

Progress and Analysis of the Outline of the Yangtze River Delta Integrated Development: Focusing on the Evolution of Ecological and Environmental Protection Policies

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Abstract: *This paper addressed understanding: how Chinese policies shifted in the Yangtze River Delta by analyzing the differences and transformations between the 2010 and 2019 Yangtze River Delta regional outlines. By using NVIVO, a qualitative research software, the analysis focuses on the new contents of the 2019 outline regarding ecological and environmental policies. Last but not least, it puts forward the progress and shortcomings of the Yangtze River Delta eco-integration policies by summarizing the latest environmental data.*

Keywords: *Yangtze River Delta; Regional integration; Environmental policy; Eco-integration; Policy evolution*

1. Introduction

The purpose of this paper is to analyze the strategic movements of the Yangtze River Delta in ecological and environmental protection policy. The paper compares the 2010 and the 2019 Yangtze River Delta Outline's ecological and environmental policies. The paper also uses additional data on the Yangtze River Delta's ecological development to compare how data changes under strategic movements.

The Yangtze River Delta, as a region with strong comprehensive strength in China, has an important strategic position and a prominent leading role in China's economic and social development. The integration of the Yangtze River Delta has been led by many years of policy planning and has been continuously updated.

By reviewing the studies of the integration of the Yangtze River Delta, scholars mainly focus on three issues: the integrated economic development of the Yangtze River Delta, the regional high-quality development, and the coordinated regional development. In the planning of high-quality development of the region, the topic of green development is ineluctable. Scholars agree that the Chinese government's Outline can promote green development through industrial clustering and economic linkages^[1]. By promoting the use of coordinated relationships, innovative development can better achieve green development of the Yangtze River Delta^[2].

However, there is a spatial mismatch between cities with high levels of high-tech innovation, high levels of economic development, and high levels of ecological environment. The spatial mismatch suggests cities in the Yangtze River Delta urban agglomeration have significant distribution characteristics. In contrast to the rapid integration in the early stage, the Yangtze River Delta is now facing difficulty in sustainable growth^[3]. The administrative intervention is an important driving force for the deepening of collective action of local governments in environmental governance^[4]. Therefore, it is important to study the ecological integration development of the Yangtze River Delta from the perspective of regional planning policy documents and research value.

The Outline of the Yangtze River Delta Integrated Development (Referred to as the 2010 outline) was released by the Chinese State Council in 2010 on the integration of the Yangtze River Delta. The planning period of the 2010 outline is 2009-2015 with a prospect of 2020. At the end of 2018, the Yangtze River Delta regional integration was elevated to a national strategy. On December 1, 2019, the State Council

released the Outline of the Yangtze River Delta Regional Integrated Development (Referred to as the 2019 outline).

2. General Analysis of the Yangtze River Delta

2.1 The Chinese context of modernization and the world context

The world's uncertainty is continuously growing. Major adjustments are going on in the international political and economic structure, which led to lots of challenges faced by the Yangtze River Delta (YRD) region.

The YRD region is now facing a more complicated international context. Many challenges exist at the same time, such as the rise of counter-globalization, conservatism, and unilateralism. Under the background of global weather extremes and ecological degradation, the YRD needs to take the lead in exploring high-quality development. The YRD is planned as a model to provide leadership and demonstration for environmental protection and develop a green and low-carbon economy.

The upgrading and development of the Yangtze River Delta integration also has an important opportunity. The new round of technological and industrial revolutions in the world converges with the modernized and high-quality development of the Chinese economy. It is important for China to gradually raise the importance of green strategies and promote eco-friendly regional integration. Thus, the YRD industry development requires a more mature industrial division of labor, industrial innovation, and linkage development in regional integration.

2.2 Higher degree of integration and more active participants

Current eco-integration research mainly focuses on the European Union, the Greater London Metropolitan Area in the United Kingdom, and New York City in the United States. There are more and more research find that large city regions have more development advantages than small city regions in the context of integration. The research provides an in-depth analysis of the integration area's planning objectives, development goals, and development processes^[5]. Studies in developed countries' urban agglomerations began in the 1950s. China's development policy for the YRD region can be traced back to 1982. After several times of expansions, the YRD area gradually developed into its current size.

