Analysis of Ecological Integration and Sustainable Development in the Context of Urbanization - A Case Study of the Yangtze River Delta Region

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Abstract. In 2015, countries that members of the United Nations jointly adopted the Sustainable Development Goals (SDGs) to be achieved by 2035, which include 17 contents including health, society, education, environment, and any other aspects. As an important member of the United Nations, China strongly supports and promotes sustainable development. Urbanization is an important process of city development. In the process of urbanization, the needs of cities often lead to environmental destruction. This is not conducive to sustainable urban development. Environmental restoration and management are necessary to promote sustainable urban development. As one of the most urbanized regions in China, the Yangtze River Delta has a guiding role in the national sustainable development process. Due to the goal of synergistic development of the Yangtze River Delta region, the integration of environmental governance is also an important part of it. This paper will focus on the relationship between environmental integration and sustainable development in the context of urbanization, and explore the policy path of environmental integration and environmental co-goverence in the Yangtze River Delta region.

Keywords: Environmental sustainability, environmental governance, sustainable economic development, urbanization.

1. Introduction

Since the implementation of China's reform and opening-up policy in 1978, the urbanization rate in China has been increasing. One of the typical characteristics of urbanization in China is the increasing size of urban spaces and the increasing density of built-up areas on the urban fringe.

With the expansion of urban areas, there are bound to be different impacts. On the one hand, the development of urban promotes the upward trend of the economy, the life quality of residents becomes more convenient, and people's sense of well-being gradually increases. However, urbanization has also brought about inevitable urban problems, such as demographic dividend, social equity, environmental issues, and so on.

Along with the expansion of the urban, the areas that were originally part of the blue-green system and rural areas have gradually been made into urban construction areas. The expansion of construction land and the reduction of green space and water space inevitably lead to serious pollution and the collapse of the ecological regulatory system. Therefore, environmental damage is one of the drawbacks of urbanization today that needs to be addressed urgently.

As a multidisciplinary issue closely related to human well-being and global sustainable development, environmental problems encompass a wide range of economic and social factors. The complexity of these factors contributes to the difficulty of dealing with environmental problems and the greatest amount of energy invested around the world. Therefore, this paper will take the Yangtze River Delta region as an example and focus on analyzing the environment and its governance issues with the process of sustainable urban development.

2. Literature Review

In 2018, the Yangtze River Delta officially opened a new era of integrated and synergistic development, and integrated and synergistic development was incorporated into the national

development strategy. As one of the most economically developed regions in China, the development process of integration in the Yangtze River Delta region is also seen as an institutional benchmark for national integrated development [1]. The new connotation of high-quality development of the integration of the Yangtze River Delta is summarized as innovation and co-construction, coordination and co-advancement, green and co-protection, openness and win-win situation and people's livelihood sharing, which will realize the effect of "1+1+1+1>4" [2]. Therefore, the perspective of sustainable development is an important starting point for integrated high-quality development. The theory of sustainable development can cut through different angles of the society concerned to achieve coordinated development in many aspects, constituting a new form of comprehensive and high-quality Yangtze River Delta integration.

General Secretary Xi Jinping emphasized at the Symposium on Further Promoting the High-Quality Development of the Yangtze River Economic Belt that, promoting the high-quality development of the Yangtze River Economic Belt fundamentally relies on the high-quality ecological environment of the Yangtze River Basin. Environmental governance is an important part of the integrated development of the Yangtze River Delta. The environment is closely related to people's lives as well as economic development. In a state of environmental excellence, people's quality of life is high and the economy is on a growth trend. When the environment is damaged, it will affect many aspects of the economy, system and society, causing irreversible damage. The Yangtze River Delta region, as a developed eastern coastal region, also suffers far more threats to the ecological environment than other regions. The researcher agrees that geographical distance affects market scope and economic efficiency, and this is also true for environmental governance [3]. Proximity is likewise one of the factors influencing the scope and efficiency of environmental governance. Clustered industries can lead to increased environmental pollution, and similarly, centralized environmental governance can lead to enhanced governance. Therefore, collaborative environmental governance in the Yangtze River Delta region should also be placed at the forefront of regional integration, to ensure the high-quality development of integration.

