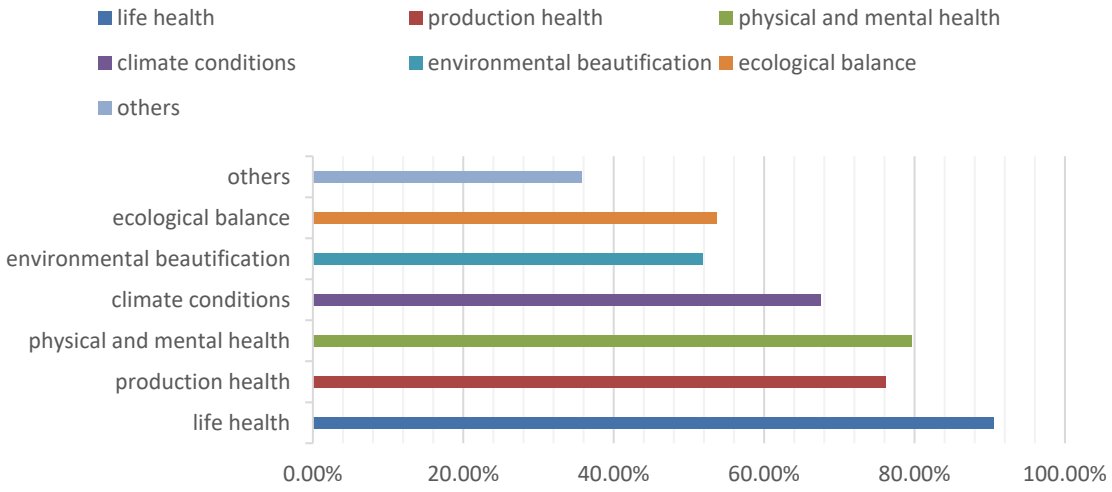

Figure 6 The main aspects affected by water pollution.

Channels for residents to access water pollution information

The channels for obtaining information include newspapers, the internet, radio, colleagues and friends around them, as well as other channels, but everyone's choices are not unique. Among them, 95.24 % chose friends, 91.35 % of people chose the internet, and 61.11 % chose newspapers.

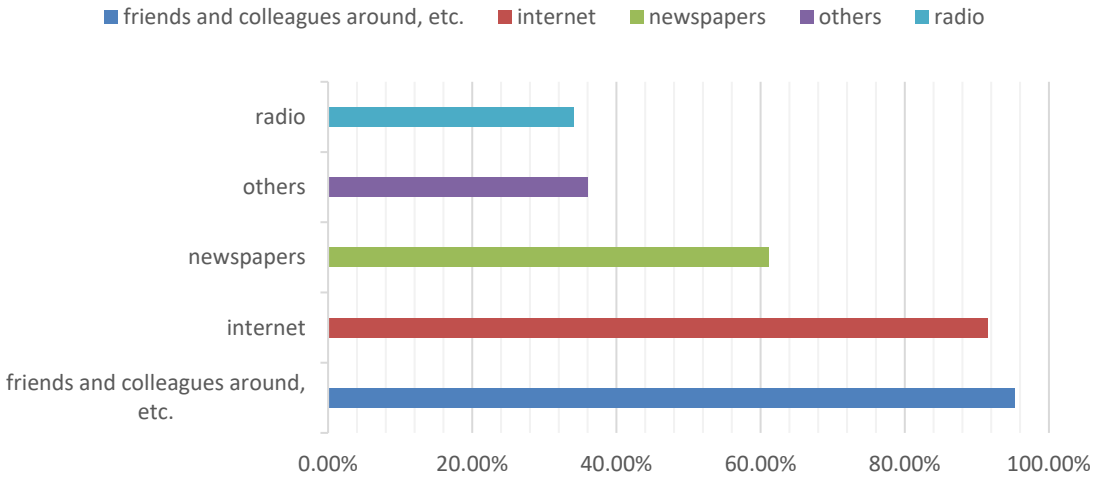

Figure 7 Channels to obtain water pollution information

Understanding of government water pollution control measures

We mainly obtain relevant questions about the government's water pollution control measures through questionnaires, including: the degree of attention the government attaches to water pollution, the measures taken by the government to control water pollution, whether residents have participated in water pollution control, and the ways in which residents participate in water pollution control.

