

Article

Evolutionary Logic and Development Foresight of Environmental Collaborative Governance Policy in the Yangtze River Delta

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Abstract: The experience of environmental governance in the Yangtze River Delta has formed the practical paths of cross-administrative cooperation and eco-civilization adaptation to economic development. As a result of a scientific analysis of policy texts on collaborative environmental governance in this region, this paper explores differences and core concerns, uncovering the development vein and mapping out the internal logic in order to provide a reference example for multi-regional governance. The policy has shifted from decentralization to authority, from universality to precision, from sustainable development to a community of common ecological destiny, from authoritarianism to co-governance, and from institutional norms to propaganda and guidance. Since the beginning of the new century, the internal logic of environmental governance policy in the Yangtze River Delta has been in line with the trend of coordinated development. In the future, efforts should be made to deepen the trinity mechanism of decision making, implementation, and supervision. When making decisions, we should further emphasize the unified standard of centralized environmental management and adhere to precise pollution control. Implementation will gradually establish the three-dimensional coordination mechanism of region, function, and role; supervision will involve the platform “internet + environment”, and the assessment will involve “pressure mechanism + environment”.

Keywords: environmental governance; collaborative governance mechanism; policy changes; Yangtze River Delta; analysis of policy text



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1. Introduction

The environment is a global issue that directly affects the achievement of global sustainable development. It is an integral aspect of the 17 ambitious Sustainable Development Goals (SDGs) of the UN [1]. Human activities and the environment are closely linked and interact in complex ways [2]. In the practice of environmental governance, it is often found that environmental problems cannot be solved in isolation, but require collaborative governance between different administrative units [3,4]. For example, in managing atmospheric environmental issues, because atmospheric pollutants can be diffused, they cannot be handled only in a small area; multi-regional collaborative management often makes pollution management twice as effective with half the effort [5].

The 2022 Chinese government work report proposes to “continuously improve the ecological environment and promote green and low-carbon development”, to strengthen the comprehensive management of the ecological environment, to fight the battle against pollution, and to collaborate in order to promote high-quality economic development and health-level eco-environment protection. “Let green become the foundation of high-quality development” has become a logical starting point for the construction of an eco-civilization. Developing an ecologically safe society begins with the deepening of the institutional structure of environmental governance and the enhancement of cross-provincial and municipal

collaborative governance. The Yangtze River Delta region (YRD) is an international pioneer in the collaborative governance of environmental regions, continuously introducing and implementing a series of proactive policies from the top down, integrating cross-domain administration technology capital, talent, and other resources, and improving the governance capacity for collective prevention and control, which together create the “Yangtze River Delta environmental governance experience”.

Currently, the research in the cross-domain field of environmental collaborative governance mainly focuses on four aspects. Physical theory and experimental methods are employed to analyze the reasons for the difficulty in controlling environmental pollution in the YRD. Researchers have discovered the sources of pollution and transport processes [6] through a comparative analysis of the YRD and other key development areas [7,8] and have presented their findings: the YRD urban agglomeration is still in the running-in phase, but it has removed the low-level coupling relationship and achieved green development [9]. Second, researchers have focused on a single subject, such as energy in the YRD [10], green space [11], land-use efficiency [12,13], air emissions [14,15], etc., exploring the optimal governance path for environmental problems in the YRD. Third, researchers have paid attention to the effectiveness of the policy itself. Legislative cooperation in the YRD is still in its exploratory phase. The logical compatibility of the current legal system needs to be strengthened, and there is still room for improvement in the operational effectiveness of legislative cooperation [16]. From the perspective of law enforcement, the role of a fair competition review in breaking local protections, regional blockades, and industry barriers should be highlighted. An integrated or coordinated competition law enforcement system and mechanism in the YRD should be reasonably constructed [17]. Fourth, studies have focused on evaluating policy diffusion models and implementation effects, on conducting in-depth research on reproducibility, policy effect characteristics, and differences in regulatory objects under different policy diffusion models [18], and on predicting the future trend of green development efficiency in the YRD [19]. The above research results have laid a specific research foundation for this paper, but there are also some shortcomings. First of all, few works in the literature have taken the YRD’s environmental collaborative governance policy as the research context. This makes it difficult to analyze how three provinces and one city make use of policy formulation to solve the problem of collaborative governance at a deep level. Secondly, regarding research methods, there is a lack of comprehensive and in-depth analyses of environmental policies in the YRD, and policy recommendations based on the description of the current situation lack scientificity and feasibility. Lastly, based on the research conclusions, most studies have focused on optimizing environmental governance. They lack a future vision and are unable to form innovative governance strategies.

In the practice of regional collaborative governance, local governments often rely on top-down policies as a driving force. Many obstacles have prevented policy implementation, such as the diversity and independence of different regional policy-making bodies and the regional competition for policy-generated benefits [20]. In addition to exploring a standard code of conduct for integration, the YRD works to coordinate regional development among various administrative units. Firstly, rapid economic development makes it difficult to maintain a balanced ecosystem. There is a growing contradiction between economic development, population growth, environmental degradation, and resource depletion in the YRD. In economically developed regions, how can we ensure the regular operation of the ecosystem? How can ecological balance be maintained? Environmental governance has become a significant concern in key regions. Secondly, many environmental governance guidelines make it challenging to control cross-domain pollution. Environmental pollution in the atmosphere, watersheds, oceans, and soils is diffuse and permeable, has cross-regional effects in the YRD, and is poorly reversible and influential. It is difficult to achieve the expected governance effect by depending on any single local governance action. Finally, different governance standards make it difficult to unify the implementation efforts. The YRD has not yet formed a unified collaborative governance institution

or organization. Fundamentally resolving the problem of pollution transfer caused by different environmental standards is challenging. To improve the quality and efficiency of regional pollution control, it is necessary to focus on the following areas: the evolution of regional environmental governance policy, the evaluation period of the provincial environmental collaborative governance policy, and the future interests of regional environmental collaborative governance policy.

2. Materials and Methods

2.1. Study Area

According to the *Outline of the Yangtze River Delta Regional Integration Development Plan* issued by the *State Council* in 2019, the YRD includes 41 cities in Shanghai, Jiangsu Province, Zhejiang Province, and Anhui Province, with a total area of 358,000 km² (Figure 1). With less than 4% of the national land area, it produces nearly 1/4 of the total economic output and holds nearly 1/7 of the entire population. It is one of the regions with the most active industrial development, the highest degree of openness, and the most robust innovation ability in China. However, economic and population accumulation leads to the rapid consumption of resources and the aggravation of environmental pollution [21]. This includes severe soil pollution, the shortage of water resources, and the aggravation of air pollution. The complex socio-economic and social-ecological environments have increased the difficulty in the collaborative environmental governance of the YRD. It is necessary to deepen the construction of institutional environmental governance in various provinces and cities as this will promote the sustainable development of the ecology and the economy in the YRD.

