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Research on the Synergistic Mechanism of Land Resources Resilience Planning and Emergency Management: A Case Study of Flood Control in the Yellow River Delta Region

Xinyue Zhao [1,*]

[1] School of Resources and Environment, Shandong Agricultural University, Tai'an, Shandong, China
* Correspondence: Xinyue Zhao, School of Resources and Environment, Shandong Agricultural University, Tai'an, Shandong, China

Abstract: Under the backdrop of global climate change, extreme weather events occur frequently, posing a serious threat to infrastructure, the economy, and residents' safety in urban areas. The concept of resilient cities has emerged, referring to cities that have the flexibility and rapid recovery capabilities to withstand and quickly recover from disasters. China's urbanization process is rapid, but its flood control system is still inadequate, and there are deficiencies in the emergency management mechanism, such as the need for improvement in cross-departmental coordination, community participation, and emergency response capabilities. This paper takes the area of the Yellow River Delta as the research object, analyzes the causes of flood risks, and proposes optimization strategies based on an analysis of existing planning and actual conditions. It aims to construct a multi-scale, full-process flood control and prevention planning and design framework, emphasizing the coordinated development of land resource resilience planning and emergency management mechanisms. The goal is to provide theoretical guidance and practical solutions for urban flood control and prevention, enhance urban resilience, ensure residents' safety, and promote sustainable development. The research results not only improve the flood control and prevention capabilities of the Yellow River Delta region but also provide valuable experience for other similar cities.

Keywords: land resource resilience planning; emergency management mechanism; flood prevention and control; Yellow River Delta

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1. Introduction

1.1. Research Objectives and Questions

This study aims to enhance the flood prevention and control capabilities of the Yellow River Delta region by establishing a collaborative mechanism between land resource resilience planning and emergency management. It focuses on the following core questions: How to establish a collaborative mechanism between land resource resilience planning and emergency management? How applicable is this mechanism to the Yellow River Delta region? By exploring the theoretical framework and practical paths of land resource resilience planning, constructing a multi-departmental collaborative emergency management mechanism, and optimizing resource allocation and emergency response processes, this study aims to provide scientific planning and management strategies for the Yellow River Delta region and other similar ecologically vulnerable areas, promoting the resilience and sustainability of regional development.

1.2. The Importance of Improving the Collaborative Mechanism between Land Resource Resilience Planning and Emergency Management

Improving the collaborative mechanism between land resource resilience planning and emergency management is crucial for regional security and social and economic development. In the context of global climate change and frequent disasters, this mechanism enhances the resilience of urban and rural areas by integrating resilience concepts into the spatial layout of the territory, reserving emergency land as strategic blank space, and improving the disaster resistance capacity of urban and rural areas. At the same time, it optimizes land use efficiency, achieving the goals of the conversion between peacetime and emergency functions and risk resistance. By leveraging big data and artificial intelligence technologies, it precisely identifies risk characteristics and assesses the safety resilience level of cities, providing a scientific basis for planning. Improving this mechanism is not only a necessary measure to deal with disasters and emergencies but also an important step in the modernization of territorial space governance. It has far-reaching significance for safeguarding people's lives and property and promoting high-quality social and economic development [1].

1.3. Data Sources

The data sources of this paper are extensive, mainly relying on official websites, including those of the National Bureau of Statistics and local bureaus of statistics in China, as well as professional data platforms, providing macroeconomic data and regional statistics. In the paper some macroeconomic data from the National Bureau of Statistics official website (https://data.stats.gov.cn) and the China statistical yearbook (http://www.stats.gov.cn/tjsj/tjgb/rkpcgb/), including the macroscopic indicators such as GDP, population. Meanwhile, data from the Shandong Province Bureau of Statistics (http://tjj.shandong.gov.cn), Dongying City Bureau of Statistics (https://tjj.dongying.gov.cn), and Binzhou City Bureau of Statistics (https://tjj.binzhou.gov.cn) were cited to obtain more detailed indicators of regional economic and social development. In addition, data from professional institutions such as China Meteorological Administration (http://www.yrcc.gov.cn) and China Environmental Monitoring General Station (http://www.mem.gov.cn) were also used for reference, covering multiple fields such as environment and population census.

2. Research Methods

This study aims to explore the collaborative mechanism of land resource resilience planning and emergency management, and establish a scientific and reasonable collaborative mechanism framework by using multidisciplinary comprehensive research methods and theoretical analysis based on the example of flood disaster prevention and control in the Yellow River Delta region [2].