Residents' perception of the government's emphasis on water pollution

Among the surveyed individuals, 132 people believe that the government attaches great importance, accounting for 34.92 %; 106 people consider it average, accounting for 28.04 %; 87 believed that the government attached great importance, accounting for 23.02 %; Only 32 people believe that the government does not attach importance, accounting for 8.47 %; Another 21 people expressed uncertainty, accounting for 5.56 %. Overall, the government attaches great importance to water pollution control.

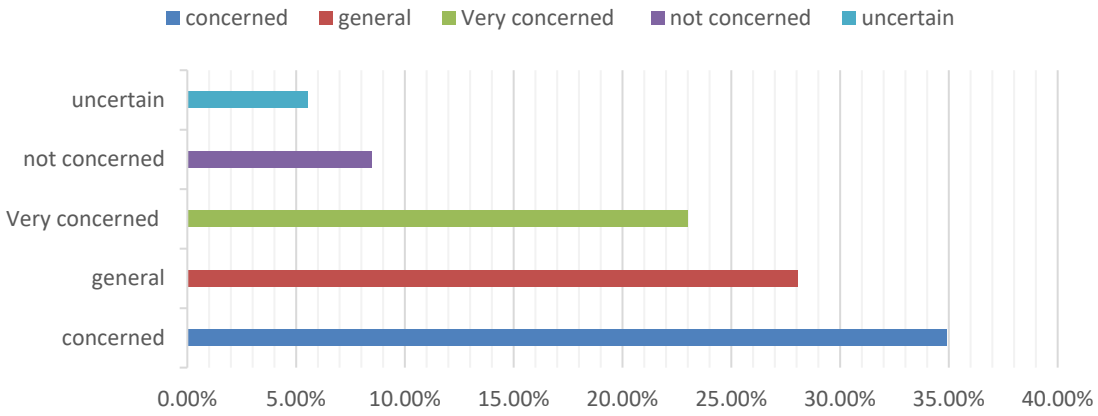

Figure 8 The government's concern about water pollution control.

Measures taken by the government to control water pollution

In terms of the governance policies adopted by the government, residents also provided corresponding responses, mainly focusing on closing key polluting enterprises, improving corresponding laws and regulations, and advocating public participation.

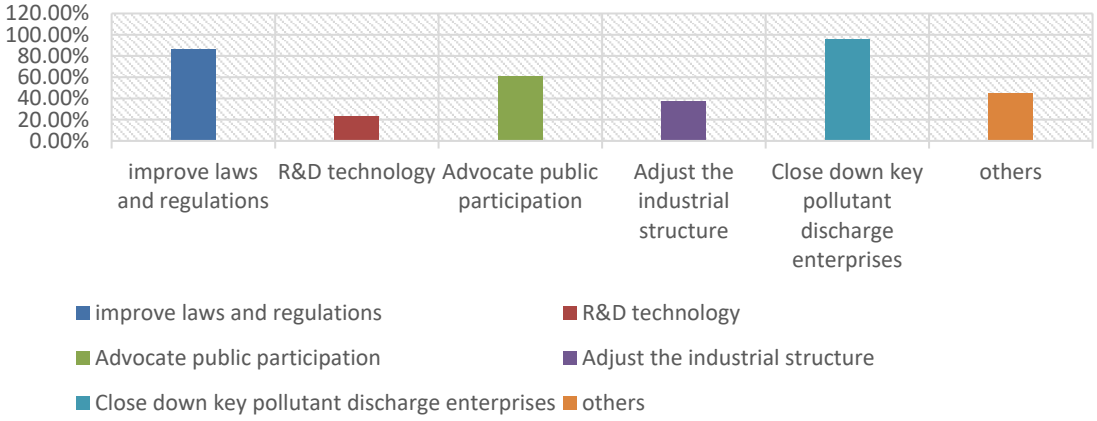

Figure 9 Measures taken by the government to control water pollution.

Participation of residents in water pollution control

In the survey on whether residents have participated in water pollution control, 72.22 % of people have participated, but 27.78 % of people have not participated in the control.