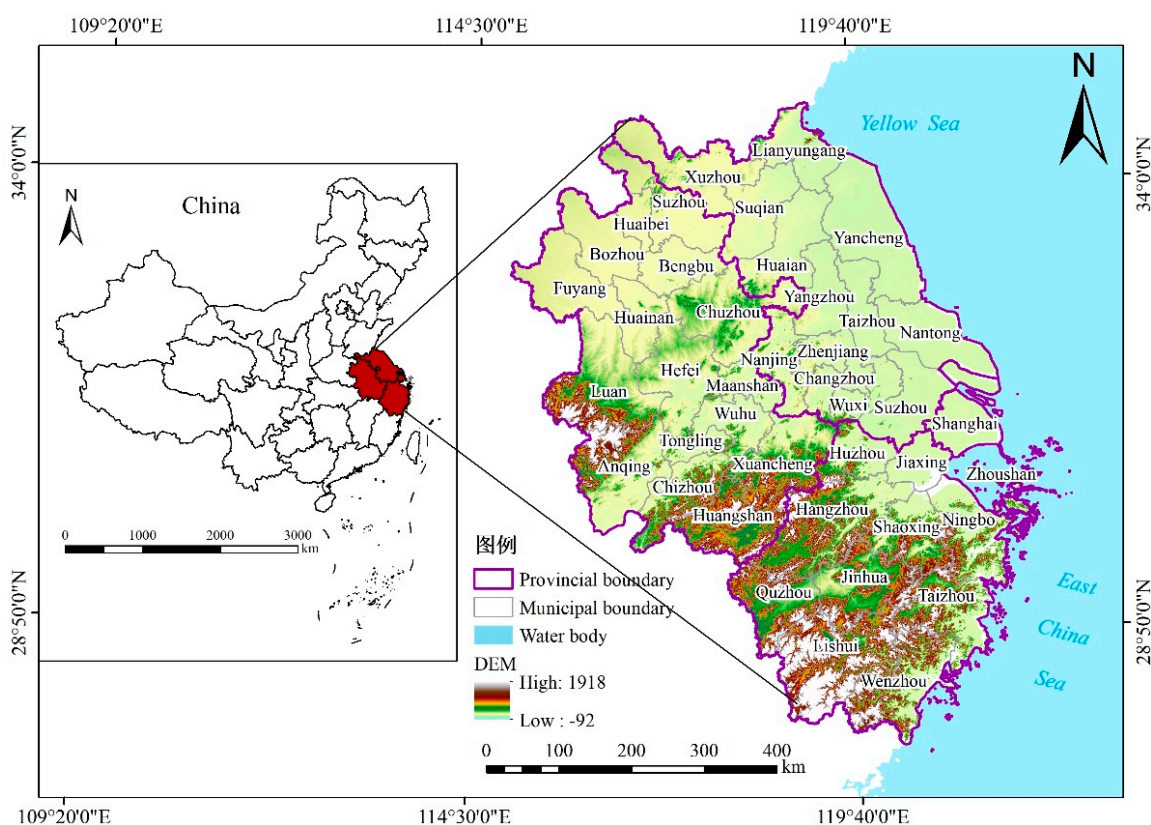


Figure 1. The map of the Yangtze River Delta region (YRD).

2.2. Study Methods

The research design is the embodiment of the overall framework. In order to systematically analyze the logic of policy evolution in the collaborative environmental governance of the YRD, this paper focuses on the relevant policies at the central level. These policies

involve environmental issues in the YRD. The collaborative governance policy text is used as the basic data, and the Nvivo12 software is used as a coding tool for in-depth exploration. After data retrieval and review, a total of 42 State Council documents, 32 Zhejiang documents, 54 Jiangsu documents, 41 Anhui documents, and 14 Shanghai documents were screened, totaling 183 documents.

Following the principles of openness and authority, we adopted the research method of policy text analysis, focused on the theme of “Yangtze River Delta Environmental Governance”, used “Yangtze River Delta”, “integration”, “environmental governance”, “energy saving and emission reduction”, and “ecological environment” as keywords, and scanned and collected relevant government documents published on the government affairs public website, including those issued by the *Central Committee of the CPC*, the *State Council*, the *Ministry of Ecology and Environment*, the *Department of Ecology and Environment of Zhejiang Province*, the *Department of Ecology and Environment of Jiangsu Province*, the *Department of Ecology and Environment of Anhui Province*, and the *Shanghai Municipal Bureau of Ecology and Environment*, which are all relevant policy documents for the extraction of effective policy signals. The 183 policy documents were chosen based on the fundamental research dimensions of role object, topic orientation, policy means, functional orientation, and action mode to form a complete coding system (Figure 2), which were used to compare the coordination of environmental collaborative governance policy design in various regions. Schemes and differences were identified, and the typical characteristics of the experience of collaborative environmental governance in the YRD were explored.

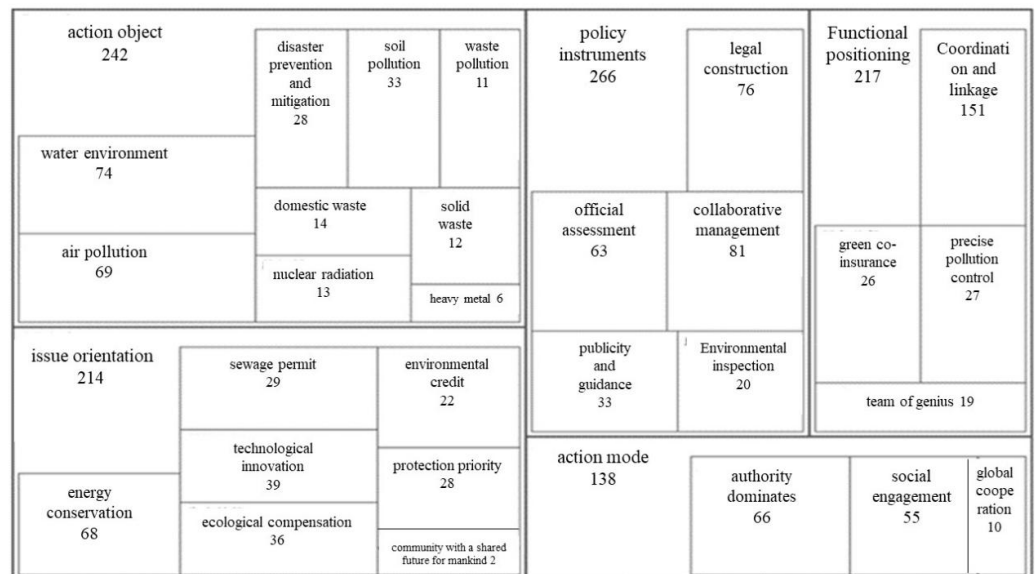


Figure 2. Node coding level and the set of reference points.

2.3. Study Tools

Policy text analysis is a content research method that combines qualitative and quantitative methods. Nvivo12, developed by the QR company, is used as a coding tool to mine information about materials [22]. It also directly reflects the environmental collaboration preference of each province and city. We imported 183 policy texts into Nvivo12 for open coding (establishing free nodes), spindle coding (establishing tree nodes), and selective coding. Finally, 28 core nodes were formed with 1120 reference points, as shown in Table 1.

Table 1. Coding of policy texts at various government levels in the Yangtze River Delta.