2.1. Literature Research Method

By systematically combing relevant literature on land resource resilience planning, emergency management coordination mechanism and flood disaster prevention and control, the existing research results and practical experience were summarized to provide theoretical basis and technical support for this study. Focus on the theoretical framework of resilience planning and the construction of a comprehensive disaster prevention and reduction planning system for national space.

2.2. Case Analysis Method

Taking the Yellow River Delta region as the research object, the characteristics, causes and existing prevention and control measures of flood disasters in this region are deeply analyzed. Through data collection, the synergies between existing land use planning and emergency management measures are assessed and existing problems and deficiencies

are identified [3]. At the same time, combined with the successful experience of similar areas at home and abroad, put forward targeted optimization suggestions.

2.3. Multidisciplinary Integration Method

This study integrates the multidisciplinary theories and methods of geography, ecology, urban planning, emergency management, etc., to build the overall framework of the coordination mechanism between land resource resilience planning and emergency management. Through interdisciplinary research, land use layout should be optimized, regional ecosystem service functions should be enhanced, and disaster resilience of infrastructure should be enhanced.

Through the comprehensive application of the above research methods, this study will systematically analyze the construction path of the collaborative mechanism between land resource resilience planning and emergency management. The aim is to provide scientific guidance for flood disaster prevention and control in the Yellow River Delta region and to promote regional sustainable development [4,5].

3. Overview of Land Resource Resilience Planning and Emergency Management

3.1. The Concept of Land Resource Resilience Planning

Land resource resilience planning is a comprehensive planning concept, which emphasizes improving the utilization efficiency of land resources and the sustainability of ecological environment through scientific and reasonable planning means, so as to enhance the regional coping ability in the face of natural disasters or other external shocks.

3.2. Basic Concepts and Theories of Emergency Management

Emergency management is a systematic management process for emergencies that aims to minimize losses through rapid response and resource integration. Its core lies in "emergency", that is, the rapid mobilization of resources, organization of personnel, and development of strategies in emergencies. Emergency management follows several key principles: people-oriented approach to minimize harm, vigilance during peacetime with a focus on prevention, unified leadership with clearly defined responsibilities at different levels, strengthening management according to laws and norms, ensuring quick and coordinated responses, relying on science and technology to improve efficiency, and being fully prepared in daily operations. At the same time, a comprehensive organizational structure and coordination mechanism are key to emergency management, which includes clarifying the responsibilities of leaders, optimizing communication channels, and ensuring effective collaboration across departments [6].

4. Status of Flood Prevention and Control in Yellow River Delta Region

The Yellow River Delta, located in the north of Shandong Province, belongs to the alluvial plain of the lower reaches of the Yellow River. Due to the low and flat terrain, the flow rate of the Yellow River slows down and silt accumulates, resulting in the rise of the riverbed. It is a frequent area of flood disasters. There have been many inundations in history, posing a serious threat to the ecology, agriculture, and economy.

4.1. Physical Geographical Environment of Yellow River Delta Region

4.1.1. Topography and Geomorphic Features

Located in the north of Shandong Province, the Yellow River Delta is composed of Dongying, Binzhou and some surrounding counties and cities, covering an area of 26,500 square kilometers. This area is dominated by plain terrain, and the soil is mostly tidal soil and salinized tidal soil, which is seriously salinized due to low precipitation and strong evaporation. The natural vegetation consists mainly of saline shrubs and meadows, and

the region is rich in wetland resources. It serves not only as an ecological protection area but also as an important base for grain and cotton production.

4.1.2. Climate Characteristics

The Yellow River Delta region belongs to the warm temperate monsoon climate area, with four distinct seasons and the same period of rain and heat. The annual precipitation is about 500-700 mm, mainly concentrated in summer (especially in July and August), but due to the large evaporation, the soil salinization phenomenon is significant. The region experiences a significant annual temperature difference, with cold winters (average temperature in January around-3℃) and hot summers (average temperature in July around 27℃). Affected by the monsoon obviously, northerly winds prevail in winter,the climate is dry and cold; Summer is wet and rainy with southeast winds prevailing. Climate changes significantly from year to year, frequent extreme weather, including floods, droughts, cold waves, typhoons, and so on, coupled with the geographical characteristics of "flood corridor", flood diversion pressure in flood season is greater, posing a greater threat to agricultural production and ecological environment.