3. Current Situation

The gross domestic product of the secondary and tertiary industries has continued to rise, the disposable income per capita of urban permanent residents has continued to increase, and industrial fixed asset investment has grown steadily in three provinces and one city in the Yangtze River Delta region in recent years. As the two sessions of the three provinces and one city in the Yangtze River Delta have all come to an end, the total economic output of the Yangtze River Delta region in 2023 is out - 30.5 trillion yuan, accounting for about 24.2% of the national share: the gross regional product of Jiangsu reaches 128,222.2 billion yuan, a year-on-year increase of 5.8%; the gross regional product of Anhui is 470,506 billion yuan, an increase of 5.8%; Zhejiang's GDP was 8,255.3 billion yuan, up 6% from the previous year; and Shanghai realized a GDP of 4,721.866 billion yuan, up 5.0% from the previous year.

High-intensity interventions of human activities have led to external impacts on the ecological environment, and the environment has been under increasing pressure, with the degree of sustainability gradually decreasing. According to data from the Statistical Yearbook of the Provinces in 2023, industrial effluent discharge in the Yangtze River Delta has continued to grow steadily, and the air environment is in poor condition, with the average concentration of PM2.5 in the 41 cities in the Yangtze River Delta region rising by 7.8% year-on-year, the average concentration of NO2 rising by 7.9% year-on-year, and the average concentration of the average daily average value of CO rising by 20.0% year-on-year.

Due to the growing intensity of human activities, the ecological vulnerability of the region is now gradually characterized and included as one of the emerging ecologically fragile zones in China [4]. According to the survey statistics of the report, the degree of ecological environmental vulnerability

level of the Yangtze River Delta urban agglomeration deepened from 2010 to 2018, and the overall transition from moderate vulnerability to severe vulnerability [5].

It is worth mentioning that Shanghai has always belonged to the area of extreme ecological vulnerability, which is related to the fact that Shanghai is a first-tier city in China as well as its extremely high population density. The higher the population density, the higher the intensity of human activities, and the higher the level of pressure on the environment and environmental damage.

The ecological and environmental problems of the Yangtze River Delta cannot be ignored, and the management of environmental issues and the restoration of the fragile state of the environment are goals that must be realized in the integration of the ecological management of the Yangtze River Delta region and its path to sustainable development.

4. The Development of Ecological Integration Policies in the Yangtze River Delta

The concept of Yangtze River Delta integration first appeared in the 2008 State Council's guiding document on the reform, opening-up and economic development of this area, which explicitly promoted the development of Yangtze River Delta integration, but the part of the document on ecological environmental protection was not clear.

In 2010, the Yangtze River Delta Regional Plan summarized the 2008 guidance program and further clarified the goals of the coordinated development of the region. For the part of ecological environment construction and protection, it specified six parts, namely, drinking water sources, sewage prevention and control, air pollution prevention and control, solid waste management, comprehensive improvement of the rural environment, and eco-construction, and the emphasis on ecological and environmental integration has been increased.

The 2016 Yangtze River Delta Regional Plan not only clarifies the specific content of ecological environmental protection, but also introduces the concept of ‘ecological co-construction and environmental co-management’, emphasizing the environmental protection and governance system of cooperation and co-management among cities.

The Outline of the Plan for the Integrated Development of the Yangtze River Delta released in 2019 deploys the master plan for the period of 2020-2035, and optimizes the supervision as well as implementation mechanism of environmental co-management. It provides more detailed, comprehensive and efficient planning for the ecological environment of the Yangtze River Delta. It also promotes the construction of the Yangtze River Delta Eco-Green Integrated Development Demonstration Zone and explores a new model of sustainable development for green-friendly integration.