	Government Level	Number of Policy Documents	Typical Policy Text	Number of Coding Reference Points
Central level	The State Council	42	<p>Outline of the Yangtze River Delta integrated regional development plan</p> <p>The overall plan of the integrated Yangtze River Delta ecological and green development demonstration area</p> <p>Measures for the assessment of the implementation of the air pollution prevention and control action plan</p> <p>Soil pollution prevention action plan</p> <p>... ..</p>	401
Provincial level	Zhejiang Province	32	<p>Further promoting the reform and opening up as well as economic and social development in the Yangtze River Delta region, relevant key work division plan</p> <p>Notice from the general office of the people's government of Zhejiang Province on printing and distributing the 2020 implementation plan of the "4 + 1" major project construction plan in Zhejiang Province</p> <p>Zhejiang Province's "three lines and one single" ecological environment zone management and control plan</p> <p>... ..</p>	189
	Jiangsu Province	54	<p>Three-year construction plan for ecological environment monitoring and the monitoring system in Jiangsu Province (2018–2020)</p> <p>Implementation plan of the Jiangsu Province vessel emission control zone in Yangtze River Delta Waters</p> <p>Implementation of opinions of the general office of the provincial government on accelerating the development of green, circular, and low-carbon transportation</p> <p>... ..</p>	224
	Anhui Province	41	<p>Anhui Province's enterprise environmental credit and green credit linkage measures (for trial implementation)</p> <p>Implementation plan for Anhui Province's three-year action plan for winning the blue sky defense war</p> <p>Anhui Province green development action implementation plan</p> <p>... ..</p>	167
	Shanghai	14	<p>Memorandum of understanding on cooperation in implementing credit joint rewards and punishments in the field of environmental protection in the Yangtze River Delta</p> <p>Opinions on the implementation of the city's "three lines and one single" ecological environment zoning management and control</p> <p>Memorandum of work on the coordinated promotion of the integration of benchmarks for ecological and environmental administrative penalties in the Yangtze River Delta region</p> <p>... ..</p>	139
	Total	183	1120

3. Results

3.1. Overall Overview of the Policy

From the combined comparison of the form and the specific content of the policy text on the horizontal axis, it can be seen that the text forms of the *State Council* and those of the three provinces and one city are mainly based on incentive policies such as notices and opinions, while other forms are supplemented (Figure 3). However, there are problems such as the generalization of topics. Most of the planning texts, such as the *13th Five-Year Plan for Economic and Social Development of the People's Republic of China* (from now on referred to as the *13th Five-Year Plan*) and the *14th Five-Year Plan*, mention the necessity for collaborative environmental governance in the YRD, which is relatively macro in outline form; it also lacks detailed implementation documents. Few administrative policies deal with formal and specific practical procedures, steps, and principles. For example, the *Outline of the Yangtze River Delta Regional Integrated Development Plan* clarifies the path and direction of the coordinated and integrated development of the YRD as well as the principles, policies, and action plans that must be adopted for the shared environmental governance issues.

According to the word frequency analysis of the word cloud based on 1120 coding reference points, a keyword cloud analysis diagram is formed. The word frequency data in Table 2 reflect three of the YRD environmental collaborative governance policy's apparent characteristics. The first is that the keywords "region", "integration", "Yangtze River Delta", "comprehensive governance", and "informatization" have a total of 2790-word frequencies, indicating that both the collaborative governance path and the policy measures focus on the development of the whole and the part, intentionally reducing the gap in the YRD in terms of the efficiency of ecological-environmental pollution control as well as benchmarking the development experience of the "first trial, demonstration, and leading" regions in order to increase the overall effectiveness of regional environmental governance. However, this does not mean that the governance content must be the same. While maintaining the same goals and standards, we should also respect the different government schemes and policies adapted to local conditions within the jurisdictions of the YRD. Second, keywords such as "people's government", "Ministry of Agriculture", "joint meeting", and "enterprise" have a total of 1902-word frequencies, revealing that the current environmental governance policy process is primarily controlled by the competent administrative department, with support from other groups. However, policy attention has gradually shifted to enterprises, which reflects the prominent role of enterprises in pollution discharge and pollution prevention and control. A total of 1407 words in the document are related to pollution, such as "pollution", "motor vehicles", "drinking water", "heavy metals", and "licenses", demonstrating the government's goal of precise pollution control, which begins with source prevention and management in order to improve emissions trading and ecological compensation, and to support the improvements in the cross-administrative regions' environmental pollution control systems.

Table 2. Word cloud word frequency analysis.

Words	Frequency	Words	Frequency	Words	Frequency
Region	1488	Pollutants	611	Water pollution	205
Environmentally friendly	1359	People's government	293	Pollution source	198
Monitor	1307	Motor vehicle	242	Heavy metal	192
Enterprise	1247	Integration	238	License	182
Emission	1242	Informatization	232	Ministry of Agriculture	132
Yangtze River Delta	702	Drinking water	224	Comprehensive governance	130

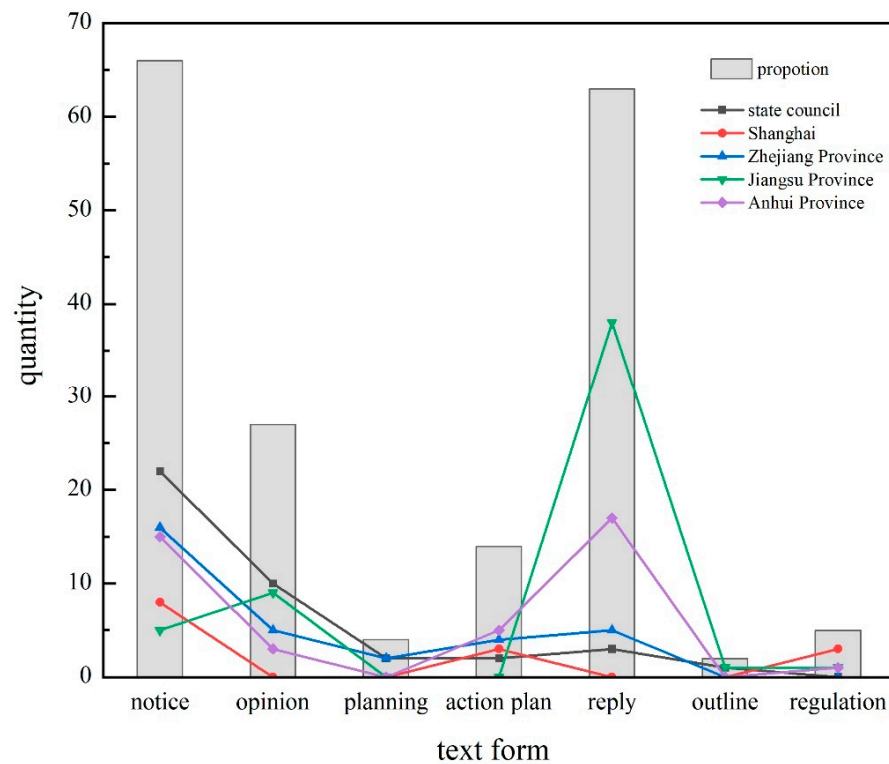


Figure 3. Statistics representing policy texts.

3.2. Evolutionary Logic of Policy Changes

During the period of the *13th Five-Year Plan*, the national strategy for the integrated development of the YRD changed from blueprint design to comprehensive construction. Due to severe pollution problems, the YRD has explored a new path of eco-priority, green, and high-quality development [23], which helps explore the “Environmental Governance Experience in the Yangtze River Delta”. In June 2020, the ecological environment departments of the three provinces and one city jointly signed the *Work Memorandum on Coordinated Promotion of the Integration of the Ecological Environment Administrative Penalty and Discretion Benchmarks in the Yangtze River Delta Region*, which unifies the environmental governance standards in the YRD, formulates ecological-environmental protection plans, improves regional pollution, and accelerates the construction process of green integrated development demonstration zones, thus clarifying the implementation path for the *14th Five-Year Plan*. According to the quantitative analysis of the policy texts, the logic of the evolution of environmental policies in the YRD is mainly divided into three stages (Figure 4). As the characteristics of each stage are reflected in the policy text for the first time, the internal logic of the YRD’s environmental collaborative governance experience is explored in five dimensions: change trajectory, functional positioning, issue orientation, action mode, and policy instruments.