In 2018, the integrated development of the Yangtze River Delta region was elevated to a national strategy, and the Yangtze River Delta City Economic Coordination Council was expanded again. After more than 20 years, the Urban Economic Coordination Council has become an important coordination and deliberation platform for cooperation among the Yangtze River Delta city clusters. Under the coordination of the Yangtze River Delta Urban Economic Coordination Council, China has gradually introduced various regional synergy policies to leverage regional development advantages and achieve sustainable, stable, and high-quality development. The Yangtze River Delta region, with its regional economic and natural advantages, has an irreplaceable role in China's overall regional sustainable development.

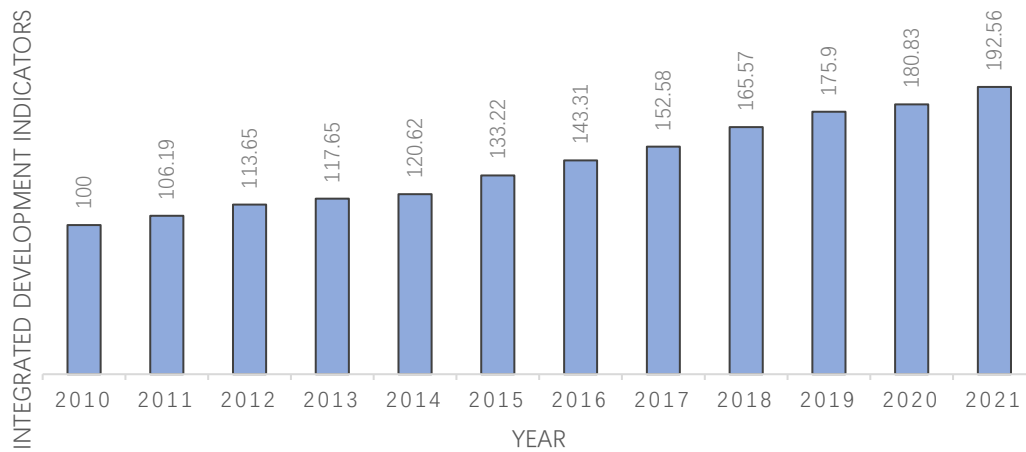
Sustainability is one of the keywords that is often mentioned in different kinds of Official Outlines and Plans. To achieve sustainability goals, it is critical to understand the dynamics between human society and natural ecosystems^[6]. People everywhere rely on ecosystems and ecosystem services to sustain their basic needs.^[7] The development of urban agglomeration becomes a potential threat to the ecosystem. Ecosystems are highly related to human well-being. Humans may create threats to the ecosystem, however, new technologies can create new opportunities to improve the current ecosystem. Both sides of the human society can have a huge impact on the ecosystem. So, the most critical question is how to balance the growth of the ecosystem and human society. To enhance performance and improve sustainability, Outline of the Yangtze River Delta Regional Integrated Development Plan in 2019 first mentioned the concept of ecological integration. It shows the rising attention on ecological problems such as "water scarcity, climate change, habitat change, biodiversity loss and invasive species, overexploitation of oceans, nutrient overloading and other unexpected and abrupt changes", and gives a perspective on policies in the Yangtze River Delta.

2.3 Trends of Yangtze River Delta integration policy under various indicators since its implementation

2.3.1 Development trend of Yangtze River Delta integration from the Yangtze River Delta integration development index

The degree of Yangtze River Delta integration has made significant progress in all directions. The "Yangtze River Delta Integration Development Index Report (2022)" counted the indicators of the Yangtze River Delta integration development index in five directions: industrial integration, facility connectivity, ecological co-protection, livelihood services, and synergy and openness, respectively. From the statistical results, the Yangtze River Delta Integration Development Index in 2021 is 192.56 points, an increase of 6.49% year-on-year. As shown in Figure 1, the Yangtze River Delta Integration Development Index has been growing continuously for 10 years since 2010, indicating that the level of Yangtze River Delta integration has been rising since 2010 under the guidance of the State Council policy. The Yangtze River Delta Integration Development Index achieved the largest increase in the last three years in 2021, indicating that the level of Yangtze River Delta integration increased the fastest in the last three years from 2020-2021 in terms of five directions: industrial integration, facility connectivity, ecological co-protection, livelihood services, and synergy and openness.^[8]