5. Governance Dilemmas

At present, the Yangtze River Delta region has been attaching increasing importance to environmental governance, but there are still governance dilemmas in some aspects that slow down the process of collaborative governance.

First, there is a lack of harmonization between environmental governance and administrative divisions. The ecological environment is a holistic concept, and the division of administrative regions in China is contrary to the holistic nature of the environment [6]. Synergistic governance requires cross-regional cooperation. However, due to different geographical conditions and different governance mechanisms, the process of coordinating between places is complicated, which leads to inefficiency in synergistic governance [7].

There is also a synergistic dilemma in government-business coordination [8]. The perspective of the government in formulating governance measures is macroscopic, while the development strategy of enterprises is in favor of their own economic efficiency. The different perspectives between the government and enterprises often lead to irreconcilable conflicts between the two. Thus,

environmental governance by enterprises is often passive. The lack of initiative by enterprises may be due to a weak sense of responsibility for environmental protection or a lack of policy and institutional safeguards for enterprises.

The difference in governances between cities also makes the synergistic difficult. The level of ecological governance is associated with economic development, when the higher the economic level of a city, the higher the awareness and level of environmental governance in that place [6]. Even in one of the most developed regions in China, there are differences in governance levels between provinces and cities in the Yangtze River Delta region, which hinders integrated governance.

In addition, factors such as insufficient participation of social forces, insufficient scientific and technological innovation, and weak supervisory functions of the main units all work together to lead to difficulties in regional environmental governance [9].

6. Impact Mechanisms and Recommendations

The main impact mechanisms of the integration of ecological and environmental governance in the Yangtze River Delta and its sustainable development can be divided into three parts: regional synergistic cooperation, policy mechanisms, technical support, and social participation.

6.1. Regional Synergistic Cooperation

The Yangtze River Delta region has strong similarities in terms of geographic location, environmental factors, and degree of urbanization. In the case of this situation, for the development of environmental integration under similar conditions, regional coordination and cooperation is far more efficient for the three provinces and one city in the Yangtze River Delta to cooperate than to govern individually. The joint development of ecological goals among the three provinces and one city and the continuous follow-up of the governance process are necessary for the sustainable development of the Yangtze River Delta region's environment.

It is worth mentioning that the governments of the Yangtze River Delta region have jointly explored and established the ‘Joint River-Lake Chief System’. The system breaks through traditional administrative barriers and has led to an overall improvement in the governance of river and lake systems in the Yangtze River Delta region. Since 2018, the neighboring regions of Suzhou, Jiangsu Province, Qingpu, Shanghai and Jiashan, Zhejiang Province have established five mechanisms, which are joint inspection, joint cleaning, joint testing, joint law enforcement, and joint governance to take charge of the cross-regional governance of river and lake systems. This initiative also realized the ecological integration of the Yangtze River Delta region [10].

6.2. Policy Mechanisms

Policy support is a prerequisite for realizing coordinated regional governance and ecological integration in the Yangtze River Delta. Policy mechanisms include the formulation and supervision of laws and regulations, as well as relevant incentive systems. The most important thing for inter-regional coordination and integration is to set the same standards and unified goals, and to implement appropriate management and supervision of the established goals and red lines. At the same time, the implementation of environmental protection-related incentives for enterprises in different regions is conducive to the development of common governance.

In this regard, the Yangtze River Delta region has adopted the “Special Program for Joint Protection of Key Transboundary Water Bodies in the Yangtze River Delta Eco-Green Integrated Development Demonstration Area”, the “Action Program for the Construction of the ‘Three-Unified’ System of Eco-Environmental Management in the Yangtze River Delta Eco-Green Integrated Development Demonstration Area”, and the “Cooperation Agreement on the Prevention and Control of Cross-provincial Water Pollution Incidents in the Yangtze River Delta Region”, which focuses on environmental risk prevention and control and emergency response mechanism, joint law

enforcement mechanism, information sharing mechanism, joint inspection and enforcement mechanism and so on, which unified the integrated institutional arrangements [9].