3.2.1. Change Trajectory: From Decentralization to Authority

It can be seen from the specific content of the policy texts (from that of the *State Council* to that of the provincial governments), which deal with the collaborative environmental governance of the YRD, that the central government’s form of instruction for the collaborative environmental governance of the YRD is constantly changing. From the initial decentralized and specialized opinions or notifications, it has risen to the national strategic level, subsequently formulating the outline of the development plan and enhancing the authority of the regional government’s environmental collaborative governance policy.

Year		1990–2013	2014–2018	2019–2021
Inner Logic	Policy instruments		institutional norms	propaganda and guidance
	Action mode	authoritarianism	co-governance by the whole people	
	Issue orientation	sustainable development		a community of ecological destiny
	Functional positioning		universality	precision
	Change trajectory	decentralization	transition	authority

Note: The “co-governance by the whole people” feature in the “action mode” first appeared in the second stage and continued to the next period.

Figure 4. Inner logic diagram of policy carding.

The first phase was the period of policy dispersion, from 1990 to 2013. After the construction and opening of the *Shanghai Pudong New Area* in 1990, the idea of synergy in the YRD gradually emerged. The main objective was to integrate 16 cities in Jiangsu, Zhejiang, and Shanghai. From among a wide range of laws, regulations, and policy texts, one of the focuses in 2013 was integrated development. Furthermore, the breadth and depth of the development practice acquired for more than 20 years were still insufficient, especially regarding environmental governance in the YRD. There is a lack of authoritative guidance and development plans. Taking the *11th Five-Year Plan* issued in 2007 as an example, the *Notice of the General Office of the State Council on Printing and Distributing the National Comprehensive Disaster Reduction 11th Five-Year Plan* emphasizes the comprehensive capacity building performed in the YRD to deal with major disasters. Research has been conducted on the mechanism of disaster occurrence, the law of activities, and the relationship between secondary disasters; the *Notice of the State Council on Printing and Distributing the National Environmental Protection 11th Five-Year Plan* clarifies that it is necessary to strengthen the comprehensive improvement of the regional environment of the YRD urban agglomeration, and to focus on reducing the total emissions of major pollutants. The coordinated environmental governance policies of the YRD were incorporated into the specialized policy texts during this period. In response to the shared environmental problems that all parts of the country are facing and need to solve urgently, the central government put forward universal solutions. It also emphasized the importance of the special status of collaborative governance in the YRD, particularly in relation to environmental policy design.

The second stage is the policy transition period from 2014 to 2018. The first successful exploration of the three provinces and one city in the field of air pollution cooperation opened the stage of coordinated governance in the YRD, from decentralized exploration to authoritative recognition. Consistent with the “establishment of a regional linkage mechanism for pollution prevention and control”, it is necessary to focus on ecological integrity and to break regional boundaries. A first working meeting of the *Yangtze River Delta Regional Air Pollution Prevention and Control Collaboration Group* was held in Shanghai in January 2014 under the principles of “consultation and coordination, responsibility-sharing, information sharing, and joint prevention and control” [24]. The relevant leaders of the state ministries and commissions and those of the local governments in the YRD all actively participated in realizing the organic integration of vertical and horizontal intergovernmental relations [25]; they also jointly reviewed and unanimously approved the “*Working Charter of the Air Pollution Prevention and Control Cooperation Group in the Yangtze River Delta Region*”. The team fully played its coordination role and explored a practical model for the joint prevention

and control of cross-regional pollution. In December 2016, the first working meeting of the *Yangtze River Delta Regional Water Pollution Prevention and Control Collaboration Group* was held in Hangzhou to clarify the goal of improving the efficiency of the operating mechanism. It aimed to be consistent with the air pollution prevention and control coordination mechanism, and to achieve institutional co-sponsorship and deliberation. Since then, joint prevention and control mechanisms have been developed, which cover air pollution, water pollution, soil pollution, energy conservation, and emission reduction in the YRD. Regulations are helpful for the construction and operation of mechanisms such as regional testing, collaborative business, and joint law enforcement supervision.

The third stage is the period of policy authoritativeness, which began in 2019. Policy guidance and support from the national level will help to overcome the shortcomings of local spontaneous cooperation, to dilute the division of administrative regions, and to gradually shift from “fragmented” to “systematic” environmental collaborative governance in the YRD [26]. In 2019, the *State Council* issued the *Outline of the Yangtze River Delta Regional Integrated Development Plan*, which proposed to vigorously develop the green economy and to achieve the internal co-governance and co-protection of ecological space. Zhejiang Province developed the *Zhejiang Province Special Action Plan for Promoting the Integrated Development of Ecological Environment Protection in the Yangtze River Delta*. In terms of jointly building an eco-civilization system, promoting the coordinated governance of rivers, lakes, and seawater environments, and strengthening cooperation in local eco-environmental protection, the YRD thus promotes the integrated development of eco-environmental protection [27]. In November 2019, the *National Development and Reform Commission* released the *Overall Plan for the Demonstration Zone of Ecological Green Integrated Development in the Yangtze River Delta and the Three Unification System Construction Action Plan for Ecological Environment Management in the Ecological Green Integrated Development Demonstration Zone in the Yangtze River Delta* in October 2020. These policies show the YRD’s determination to take the lead in exploring regional, ecological, green integrated development. In January 2021, the *Yangtze River Delta Regional Ecological Environment Joint Protection Plan* was officially issued, marking the first time that “Yangtze River Delta Environmental Collaborative Governance” appeared in an authoritative policy document, which focused on the systemic, regional, and cross-border issues faced by the YRD. Ecological and environmental problems were also highlighted. The regional cooperation mechanism of unified planning and unified law enforcement and supervision was thus strengthened, indicating that the collaborative environmental governance of the YRD has reached a new level.

3.2.2. Functional Positioning: From Universality to Precision

The YRD prioritizes active economic development, reform, and innovation. However, the eco-environment has been overloaded for a long time. Due to the significant differences in natural resource endowments, economic and social conditions, and eco-environment governance efficiency, the causes of environmental pollution are complex. The stakeholders are diversified. It is difficult for universal policies to meet reality, and achieving the goal of eco-friendly and green integrated development is problematic. Therefore, policy functions have begun to tilt towards precise positioning, and policy documents emphasizing precise pollution control paths have become more and more abundant. Precision differs from pertinence as it emphasizes the specific analysis of specific problems and creates policy synergies in particular areas. From the Nvivo 12-encoded data (Table 3), it is apparent that the environmental protection policy in the YRD is dominated by the three significant battles of atmosphere, water, and soil, supplemented by other environmental protection fields. Government attention has constantly been extended to disaster prevention and mitigation, waste pollution, domestic waste, and nuclear radiation. Despite the vigorous implementation of collaborative governance policies, the environmental battle involves a lot of eyesight and takes a long time. To promote the optimization and upgrading of pollution prevention and control paths, it is necessary to continuously accelerate the transformation of policy function positioning from universality to precision.

Table 3. Node hierarchy and coding information with precise pollution control “objects of concern”.