YANGTZE RIVER DELTA 2010-2021 DEVELOPMENT INDICATOR



Source: China Economic Information Service and China Academy of Urban Planning and Design - "Yangtze River Delta Integration Development Index Report (2022)"

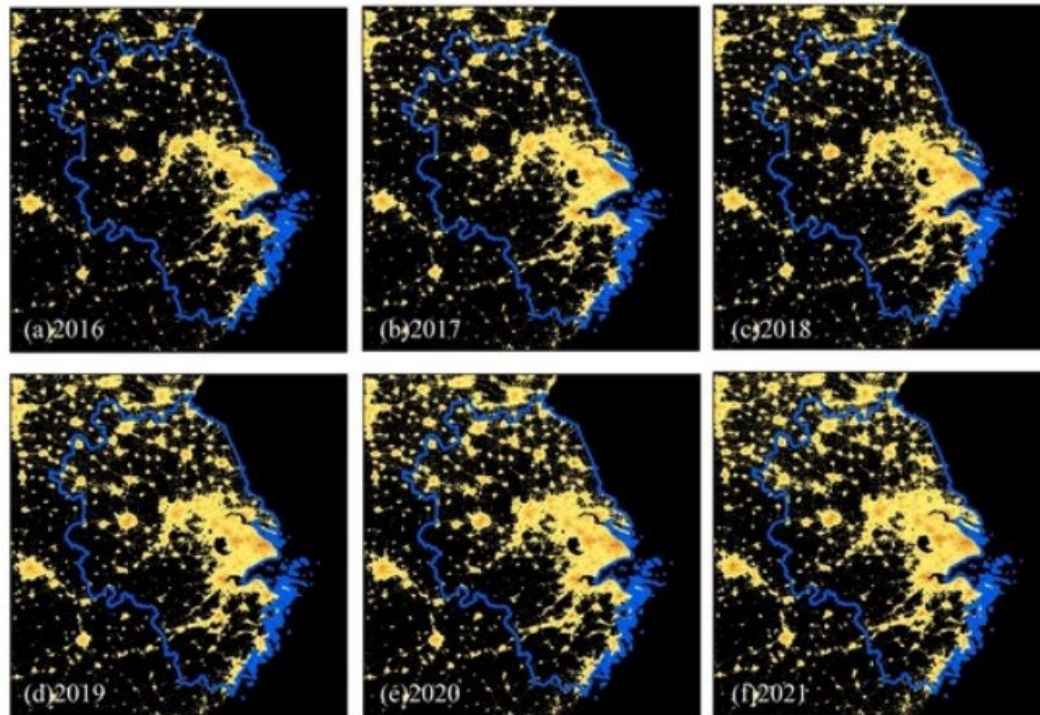
Figure 1. Yangtze River Delta Development Indicator.

According to the data, the five primary indicators of Yangtze River Delta integration have shown stable growth for 10 consecutive years, and the indicators of the Yangtze River Delta integration index in 2021 have been increased from five indicators to seven indicators, with the addition of "digital ecology" and "green water and green mountains". Two indicators have been added. From the data, the integration of the Yangtze River Delta with the concepts of green ecological development and digital transformation is integrated and mutually beneficial, and the level of integration is not affected by the addition of new indicators, which is rare.

The Yangtze River Delta is at the forefront of responding to China's green eco-development and digital transformation innovations, with the three provinces and one city in particular performing above the national average in terms of data. The integration of the Yangtze River Delta has achieved great results in the past decade, and at the same time, the various subjects of the Yangtze River Delta integration have gradually become more actively involved in regional integration. The significant improvement of the Yangtze River Delta Integration Development Index reflects the high-quality development of regional integration in the Yangtze River Delta and also shows the correct leadership of the 2019 Outline of the Yangtze River Delta Regional Integrated Development Plan (hereinafter referred to as the 2019 planning document) in the direction of the development of Yangtze River Delta integration, especially in terms of ecology.