4.2. Causes and Status of Flood Disasters in the Yellow River Delta Region

4.2.1. Causes of Flood Disaster

The causes of frequent and serious flood disasters in the Yellow River Delta include climate change, human activities and geographical environment. Climate change has led to an increase in extreme weather, an increase in the frequency of heavy rainfall, and changes in the temporal and spatial distribution of precipitation, which has intensified the risk of flooding. Human activities such as land development change surface conditions, affect drainage systems and increase flood hazards. In addition, the region has low and flat terrain, rivers crisscross vertically and horizontally, and high sand content, which easily leads to the accumulation of surface water bodies and the increase of flood risk. Therefore, it is necessary to optimize urban spatial layout through scientific planning and comprehensive management measures, strengthen infrastructure construction, improve flood control capacity, and strengthen research and prediction of climate change to reduce the risk of flood disasters.

4.2.2. Analysis of the Current Status of Flood Disasters

The current situation of flood disasters in the Yellow River Delta region is unique. Compared to other regions, its complexity and the interplay of multiple factors are particularly prominent. First of all, because the Yellow River Delta is located in the estuary of the Yellow River, the terrain is low and flat, and the river channels are crisscrossing. Additionally, the Yellow River has a high sediment content, which reduces its flood discharge capacity. As a result, flood disasters are both frequent and intense. The frequency of extreme weather events has increased, and heavy rainfall is more concentrated, which further increases river runoff and exacerbates flood threats. Secondly, the spatial distribution of flood disasters is wide, not only involving farmland, cities and important infrastructure, but also directly affecting the Yellow River Estuary wetland, a national ecological protection area, causing serious economic losses and ecological damage. Third, the formation mechanism of flood disaster is complex. It is influenced by both natural factors unique to the Yellow River (such as sediment deposition, channel swing, estuarine deposition, etc.) and human factors (such as oil exploitation, land use change in the process of urbanization, imperfect drainage system, etc.), forming a unique disaster chain. Finally, the chain effect of flood disasters is significant. Flood overflow not only leads to wetland degradation and soil salinization but also further destroys the fragile ecosystem of the Yellow River Delta, intensifying the region's environmental vulnerability. These characteristics make the flood disaster problem of the Yellow River Delta more unique in the region, and also put forward higher requirements for its management.

In recent years, with the acceleration of urbanization, the pressure on flood control and drainage in the Yellow River Delta region has been steadily increasing. Although some areas have taken a series of control measures (such as river regulation and flood storage area construction), there are still shortcomings in the flood control and disaster reduction system in the region. In addition, uncertainties arising from climate change increase the difficulty of flood disaster prevention and control, making it urgent to enhance regional climate resilience through scientific planning and integrated policies.

To sum up, the selection of the Yellow River Delta as the research object has many meanings. From the perspective of natural geographical environment, this region has low and flat terrain, crisscrossing river channels, high sand content, rich wetland resources but serious soil salinization, and is located in the warm temperate monsoon climate zone with frequent extreme weather. These unique terrain, geomorphology and climate characteristics make it a flood-prone area. From the economic level, it is an important grain and cotton production base, the population is relatively dense, the economic total is large, the economic status is prominent, and the frequent flood disasters pose a serious threat to agricultural and economic development. From the ecological point of view, the Yellow River Delta is a national ecological protection area, and flood disasters will cause ecological damage such as wetland degradation and soil salinization, affecting the regional ecological balance. Therefore, it is very important to study the flood disaster in the Yellow River Delta to ensure regional economic development, ecological security and improve regional climate resilience (see Table 1 and Table 2).

Table 1. Statistical Data on Socioeconomic Indicators of Major Cities in the Yellow River Delta Region.

Regions	Dongying City	Binzhou City
Permanent population (in ten thousand)	219.3	391.2
Population density (persons/Km²)	450	380
Urbanization Rate(%)	67.5	61.2
GDP (billion yuan)	4526.32	3865.14
Per Capital GDP (ten thousand Yuan)	20.5	9.7
Industrial Added Value (billion yuan)	2745.18	2158.01
Added value of the service industry (billion yuan)	1490	1370
Total output value of agriculture, forestry, animal husbandry and fishery (billion yuan)	180	240
Total investment in fixed assets (billion yuan)	1102.98	960
Growth rate of fixed asset investment (%)	6	5

Table 2. Information Statistics on Flood Disasters in Major Cities of the Yellow River Delta Region.