Node	Child Node	Reference Points	Coding Example
Object of attention	Air Pollution	79	Enhance the Meteorological Service Function of the Ecosystem in the YRD
	Water pollution	74	Strictly implement water pollution prevention and control measures
	Soil pollution	33	Classification and prevention of soil environmental pollution
	Disaster Prevention and Mitigation	28	Strengthen environmental risk prevention and emergency measures
	Domestic waste	14	Sort and dispose of municipal waste to promote reduction and harmlessness; strengthen major scientific and technological breakthroughs in pollution prevention and control
	Nuclear radiation	13	Strictly supervise the nuclear and radiation environment, and cooperate with the Public Security Department to carry out a special campaign for the safety of radioactive sources in the province
	Solid Waste	12	Promote the safe disposal of solid waste
	Heavy metal	6	Implement total emission control of key heavy metal pollutants in key areas for comprehensive prevention and control of heavy metal pollution

The reference point for “air pollution” is 79, which focuses on precise pollution control. Efforts to enhance the meteorological service function of the YRD ecosystem have achieved remarkable results. Since implementing the *State Council’s Air Pollution Prevention and Control Action Plan* in 2013, the YRD has actively promoted the joint prevention and control and data sharing in the YRD and has coordinated the management of air pollution in the region. In 2017, the annual average concentration of fine particulate matter in the atmosphere of 25 cities in the YRD was $44 \mu\text{g}/\text{cm}^3$. Compared with 2013, this amount decreased by 34%. The environmental collaborative governance strategy has achieved positive results. However, in the first half of 2018, the PM_{2.5} concentrations in 24 cities in the YRD rebounded. Therefore, the *Notice of the Three-Year Action Plan for Winning the Blue-Sky Defense War* was issued, which adheres to problem orientation and the establishment of measures to “optimize the industrial structure and promote green development” according to local conditions. The three provinces and one city actively responded and formulated local action plans. From 2018 to 2020, the overall air quality in the YRD improved. The proportion of days with good air quality in cities has increased yearly, and the values of PM_{2.5} and PM₁₀ have decreased annually (Figure 5).

The “Water Pollution” reference point is 74. As the key target of the three major environmental battles, the YRD strictly implements water pollution prevention and control measures and unifies local standards. The YRD attaches high importance to rural eco-environmental protection, and thus local standards were formulated early. However, the effectiveness of rural eco-environmental protection has been hindered by objective and subjective constraints, and it is not easy to get through the last mile of phased progress. To promote the comprehensive improvement of the rural environment, the government departments of the three provinces and one city continue to identify and analyze the differences in environmental protection between the rural and urban areas; they also continue to carry out improvements in the rural living environment and establish a pollution disposal system that conforms to the actual situation in the countryside. Taking domestic sewage

treatment as an example, Zhejiang Province issued the *Water Pollutant Discharge Standards for Rural Domestic Sewage Treatment Facilities* in 2015. Then, Shanghai, Anhui Province, and Jiangsu Province began to draft relevant documents on the rural domestic sewage discharge standards within their jurisdictions. The local standards for rural domestic sewage treatment in the YRD are significantly more advanced than those of the national government departments. Until August 2020, the *Ministry of Ecology and Environment* and the *Ministry of Housing and Urban-Rural Development* jointly issued the *Notice on Accelerating the Development of Local Rural Domestic Sewage Treatment and Discharge Standards*, which required localities to pay attention to the development progress of rural domestic sewage treatment and discharge standards, thereby improving the level of rural domestic sewage treatment (See Table 4).

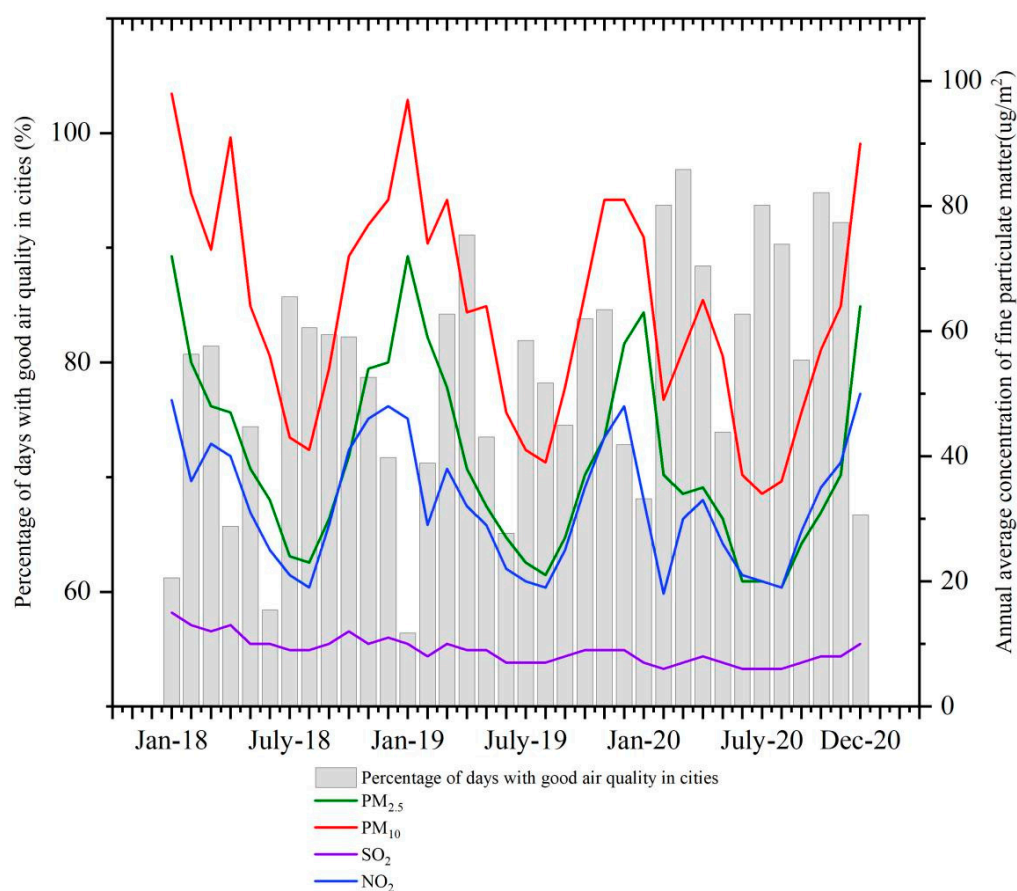


Figure 5. Trend chart of air quality change in the YRD.

3.2.3. Issue Orientation: From Sustainable Development to a Community of Common Ecological Destiny

Issue orientation was originally an environmental protection concept that was passed down from generation to generation under sustainable development. International co-operation and environmental protection policies were then extended to encompass the vision of a community with a shared future for humanity (Table 5). *China's 21st Century Population, Resources, Environment, and Development White Paper* in 1992, for the first time, revealed that the sustainable development strategy was incorporated into the long-term planning of national social development, emphasizing the appropriate development of natural resources and guaranteeing future generations the opportunity to fairly enjoy the resources of the world [28]. Under its guidance, the sustainable development level of the YRD has been continuously improved. In 2006, the *China Urban Sustainable Development High-level Forum* released the *Empirical Analysis of the Sustainable Development of Cities in the Yangtze River Delta*, which comprehensively evaluated the sustainable development level of

the 16 cities in the YRD and encouraged governments at all levels to consciously adhere to the environmental as well as the economic and social aspects of the practical approach to coordinated development. The incorporation of green quality into the index system of comprehensive and fundamental modernization as well as the holding of joint meetings, among others, have prompted environmental protection cooperation in the YRD to enter a substantive start-up stage [29]. In June 2020, the ecological environment departments of the three provinces and one city jointly signed the *Work Memorandum on Coordinating and Promoting the Integration of Ecological and Environmental Administrative Penalty and Discretionary Benchmarks in the Yangtze River Delta Region*, which emphasized the deepening of cross-regional cooperation in ecological and environmental protection, therefore resolutely winning the battle against pollution in the YRD in order to jointly protect the lifeline of sustainable development and to ensure that natural resources can be enjoyed equally between generations.