2.3.2 The development trend of Yangtze River Delta integration from the intensity of light remote sensing images

The remote sensing map shown in Figure 2 shows the concentration and distribution of nighttime lights from 2016 to 2021. In 2016, the distribution of lights in the Yangtze River Delta region was concentrated in the central coastal area on the right, where the dense orange-red areas are geographically located with the major cities of Shanghai, Suzhou, Wuxi, Hangzhou, Shaoxing, Ningbo, and other major cities in the Yangtze River Delta region covering the Shanghai The metropolitan area overlaps.



Source: China Economic Information Service and China Academy of Urban Planning and Design - "Yangtze River Delta Integration Development Index Report (2022)"

Figure 2. 2016-2021 Remote Sensing Images of Nighttime Lighting in Yangtze River Delta

Compared with the remote sensing map in 2016, the above orange-red areas are more closely connected during 2017 and 2018, and the yellow areas also tend to spread, such as the increase in horizontal width and area means that the population is driven by the central cities in the integrated region and the cities in the middle and upper Yangtze River Delta also start to show a tendency to spread to the periphery. If the remote sensing map of 2016 is compared with that of 2021, it can be seen that the population in the upper part of the map gradually increases, the light range keeps getting bigger, and the distribution of points from a little bit gradually spreads into more closely connected points and surfaces. Among them, in 2016, the more closely linked urban agglomerations regional population spread more obviously, with the yellow area covered by a larger area. This also indicates that the "half-hour commuting circle", "one-hour living circle", and "three-hour high-speed railway circle" policies promoted by the Yangtze River Delta region are effective, making the population in the region more The trend of mobility and expansion of the population in the region. In addition, while the surrounding areas are spreading, the Shanghai metropolitan area is also spreading, and there is no increase in the intermediate gathering trend compared with 2016, and there is a trend of decentralization.

Under the trend of economic integration of the Yangtze River Delta, the population distribution will still maintain the current trend and become more even in the future. It can also be summarized as follows: (1) The development of the Yangtze River Delta integration revolves around the Shanghai metropolitan area, showing a decentralization trend. (2) All cities show a tendency to expand outward, indicating that the movement of population is more frequent and closer compared to 2016, driven by the construction of infrastructure such as commuter high-speed rail. (3) Cities are more closely connected, and small city clusters may also be formed in the upper central region and faceted in the future. People actually feel the convenience brought by the Yangtze River Delta integration policy, which makes China elevate this policy to a higher level and also put forward more integration strategies within China for target development areas, such as the Guangdong-Hong Kong-Macau-Great Bay Area integration policy and

the Beijing-Tianjin-Hebei integration policy.

2.4 Obstacles encountered in integration

Although the increasing trend of integration is a welcome development, it also poses an obstacle to the sustainable development of the overall environment of the Yangtze River Delta. Unlike economic integration and social integration, ecological integration in the Yangtze River Delta region faces more difficult coordination problems. First of all, in terms of the differences within the Yangtze River Delta region, cities with high levels of economic development also have high levels of ecological environment, while cities with weaker economic development have the need to develop industry. In turn, the large differences in the level of development between cities increase the difficulty of coordination. From the perspective of inter-governmental cooperation, there are differences in environmental assessment indicators and laws and regulations across the Yangtze River Delta. Therefore, there are also obstacles to coordination between local governments. Finally, from the specific issue of ecological pollution, the Yangtze River Delta region has many watersheds and is the hinterland of China's industrial development. There is also a problem of upstream and downstream transfer of environmental costs in the Yangtze River Delta region. (Figure 3)