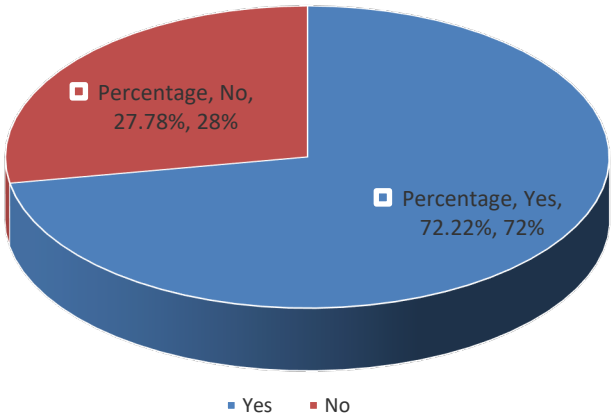

Figure 10 Whether residents participate in water pollution control.

Among the people involved in governance, the author has gained an understanding of the channels through which they participate. Among them, 28.31% of people participate through social welfare organizations, 38.62 % through online platforms, 30.95 % through friends or colleagues, and 2.12 % through other channels. From this perspective, the channels of participation are still diverse, and the network and public welfare organizations play a significant role.

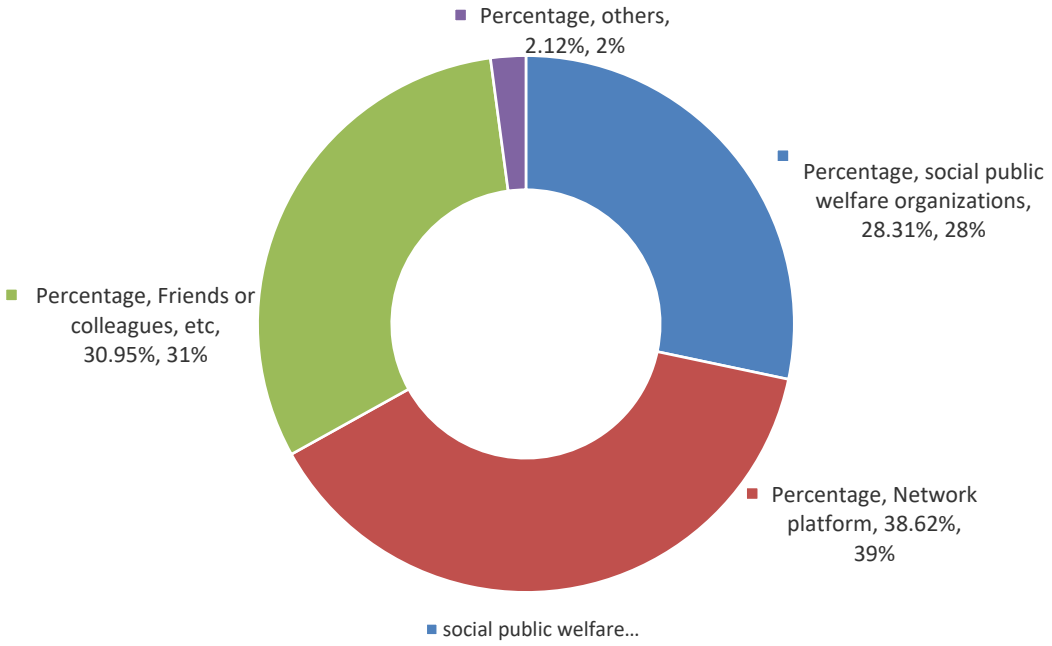

Figure 11 Channels for residents to participate in water pollution control.

In the research on the frequency of government regulation, the author divided it by year. The 43.1 % of people believed that the frequency of government regulation was once per year, 35.7 % believed that the frequency of government regulation was twice per year, 12.4 % believed that the frequency of government regulation exceeded twice per year, and 8.7 % did not know.

Table 3 Government supervision frequency of water pollution.

Frequency	Num	Percentage
1 time/year	163	43.1 %
2 times/year	135	35.7 %
above 2 times/year	47	12.4 %
uncertain	33	8.7 %

In addition, interviews with environmental protection department staff were conducted to obtain information on the implementation of measures such as government water pollution prevention and control work. The interviewees are as follows:

Table 4 Basic information of interviewees.