However, it is often difficult for a single local government to solve eco-environmental problems across administrative regions, mainly to deal with the issue of diffuse environmental pollution. Intergovernmental cooperation and collaborative governance are much more needed. In 2011, *China's Peaceful Development White Paper* put forward the new perspective of "a community of a shared future" and called for the gradual formation of a global value for jointly addressing human challenges and realizing the common interests of humanity. Thus, under the guidance of the concept of "a Community with a Shared Future for Mankind", the local governments of the YRD strengthen the citizens' awareness of "a community of ecological destiny" in the region and actively create a supervision model that integrates eco-protection red lines [27]. The YRD, in its creation of the legal system, further enshrines the concept of a "community of common ecological destiny" and emphasizes a green lifestyle. The *Yangtze River Delta Eco-Green Integrated Development Demonstration Zone* was launched on 31 October 2020. The first draft of land and space planning was compiled across provinces and were made legally effective, resulting in a unified preparation, joint approval, and joint implementation. Meanwhile, government departments around the YRD continue to improve the environmental education system, environmental protection awareness, knowledge, ethics, and the social responsibility of stakeholders in order to grow the value of sustainable development and explore the construction of a "community of common ecological destiny".

3.2.4. Action Mode: From Authoritarianism to Co-Governance by the Whole People

Today's international environmental governance situation is changing day by day. As a representative of developing countries, China has consciously increased pressure to reduce emissions. It has also strengthened its determination to improve its independent national contribution to global energy conservation and the emission reduction process. At the *Climate Ambition Summit* in December 2020, the Chinese leader committed that carbon dioxide emissions per unit of GDP will fall by more than 65% by 2030. The YRD, as a key region for energy conservation and emission reduction in China, plays a "pioneer" role in the development, transformation, and comprehensive reform process. From Table 6, we can see that "authority-led" accounts for the most significant proportion of policy coding in the action mode, which appears 66 times in the policy text, and emphasizes the role of organizational leadership in the collaborative governance of the YRD environment. The second is that "social participation" appeared 55 times and was gathered in the second half of the year, emphasizing public participation in environmental protection governance. Finally, "international cooperation" has the fewest occurrences and is the new focus of current policy attention. In the YRD, there has been no policy synergy. Therefore, to achieve the expected energy conservation and emission reduction goals, the YRD's environmental collaborative governance policy is constantly innovating, changing from authoritarianism to co-governance.

Table 4. Formulation of local standards and central documents for rural domestic sewage treatment in the YRD.

Area	Local Standards and Central File Names	Promulgating Unit	Current Progress	
			Released	Implemented
Zhejiang	<i>Discharge Standard of Water Pollutants for Rural Sewage Treatment Facilities DB 33/973—2015</i>	<i>Zhejiang Provincial People's Government</i>	29 June 2015	1 July 2015
Shanghai	<i>Discharge Standard of Water Pollutants for Rural Sewage Treatment Facilities 31/T 1163—2019</i>	<i>Shanghai Administration for Market Regulation</i>	14 June 2019	1 July 2019
Anhui	<i>Discharge Standard of Water Pollutants for Rural Domestic Sewage Treatment Facilities DB34/3527—2019</i>	<i>Anhui Provincial Department of Ecology and Environment and Anhui Provincial Administration for Market Regulation</i>	25 December 2019	1 January 2020
Jiangsu	<i>Discharge Standard of Water Pollutants for Rural Domestic Sewage Treatment Facilities DB32/3462—2020</i>	<i>Jiangsu Provincial Department of Ecology and Environment and Jiangsu Provincial Administration for Market Regulation</i>	13 May 2020	13 November 2020
Central Committee of the CPC	<i>Guiding Opinions on Promoting Rural Domestic Sewage Treatment</i>	Nine departments, including the Central Agricultural Office		July 2019
Central Committee of the CPC	<i>Notice on Accelerating the Formulation of Local Rural Domestic Sewage Treatment and Discharge Standards</i>	Ministry of Ecology and Environment and Ministry of Housing and Urban-Rural Development		August 2020

Table 5. “Issue orientation” node hierarchy and coding information table.

Node	Child Node	Reference Points	Coding Example
Issue orientation	Energy conservation	68	About encouraging the development of emerging environmentally friendly industries
	Technological innovation	39	Strengthening scientific and technological support for the prevention and control of hazardous waste pollution
	Ecological innovation	36	Further promotion of the pilot project of horizontal ecological compensation in the upper and lower reaches of the Xin'an River
	Sewage permit	29	Accelerating the implementation of the pollutant discharge permit system
	Protection priority	28	Adhering to the priority of protection and implementing the red line of ecological protection
	Environmental credit	22	Strengthening the responsibility of polluters; improving the environmental protection credit evaluation, mandatory information disclosure, severe penalties, and other systems
	Community with a shared future for mankind	5	The construction of ecological civilization is an important part of building a community with a shared future for mankind

Table 6. “Action Mode” node hierarchy and coding information table.

Node	Child Node	Reference Points	Coding Example
Action mode	Global Cooperation	10	Strengthen international environmental cooperation; deepen international cooperation and exchanges on disaster prevention and mitigation
	Authority Dominates	66	Strengthen organizational leadership; give full play to the role of the central and local regional coordination mechanisms
	Social Engagement	55	Strengthen public participation; promote general understanding and participation in environmental protection governance

In the environmental governance model under authoritarianism, the government assumes the leading role in policy formulation and implementation. Other subjects are on the verge of losing their sense of participation. The government takes advantage of “concentrating efforts to do big things” and can achieve emission reduction targets in a short period under certain circumstances. For example, in order to ensure the smooth holding of the *2014 Nanjing Youth Olympic Games*, the environmental protection departments of the three provinces and one city jointly discussed the *Nanjing Youth Olympic Games Environmental Quality Collaboration Guarantee Plan*, shared air quality data and pollution source emission lists, and protected the high-quality eco-environment during the games. However, it is challenging for authoritarianism to guarantee the long-term effectiveness of green co-insurance, and environmental governance in the YRD has long faced the problem of a rigid stripe structure. The fragmentation of environmental governance authority results from the increasing competition and conflict among stakeholders in the decision-making process [30]. The report from the *19th National Congress of the CPC* in 2017 recommended “adhering to joint governance by all people and prevention and control at the source”. The local governments of the Yangtze River Delta actively responded to the call, advocated for the pursuit of the value of co-governance by the whole people, and guided and encouraged enterprises, the public, new media, NGOs, and other entities to engage in specific actions in the formulation and implementation of environmental governance policies. In August 2020, Zhejiang Province issued the *Implementation of Opinions on Establishing and Improving the Discovery Mechanism for Environmental Pollution Problems*, requiring the government, market, and society to collaborate and participate in constructing the environmental governance mechanism. The leading role of “responsibility” emphasizes the precise assistance and implementation of the main responsibility of enterprises, enhances the ability of the masses to participate, introduces private funds to allocate ecological monitoring equipment, etc., in order to ensure the effective operation of the public supervision mechanism for environmental governance. To ensure the efficient operation of the public supervision system for environmental governance, the government strengthens the leadership role by emphasizing precise assistance and action on the enterprises’ part, by improving the ability of the masses to participate, and by introducing private funds to allocate ecological monitoring equipment.