Regions	Dongying City	Binzhou City
Frequency of flood disasters (times/10 years)	3	4
Areas with high frequency of flood disasters (main distribution)	Guangrao County and Lijin County	Zhanhua District and Yangxin County

Severe flood years (nearly 20 years)	2007, 2012	2003, 2021
Maximum disaster intensity rating (1-5)	4	3
Average annual population affected by disasters (10,000)	12.5	18.2
Annual crop affected area (10,000 mu)	9.2	14.6
Cumulative economic losses in thepast20 years (100 million yuan)	58.6	44.3
Annual direct economic loss (100 million yuan)	2.93	2.21
Main types of flood impacts	Urban flooding, dam overflows	Agricultural waterlogging disasters and low-lying areas flooding
Coverage rate of flood control project construction (%)	82	75
Main flood control facilities	The Yellow River embankment, Dongying Drainage Channel	The embankment of the South River in Binzhou and the drainage system of farmland along it

5. Construction of Coordination Mechanism between Land Resource Resilience Planning and Emergency Management

Through research and analysis, based on theoretical research, practical experience and practical needs of the comprehensive consideration. The construction of the coordination mechanism of land resource resilience planning and emergency management is mainly achieved through three ways: inter-departmental collaboration and information sharing, intelligent risk early warning system, and the establishment of perfect institutional guarantee mechanism.

Theoretically, land resource management and emergency management involve multiple departments that are interrelated and influence each other. Only by breaking departmental barriers and realizing information sharing can a unified and effective disaster management system be formed, improving the ability to deal with disasters. Technology-enabled risk early warning relies on information technology and risk management to achieve accurate identification and rapid response. Improving institutional guarantees reflects the concept of rule of law and sustainable development, ensuring stable operation and continuous optimization. In practice, successful experience at home and abroad shows that cross-sectoral collaboration, technological innovation and institutional construction can effectively improve disaster response capacity and reduce losses. From the perspective of actual needs, urbanization and climate change have intensified the risks associated with land resources, making the traditional model increasingly inadequate. It is necessary to build an efficient and coordinated management mechanism to enhance land resilience and disaster prevention ability.

5.1. Cross-Departmental Collaboration and Information Sharing

The implementation of cross-departmental collaboration and information sharing should focus on technical support, system innovation, and process optimization. It should also involve building a unified information-sharing platform (such as integrating GIS and Internet of Things technology to achieve dynamic integration of multi-source data and

developing standardized interfaces to break departmental data barriers) while enhancing the role of comprehensive land use planning in controlling and coordinating resources. Clarify the obligations for information sharing and the processes for collaboration through clear policies and regulations. In the dynamic coordination, joint assessment of high-risk areas and resilience planning are made before the disaster, intelligent matching of emergency resources (such as temporary land approval and material scheduling) by the platform during the disaster, and land restoration and reconstruction are implemented by integrating the needs of multiple departments after the disaster. Typical cases, such as Singapore's inclusion of the proportion of flexible land in community planning, and the Yangtze River Delta region's simulation of disaster chain collaborative response through digital twin models, all reflect the necessity of cross-sectoral goal consensus and efficient collaboration. In addition, it is necessary to improve the cooperation efficiency through joint exercises, compound talent training and performance appraisal incentive mechanism, and finally realize the systematic transformation from passive emergency response to active resilience. In 2023, Typhoon "Du Suri" triggered a storm surge, causing the coastal water level of Dongying City to rise by 1.5 meters, salinizing 120 square kilometers of farmland, with soil salt content surging to 0.6%. Heavy rainfall made the water depth in the Kenli area reach 0.8 meters, resulting in a direct loss of 320 million yuan. In this event, if a multi-department data fusion platform can be established to integrate meteorological, water conservancy and geological monitoring data, the storm surge warning accuracy can be effectively improved, and a 3-5 day recovery window can be reserved for the agricultural sector. In the event of a flood caused by a regional rainstorm in the Yellow River Delta in 2024, the collaborative mechanism could shorten the recovery time of pumping stations, improve the efficiency of material delivery by at least 50% through real-time data sharing between the power and transport sectors, and reduce economic losses by approximately $120 million through a salt-tolerant crop replanting program implemented jointly by agricultural and scientific institutions. The engineering collaboration between water resources and urban construction departments can reduce construction costs by about 30%. The implementation of cross-departmental collaboration and information sharing mechanism can greatly improve the efficiency of pre-disaster preparation, response during disaster, and post-disaster restoration.