Interviewee	Age	Gender	Careers	Years of work
Mr. Wang	41	male	Civil servant	15
Ms. Ouyang	35	female	Doctor	5
Mr. Cao	36	male	Teacher	8
Mr. Chen	28	male	Farmer	10
Ms. Zhang	43	female	Worker	18

To create a good water environment ecosystem, policy guidance and protection are indispensable. From the current policy system for water pollution prevention and control in Guizhou Province, policy tools related to water pollution prevention and control can be divided into command and control type environmental policies, incentive type environmental policies, and public participation type environmental policies.

Through interviews with several staff members, the interviewees stated that the government's command and control environmental policy has been playing a very important role in addressing water pollution prevention and control issues. etc. From the perspective of specific measures, they mainly include improving river water quality, strengthening the control of water source protection zones, constructing sewage plants and pipelines, strengthening the utilization of recycled water, circulating water, controlling industrial pollution sources, controlling agricultural non-point source pollution, strengthening groundwater protection, treating urban black and odorous water bodies, and strengthening relevant publicity and education, information reporting, etc.

Discussion

Legislative system norms

Local governments lack a scientific system in legislation, and their responsibilities in pollution control are not perfect enough. Some even lack environmental protection indicators. Therefore, local governments should strengthen legislation to ensure the timeliness, scientific, and sufficiency of ecological system supply. Article 16 of China's Environmental Protection Law clearly stipulates: "Local people's governments at all levels shall be responsible for the environmental quality of their jurisdiction and take measures to improve environmental quality." The law is promoted and implemented by relevant departments within the government. If the government has irresponsible behavior, environmental governance must not satisfy the general public. In addition, the government's inaction should be due to improper supervision loopholes within the government. In summary, in order to better address the pollution problem in this area, local governments must improve the dual standards of supervision and governance, strengthen legislation, and refine the relevant content of each legislation to ensure its scientific, avoid being too broad and vague, and achieve a legal basis.

Improvement of regulatory mechanisms

Innovative ecological environment supervision model

Taking the reform of ecological and environmental protection management institutions as an opportunity, guided by the construction of ecological and environmental governance systems and modernization of governance measures, and focusing on promoting the optimization, coordination, and efficiency of institutional functions, we will vigorously optimize the functional allocation of ecological and environmental management departments, systematically integrate relevant policy measures, and create policy synergy. Strictly implement the dual responsibilities of the Party and government for ecological and environmental protection, establish a sound ecological and environmental protection responsibility system with clear responsibilities and reasonable division of labor, improve the goal, evaluation, and assessment mechanism for the overall requirements of ecological civilization, strengthen the system of environmental responsibility departure audit, environmental protection supervision, and performance interview, implement the lifelong accountability system for ecological and environmental damage responsibility, and accelerate the comprehensive implementation of environmental protection responsibility. Strengthen the hard constraints of "3 lines and 1 order", promote and form the three red lines as prerequisites and important constraint mechanisms for comprehensive decision-making. Implement unified supervision of the ecological environment and establish a comprehensive monitoring platform for ecological environment protection. Strengthen the supervision capacity of grassroots ecological and environmental protection, further improve the process and operating rules of grid management of grassroots ecological and environmental protection, improve the mechanism for discovering, handling, feedback, guarding, information disclosure, and supervision of illegal ecological

and environmental protection behaviors, and gradually reduce the authority of ecological and environmental protection management.

Stabilising the quantity and quality of water resources

Water shortage and water quality degradation have become serious problems facing karst areas. Water resources security should be achieved by combining the quantity and quality of water resources to ensure a consistent and stable allocation. On the one hand, ensure the security of water resources quantity, including the security of total water resources and available quantity. Ensure water ecological protection and restoration, protection of key water sources and construction of water connotation forests; on the other hand, strengthen water quality security. In cities, centralised sewage treatment can be adopted, while industry strictly controls industrial wastewater discharge, increases the rate of wastewater discharge compliance, improves the outdated facilities of outdated sewage treatment plants and enhances sewage treatment capacity; incorporates agricultural surface and point source pollution into the overall planning of pollution prevention and control, gradually reduces the amount of chemical fertilisers and pesticides used on farmland, and reduces the pollution of water bodies caused by dirty irrigation. Strengthen the regulation of river outfalls and strictly restrict and regulate the setting of outfalls. Strengthen the protection of groundwater quality and drinking water sources, and enhance