3.2.5. Policy Instruments: From Institutional Norms to Propaganda and Guidance

In China, the implementation of environmental pollution control adopts a dual-track responsibility mechanism. The party and the government share the same responsibility. The newly revised *Environmental Protection Law* in 2015 clarifies the government’s responsibility for the supervision and management of environmental protection. According to the *Accountability Regulations of the CPC* in 2016, those who provide poor leadership or make serious mistakes in promoting the construction of eco-civilization should be held responsible for severe losses. According to the *Measures for the Evaluation and Assessment of Ecological Civilization Construction Objectives* in December 2016, the party and the government are responsible for evaluating and assessing eco-civilization [31]. Using a dual-track

responsibility mechanism, public officials can effectively supervise the implementation of their policies. In addition, it can effectively reduce the speed of “oasis degradation” and ensure the integrity of ecological balance.

Environmental inspectors and official assessments guaranteed the mechanism. On the one hand, “Environmental Protection Inspector” started as a pilot project in Hebei Province in 2015 and officially entered all provinces across the country. Among them, the environmental protection inspection work in the YRD was highly valued by the *Central Committee of the CPC*. Can ecological stability be maintained under the premise of rapid economic development? The public information facilitated by environmental inspectors stationed in the YRD is an example of coding (Table 7). The analysis of the coding results shows that the reference points for “coordinated supervision” and “legal system construction” are the largest, appearing 157 times in the policy text. The data shows that our country attaches high importance to constructing and improving institutional norms of “laws to follow and strict enforcement”. Although “propaganda and guidance” does not appear often, it has been frequently mentioned in recent years, and the trend toward concentration is evident. Therefore, to implement the requirements of the integrated development of the environment, the YRD has gradually changed the focus of policy measures, moving from institutional norms to publicity and guidance.

Table 7. “Policy instruments”, node hierarchy and coding information table.

Node	Child Node	Reference Points	Coding Example
Policy instruments	Legal construction	76	Deepen the reform of the ecological civilization system and improve the long-term governance mechanism (Zhejiang August 2017)
	Official assessment	63	Strengthen responsibility and assessment (Anhui April 2017)
	Environmental inspector	20	Improve political standing and resolutely shoulder the political responsibility of inspectors and rectification (Jiangsu May 2018)
	Collaborative supervision	81	Strengthen law enforcement with an iron fist and continue to increase environmental supervision (Shanghai November 2016)
	Publicity and guidance	33	Increase efforts to solve outstanding ecological and environmental problems around the masses and strive to improve the comprehensive management of the ecological environment (Anhui October 2018)

On the other hand, the number of reference points for “official assessment” ranks third among the total nodes of policy measures. The achievement of local eco-civilization is linked to the efforts of officials, as it was mentioned 63 times. Such an approach is conducive to the further improvement of the efficiency of local governments in dealing with environmental pollution problems. By way of example, in 2014, the *Measures for Assessing the Implementation of the Air Pollution Prevention and Control Action Plan* was implemented, which effectively stimulated the interest of environmental law enforcement officers. By 2016, the scope of assessment was expanded, and a formal and unified target evaluation system was formulated, namely the *Method for Evaluation and Assessment of Ecological Civilization Construction Objectives*, to further strengthen the assessment of joint prevention and control and to enhance the endogenous driving force for the collaborative environmental governance of local governments [32]. Since 2018, the YRD has been designated as the subject of collaborative assessment. PM_{2.5} in the YRD was released by the *Ministry of Ecology and Environment*, emphasizing the policy direction of joint air pollution prevention and control in the YRD. In addition, governments established the dual-level performance structure of “ecology and economy” [33], substantially promoting the unification of economic, social, and ecological benefits.

Although the government's role in collaborative environmental governance has gradually emerged and improved, the public nature of environmental governance indicates that government failure is inevitable. This requires stakeholders to participate, supervise, and govern together. The current policy texts, however, emphasize administrative and market means to curb other entities' pollution discharge behavior. The specific procedures, methods, and degrees of public participation in environmental governance are not well-regulated, and the results are minimal. As one of the objects of environmental policy implementation, the public is both the participant and victim of pollution behavior. There is an urgent need for the effective implementation of environmental policy. Therefore, the public should be the most active policy responder. At the policy design level, more attention should be paid to ensuring the correct publicity and guidance for the public and to the gradual increase in the intensity of advertising and education. In August 2020, Anhui Province issued the *Notice on Printing and Distributing the Overall Emergency Response Plan for Anhui Province Emergencies*, which pointed out that emergency command agencies at all levels should formulate a unified information release and public opinion guidance plan. The main ways for the public to participate in the construction of ecological civilization include legislative participation, decision-making participation, and execution participation [34]. To achieve this objective, the government must provide transparent affairs, guide public opinion, promptly promote other regions' work results, and actively create an environment where the whole society could jointly supervise and participate in environmental governance.

4. Discussion

4.1. *Environmental Collaborative Governance Policy and Environmental Performance*

Environmental performance is the measurable effectiveness of an environmental management system based on environmental objectives and factors. It is used to express the actual environmental consequences related to the level of effort and quality of work. It should be said that environmental performance is the ultimate criterion for evaluating environmental policies [35]. Environmental policy yields huge benefits. Environmental sustainability is closely related to environmental policies, for example, policies that prevent food waste significantly reduce environmental consequences [36], policies that effectively manage natural resources can transform the resource curse into national well-being [37], and policies that build ecology effectively improve the ecological footprint [38].

After more than three decades of promoting collaborative environmental management, the environmental conditions in the YRD have improved significantly, with an effective initial treatment of air, water, and soil pollution. One study found that regional integration gradually contributed to the improved environmental performance [39]. The YRD has also seen steady growth in environmental performance in the recent years [40]. Because this study focuses on the analysis of environmental collaborative governance policy texts, environmental performance was not examined. However, environmental performance, as a reflection of the effectiveness of environmental policy implementation, may be of guidance for future environmental policies. Therefore, the next research should focus on studies that measure how much of an impact these environmental collaborative governance policies have actually had on the environment.

4.2. *The Future Direction of Environmental Collaborative Governance Policy*

In analyzing the internal logic of relevant policy texts on collaborative environmental governance, it was found that the ability of collaborative environmental governance in the YRD has gradually strengthened as it responded to the strategic direction of the integration of the YRD and the joint regional development. It has become a practical approach to cross-domain environmental governance issues. However, restrictive factors and governance bottlenecks still exist in implementing specific policies. Due to the different stages of economic development, regulatory systems, institutional environments, and governance demands in the YRD, the preferences, models, and behaviors in ecological environment

governance are quite different. Summarizing the results of policy text analysis, collaborative environmental governance in the YRD should be comprehensively deepened in the three dimensions of decision-making, implementation, and supervision in order to promote the simultaneous improvement of the speed and efficiency of collaborative environmental governance (Figure 6).