6.3. Technical Support

Due to the development of urbanization accompanied by industrial transformation, environmental problems in the Yangtze River Delta region do not only exist in one aspect, but its environmental vulnerability and the degree of environmental pollution involve multiple perspectives of the environment, such as water pollution, air pollution, solid waste pollution, ground depression, and threats to the ecological red line. The complex ecological status needs to be precisely assessed, and the excellent technical resources and means of the Yangtze River Delta region are utilized for the restoration and management of the site.

Efficient environmental management requires precise positioning. Therefore, the Yangtze River Delta region can introduce the technology of "Internet +" based on the current governance means, collecting data related to the environment with the help of big data and the Internet. In this way, it can help to comprehensively assess the environment of the Yangtze River Delta region and arrive at the overall development trend of the environment. Big data can also be used to analyze environmental weaknesses in the context of environmental integration, pinpointing them and solving problems in a targeted manner [11].

In terms of environmental restoration techniques, different treatment methods are needed for different environmental problems. However, the current environmental situation is such that there is no single cause for the fragility of the Yangtze River ecosystem. Therefore, it is necessary to synthesize and apply a multi-scientific cross-cutting system of governance and restoration. For example, in the Yangtze River Delta region, it is necessary to synthesize the formation factors of ecological problems such as land, atmospheric and environmental pollution and ground subsidence in the region, and consider them in conjunction with existing restoration means, to select the most suitable multidisciplinary cross-cutting restoration and treatment technologies [4].

6.4. Social Participation

Environmental issues are also social issues. The development of urbanization requires the participation of citizens, and in another way, the creation of environmental problems is also related to citizens. However, as urbanization continues to grow, citizens' needs for a better living environment also grow. Citizens are also dissatisfied with the current environmental governance. Therefore, environmental sustainability is not only a task at the decision-making level, but also requires citizen participation.

There are still drawbacks to environmental governance through government alone. For citizens, citizen participation is precisely what can complement and support the shortcomings of the environmental governance process. For example, by participating in the government's decision-making process on environmental governance, citizens can provide their own opinions, and they can also cultivate a sense of environmental protection and try to avoid environmentally destructive behaviors in their lives. With the participation of the community, the government's environmental governance is supported by the public, and its efficiency as well as effectiveness will be more obvious in the Yangtze River Delta.

7. Conclusion

This paper is based on the context of urbanization, for the synergistic cooperation between regions, integrated development and sustainable development to explore. The Yangtze River Delta, as a model area for integrated development, has a guiding role for the whole country in its development model. As one of the parts of integrated development, it is necessary to pay attention to environmental issues. The Yangtze River Delta region has specified the means of collaborative governance in the overall development plan to actively address the threat of ecological problems brought about by the current

urbanization as well as to repair the ecologically fragile parts of the region and to promote sustainable development. Whether or not the environmental co-management policy is effectively practiced is worth monitoring by the public, and at the same time, to strengthen the degree of environmental co-management in the future.

To strengthen the degree of environmental co-management in the future, not only the decision-making departments need to clarify the ecological limits, but also the supervisory departments and the practical departments should pay more attention to the transformation of the relevant industries, and actively develop the green economy. The behavioral standards of the industries should be strictly implemented as well. Furthermore, the technical means of ecological management should also be updated in a timely manner, integrating multi-scientific and multi-faceted technical methods to formulate an appropriate management plan. It is necessary to follow the benchmark which is successful in the environmental synergy development. For citizens as participants, actively responding to environmental changes, starting from the smallest things around them, and integrating the concept of sustainability into their lives. These strategies are the indispensable backbone of environmental protection in the Yangtze River Delta, and even in the whole country.

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