Changing traditional water use patterns

There is still much room for water conservation potential in your province. In industry, energy saving, consumption reduction, efficiency enhancement and pollution reduction are the entry points to vigorously develop a circular economy and clean production, and further improve the reuse rate of industrial water. The government should guide the change of rough production methods, develop a circular economy and reduce the traditional types of industries with high resource consumption, and water reuse is the key to achieving water savings. In agriculture, water-saving irrigation techniques can be improved to control water output according to the characteristics of the crop itself, in an effort to make efficient use of water resources and reduce leakage in agricultural irrigation channels. The use of pilot irrigation and drip irrigation for farmland irrigation, to maximize the use of water. Increase investment in agricultural water conservation and reduce wastage of agricultural irrigation water; in life, reasonably allocate water for domestic use and ecological use. At the same time to solve the problem of serious leakage of the drainage network, in some water-scarce areas should implement water conservation projects groundwater monitoring.

Public participation guidance

Enhance the enthusiasm and level of public participation

We need to strengthen the publicity and education of ecological environment protection, convey the concept of environmental protection through popular forms of expression and vivid promotional content, enhance the awareness of environmental protection responsibility, and stimulate the consciousness and enthusiasm of consciously participating in environmental public affairs. Strengthen the acceptance of environmental petitions, ensure people’s awareness of the surrounding ecological environment, address people's demands for the surrounding ecological environment, and promote people’s attention to the surrounding ecological environment.

Promoting the good development of environmental non-governmental organizations

Environmental non-governmental organizations, with the purpose of protecting the environment, have a certain degree of consistency with the government in pursuing public interests and have a foundation for cooperation. The government should recognize the necessity of dealing with environmental affairs, and through the professional advantages of environmental non-governmental organizations, solve the environmental issues that are difficult to effectively manage by the receiving government. The government should ensure its financial support; Deepen the degree of cooperation between the government and non-governmental organizations in purchasing environmental services;

improve and update relevant rules and regulations, release more vitality from non-governmental organizations, and build greater space for implementation. Ultimately, a joint management force is formed to protect the environment and promote the continuous improvement of environmental management level.

Conclusions

Strengthening the prevention and control of water pollution, promoting water ecological protection and water resource management, relying solely on the top-level design and strategic planning of the central government is not enough. It is difficult to meet the actual needs of various places, and it is necessary to fully mobilize local governments and other participating entities to achieve coordination and linkage, work together, and promote together to fight this battle against pollution. In the prevention and control of water pollution, the local government of Guizhou Province, as the ultimate executor of central policies, undoubtedly plays a very important role in the entire environmental governance process. On the basis of analyzing the current situation of water environment in karst areas of Guizhou Province, this article takes the government's performance in water environment governance as the research object, and analyzes the problems in the current process of water environment governance from the perspective of government public services. The aim is to open up new ideas for water environment governance through research, clarify the main position of the government in the process of water environment governance, improve the government's water environment governance system, and apply science and technology An efficient way of thinking can better solve the related problems of water environment governance in karst areas. The research conclusions of this article are as follows:

By studying and drawing on the theory and practice of government responsibility in water pollution prevention and control at home and abroad, this paper analyzes the public attributes of water resources, the sources and composition of government responsibility, and the four major aspects of government responsibility in water pollution prevention and control. This lays a theoretical foundation for the in-depth analysis of government responsibility in water pollution prevention and control in Guizhou Province in the following text

By reviewing various bulletins, annual reports, and other materials, the water environment quality of typical karst areas in Guizhou Province was objectively grasped vertically and horizontally. The characteristics of water environment resources, water pollution situation, government governance methods, and governance effects of typical karst areas in Guizhou Province were reviewed. At the same time, through methods such as questionnaire surveys and interviews, the implementation of environmental responsibilities by various government departments in karst areas was further analyzed. Finally, corresponding countermeasures were proposed to enable local governments to better fulfill their environmental responsibilities.

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