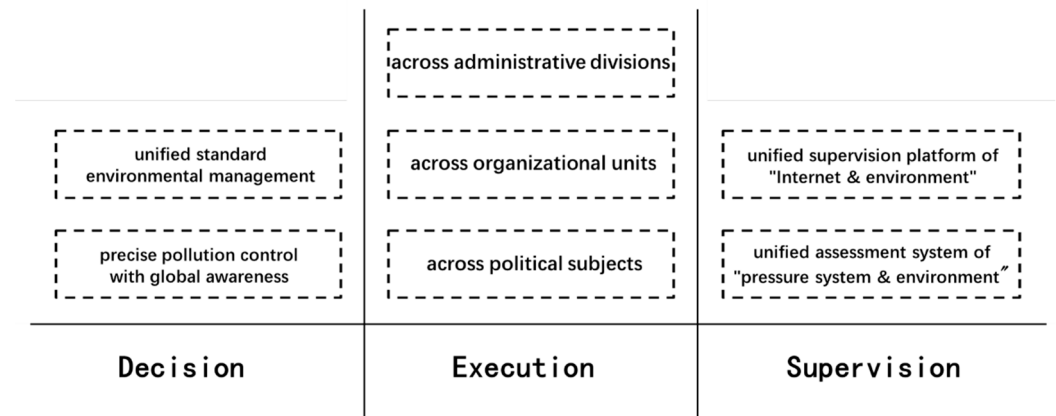


Figure 6. The path for improving collaborative environmental governance in the Yangtze River Delta.

4.2.1. Decision: Unified Standard Environmental Management and Precise Pollution Control with Overall Awareness

Environmental standards are an invaluable bridge for constructing the environmental legal system [41]. They provide an objective basis for environmental law enforcement and help to promote the effectiveness of regional environmental collaborative governance [42]. The YRD has formulated different local standards for environmental issues. As an example, with regard to the emission of particulate matter in the *Pollutant Emission Standard for Biopharmaceutical Industry*, the standard value in Shanghai far exceeds that in Zhejiang and Jiangsu [43]. Different environmental standards can easily lead to the transfer of pollution. In the process of eliminating outdated production capacity in areas with high environmental standards, high-polluting enterprises are transferred to surrounding areas with lower environmental standards. Overall, the pollution situation in the YRD has improved, but the pollution sources have not been effectively controlled. In response to the conflict of environmental standards in the YRD, the *State Council* issued the *Outline of the Yangtze River Delta Regional Integrated Development Plan*, proposing to build a "high-level ecological and green integrated development demonstration area in the YRD" and to formulate a unified environmental access in the integration standard. Facts have proved that only by carrying out strict and unified centralized environmental management and by actively promoting the formulation of a negative list for industrial access in critical ecological function zones can we effectively alleviate the transfer of pollution sources and narrow the wide gap in environmental quality among the three provinces and one city [44].

The *19th National Congress of the CPC* and the *Fourth Plenary Session of the 19th Central Committee* took an initial step toward modernizing the eco-environment governance system and enhancing its capacity, acknowledged the close connection between precise pollution control and eco-civilization, and scientifically understood pollution in the three major fields of air, water, and soil. Thus, the essentials of governance coordination were established. Through the analysis of policy texts, it was found that the pollution problems commonly faced by the YRD include domestic garbage, waste pollution, nuclear radiation, heavy metals, etc., in addition to the three basic areas. The YRD addresses the environmental problems in a more overall and long-term fashion as part of their overall environmental governance process.

4.2.2. Execution: Three-Dimensional Coordination and Linkage of Environmental Coordination Mechanism

It is difficult to manage the environment of the YRD because the regulatory systems are independent of each other, and the implementation methods are entirely different. The solution to the policy design lies in the construction of a three-dimensional coordination and linkage mechanism for environmental governance across administrative divisions, organizational departments, and political entities. A multi-subject approach to policy formulation and implementation helps to overcome the problem of “adjacent but uncoordinated” metropolitan circles [45]. Since pollution is transboundary, public, and uncertain, the local government must extend beyond urban to multiple regions and at various levels [5] to expand public participation in policy formulation and implementation. (1) Geographically, the environmental governance of the YRD spans the administrative divisions of many provinces and cities, no longer adopts administrative units as the governance object, and pays more attention to the cooperation between critical provinces and cities. For example, through city environmental planning in relation to Shanghai, Nantong has broken the inherent shackles of narrow environmental governance and the effects of weak governance. (2) In terms of functions, governments strengthen the mechanism for cooperation and negotiation across organizational officials and break the inter-office barriers in environmental governance. As a result of realistic dilemmas such as relationship prevarication, tension, contradiction, and sluggishness, law enforcement methods, approaches, and strengths are put together and form a full-fledged cooperation mechanism between various departments. (3) In terms of roles, based on the concept of a community with a shared future for mankind, the eco-environment was formed to be inclusive. The environmental governance situation requires, for the collaborative governance of the YRD’s environment, the imperative construction of a comprehensive framework that involves multi-subject participation [46], the maintenance of the government’s authority and dominance as a decision-maker, and the fostering of awareness and involvement in social organizations and the public through publicity, education, and technological innovation.

4.2.3. Supervision: The Unified Supervision Platform of “Internet + Environment” and the Unified Assessment System of “Pressure System + Environment”

The *14th Five-Year Plan* emphasizes the critical position of ecological green development in the national development strategy, which has made ecological supervision a critical link in environmental governance. Based on the existing meteorological business platform in the YRD, it will support the sharing of the YRD’s environmental data. This will improve the ability to observe pollution transportation networks. At present, China’s environmental governance is undergoing an informatization process. Accelerating the establishment of an environmental credit resource database and realizing a unified “Internet + environment” intelligent supervision platform is conducive to the realization of public participation and collaborative supervision. A unified performance appraisal mechanism of rights, responsibilities, and interests should be established within the scope of the YRD with the help of a data-sharing platform. Positive list systems should be encouraged in the assessment of project environmental impact in order to boost the YRD’s environmental impact. The incentive and competitiveness of the supervision mechanism [47] includes the evaluation of enterprises and public representatives in the official evaluation system, gives local government officials a higher evaluation weight for environmental governance efficiency, optimizes the procedures and structure of high-quality development performance evaluation, and integrates environmental governance.

5. Conclusions

Environmental policies in the Yangtze River Delta have undergone significant changes over the past three decades. This study analyzed the logic of policy changes in five dimensions. The trajectory of policy change transitioned from decentralization to authority; the function positioning changed from universality to precision; the issue orientation

expanded from sustainable development to a community of common ecological destiny; the action mode advanced from authoritarianism to co-governance by the whole people; the policy instruments changed from institutional norms to propaganda and guidance.

The purpose of policy text analysis is to put forward policy suggestions. Government efforts in the future will be directed to improve on the unified standard environmental centralized management, to improve decision-making mechanisms for precise pollution control with global awareness, and to integrate regional, functional, and role-based environmental coordination and implementation mechanisms; they will also be establishing the unified assessment and oversight mechanisms of “pressure system + environment” and integrating the unified supervision platform of “Internet + environment”.

Future research on environmental collaborative governance policies in the YRD could be directed toward the study of the environmental performance generated by the policies. How to scientifically quantify the environmental performance resulting from these policies is still a scientific question that can be discussed.

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