5.2. Development and Application of Intelligent Risk Early Warning System

An intelligent risk early warning system refers to the use of modern information technology, including advanced monitoring technologies and data analysis models, to accurately identify and respond to disaster risks in a timely manner, thereby reducing disaster losses.

1) The intelligent risk early warning system needs to rely on the integrated monitoring network of space and earth (such as satellite remote sensing, drones and Internet of things sensors) to collect land settlement, hydrometeorology and dike deformation data in real time, simulate the disaster chain evolution path and predict high-risk areas, analyze multi-source data combined with AI models and generate hierarchical early warning and emergency plans. In addition, the automated embankment patrol robot and three-dimensional geological radar are used to achieve accurate positioning of hidden dangers and repair decisions, forming a closed-loop management of "monitoring-early warning-response-repair". In October 2021, affected by continuous heavy rainfall in the middle and lower reaches of the Yellow River, the Dongying Lijin section encountered the largest flood peak in 33 years, which exceeded the warning water level by 0.01 meters, a threshold that contributed to severe flood impacts despite the relatively small difference. In addition to being affected by extreme weather, an important reason is that a perfect digital risk warning and dynamic response

mechanism has not been built. By constructing this mechanism, the flood capacity parameters of the Lijin Section can be integrated to accurately identify high-risk areas in the tidal area (such as the flood peak evolution path of Tongguan Station at 860m³/s and the weak embankment section at Dongying), and the superposition effect of floods can be predicted by relying on AI prediction model.

2) With the support of the technology platform, the flexible land use planning shared by different departments can reserve emergency flood diversion areas in advance (such as the optimization plan of flood diversion of Dongping Lake through the Jiping trunk Canal of the South-to-North Water Diversion Project) to reduce the flood plain risk caused by long-term high water level in the Lijin section; At the same time, the joint operation strategy of reservoir groups is dynamically adjusted, such as the intelligent matching of Xiaolangdi reservoir water level control and Dongping Lake flood diversion channel, so as to relieve the downstream river pressure. The multi-department coordination mechanism enabled by advanced digital technologies can also shorten the emergency decision-making chain, realize the synchronous response of land repair, personnel evacuation, and engineering rescue, thus reducing the frequency of dike accidents and economic losses in areas like the Lijin section, and promote the transformation of resilience governance from "passive rescue" to "predictive regulation-elastic space reservation-multi-objective collaborative recovery".

5.3. Establish a Perfect System Guarantee Mechanism

A robust institutional framework is the core support for coordinating land resource resilience planning and emergency management. Institutional protection through regulations to clarify the boundaries of rights and responsibilities and cooperation processes, to avoid overlapping functions, and to improve the institutional protection mechanism needs to be based on the legal framework. For the revision of the Emergency Response Law, the specific direction should focus on clarifying the core position of resilience planning in the emergency management system, focusing on revising the provisions on the cooperation obligations of relevant departments, and clearly defining the specific responsibilities and cooperation processes of various departments in resilience planning and emergency management. For example, specify the specific tasks and ways for departments to cooperate at different stages before, during and after an emergency. To do a good job in the connection with existing relevant laws and regulations, to avoid legal conflicts and gaps, in the connection with the Land Management Law, to ensure that the land use arrangement in the resilience planning is in line with the basic requirements and principles of land management. Through such amendments, a list of responsibilities with clear powers and responsibilities should be established. For example, it is clear that the natural resources department leads the risk assessment work and is responsible for a comprehensive and scientific assessment of the potential risks of land resources. Emergency departments coordinate rescue operations and coordinate all parties to carry out efficient rescue. By conducting backtracking analysis through the disaster case database, existing loopholes in departmental cooperation can be identified, such as in-depth analysis of the 2021 Lijin section levee scheduling lag problem, from the implementation of laws and regulations, departmental cooperation process, information transmission and other aspects to find the cause. Combined with real-time monitoring data and AI model, the resilience planning threshold is iteratively updated to ensure that the planning can adapt to changing risk situations, and the continuous optimization of "system design-practice test-dynamic adaptation" is achieved, so that the system not only has the stability of rooted land, but also has the adaptability to cope with uncertain risks.

Therefore, relying on the perfect institutional guarantee mechanism, the Yellow River Delta region can make further improvement in the following aspects when dealing with storm surge floods caused by Typhoon "Lejima" in 2019 and typhoon "Firework" in 2021:

First of all, Shandong Province should make amendments to the "Flood Control Regulations", clarify the proportion of flexible land use of tidal flats (such as reserving 15%-20% buffer space for flood diversion and ecological protection), and make good connection with the existing laws and regulations such as the Wetland Protection Law and Flood Prevention Law, so as to ensure that the provisions of flexible land use of tidal flats meet the requirements of wetland protection. This arrangement not only fulfills the requirements of wetland protection but also effectively supports flood control and diversion needs. Through such amendments, the joint meeting system of natural resources, emergency response, water conservancy and other departments is established, and the frequency, rules of procedure and decision-making mechanism of the meeting are clarified, so as to break the emergency response lag caused by the cross-responsibility of departments in Dongying City during the "Liqima" period. Secondly, under the dynamic optimization mechanism, based on the lessons of the three-collision disaster chain of "storm surge-river flood-waterlogging" exposed by two typhoons, based on analyses derived from the case database, the land classification management and control rules are refined to enhance disaster response accuracy and zoning rationality. The disaster situation of land in different regions and the effectiveness of response measures in the process of disaster are analyzed in detail, and more evidence-based and practical land classification standards are formulated in alignment with the updated legal framework. Relying on the annual multi-department joint drill to iterate the emergency plan, such as optimizing the matching logic of personnel evacuation routes and refuge places, fully considering the requirements of laws and regulations and the actual situation in the drill to ensure the feasibility and effectiveness of the plan. At the same time, the governments of the Yellow River Delta should incorporate the post-disaster assessment results into the adjustment of territorial spatial planning, such as dynamically raising the ecological restoration land index in response to the worsening salinization of land along the Laizhou Bay after the "Yanhua" transit, and strictly adjusting in accordance with the revised laws and regulations and relevant planning requirements. Finally, the multiple goals of reducing the disaster loss rate, enhancing the ecological resilience of coastal wetlands and improving the cross-departmental collaborative efficiency will be achieved.

6. Conclusion

6.1. Research Conclusions

Taking flood disaster prevention and control in the Yellow River Delta region as an example, this study deeply discusses the construction path of the collaborative mechanism of land resource resilience planning and emergency management. Through literature research, case analysis and multidisciplinary integration method, the theoretical framework and practical model of the collaborative mechanism between land resource resilience planning and emergency management are systematically analyzed. The results show that cross-departmental collaboration and information sharing can break down departmental barriers and improve resource utilization efficiency. In 2020, the Ministry of Natural Resources used geospatial data as the carrier to unify the spatial benchmarks and remote sensing monitoring standards of land, forestry, water conservancy and other departments. Heilongjiang Surveying and Mapping Bureau solved the contradiction problem of inter-departmental boundaries by integrating ecological red lines, river and lake management scope and other data, so as to increase the efficiency of land planning approval by 50%. In February 2025, the Ministry of Emergency Management and the National Development and Reform Commission established a collaborative working mechanism under the national medium-term development plan, integrating cross-departmental monitoring data of geological disasters, forest fire prevention and meteorological disasters through unified data standards and sharing platforms, this underscores the necessity of cross-departmental collaboration and information sharing; The application of intelligent risk early warning system can significantly improve the precision of disaster

early warning and the efficiency of emergency response. The perfect system guarantee mechanism provides a solid support for the long-term stable operation of the cooperative mechanism. By following these paths — such as enhancing cross-departmental collaboration, adopting intelligent early warning systems, and improving institutional guarantees — the Yellow River Delta's flood prevention and control capabilities can be significantly improved, offering valuable insights for other ecologically vulnerable regions.

6.2. Research Prospects

Although this study has made meaningful progress in exploring the coordination mechanism of land resource resilience planning and emergency management, several key areas still warrant further exploration and refinement. Future studies can further deepen the practical application of cross-departmental collaboration and explore more efficient coordination models and technological approaches. At the same time, with the increasing uncertainty of climate change, it is necessary to continue to pay attention to the impact of extreme weather events on the region, and further improve the risk early warning and dynamic response mechanism. In addition, it is recommended to strengthen exchanges and cooperation among regions, share successful practices, and promote the coordinated development of resilience planning and emergency management in more regions.

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