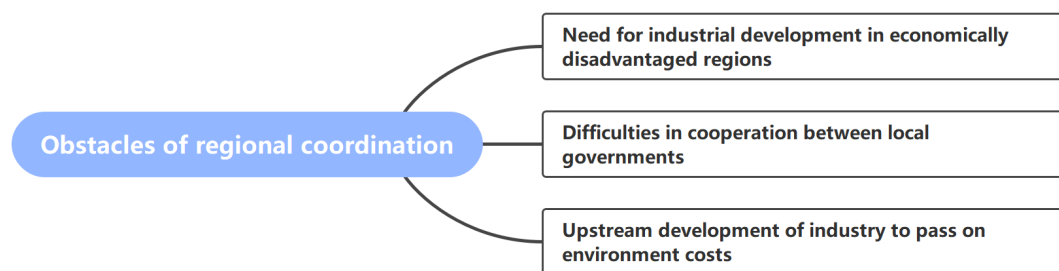


Figure 3. Difficulties of regional coordination. Source: own presentation

3. Comparison of Strategic Orientation

In terms of changes within the Yangtze River Delta, the most intuitive change in the 2019 outline compared to 2010 is the expansion of the scope of integration of the Yangtze River Delta. From the 2010 planning area of 210,700 square kilometers to 358,000 square kilometers, the 2019 ground plan outline involves 27 cities as the central area. New ideas have also been added to the 2019 outline: the construction of the Yangtze River Delta ecological green integrated development demonstration zone and the new China (Shanghai) Pilot Free Trade Zone. Since the 20th century, the integration process of the Yangtze River Delta has continued to deepen, and the economic competitiveness of city clusters in the Yangtze River Delta region has continued to grow.^[9] The great achievements of the YRD integration in the past continue to attract the active participation of the YRD region in the integration. The evolution of the policy strategy of YRD integration reflects not only the expansion of the scope of YRD integration, but also the increase of the YRD region's active participation in the integration.

In terms of a new focus on strategic orientation, the 2019 outline includes a new dimension of ecological integration. In the rapid urbanization process, urban sprawl continues to have a negative impact on the ecological environment as a result of urbanization and industrialization, especially in China.^[10] Regional integration can contribute to the co-occurring benefits of different parts of an urban agglomeration by managing these parts as a whole^[11], so it is important to promote ecological conservation through regional synergies and cooperation. The new outline of the Yangtze River Delta integration combines integration and ecological protection more closely, using the advantages of integration to break down administrative barriers and actively create a model for the development of eco-friendly integration. It also takes the lead in exploring the transformation of ecological advantages into economic and social development advantages, providing strategic policy guidance and support for a green economy with high-quality development.

4. Comparison of environmental policies

4.1 Trends in Ecological Governance

Key aspects mentioned in the Outline in 2010 include joint use of land resources, to protect arable land, protect ecological land, and optimize the allocation of land resources, while strengthening ecological construction and environmental protection, strengthening the protection of drinking water, strengthening water pollution control, promoting the prevention of air pollution, strengthening the environmental management of solid waste, carrying out rural environmental management, and strengthening ecological construction.

The new version of the plan emphasizes the protection of ecosystems. The new version of the plan does not focus on aspects of the ecosystem but the ecosystem overall. The new version of the plan not only focuses on the protection of resources but also environment and ecology. It indicates that the Chinese government is going to insist on the strategy of giving priority to ecological protection. While protecting and restoring the ecological environment, the plan also divides key protection zones. The protection zone compartmentalization has a focus on the Dabieshan Mountains which are located in western Anhui Province and the mountains in the southern Anhui Province, the western Zhejiang Province, and the southern Zhejiang Province. The division protection zone can build barriers on important ecological environmental protection zones. It also requires the enhancement of ecosystem functions, such as the functions of rivers, lakes, forests, wetlands, etc. The new version of the plan is planned to achieve a more resolute ecological protection aim. In addition, much clearer on the planned scopes of protection.

In contrast with the 2010 plan, the focus on land resources has changed to the protection of ecosystems that incorporate both people and nature. There is also a trend in joint governance of ecology protection. Moreover, the joint governance in inter-basin ecological compensation and pollution compensation shows the advantages of integrated development. (As shown in Table 1)

Table 1. Environmental policy summary in the 2010 outline and in the 2019 outline. Source: own representation

2010 Outline Summary	2019 Outline Summary
<ul style="list-style-type: none">• Joint Use of Land resources	<ul style="list-style-type: none">• Ecology
<ul style="list-style-type: none">• Arable Land Protection	<ul style="list-style-type: none">• Protection of Ecosystem
<ul style="list-style-type: none">• Ecological Land Protection	<ul style="list-style-type: none">• Ecological Environment
<ul style="list-style-type: none">• Allocation of Land Resources	<ul style="list-style-type: none">• Scopes of protection

4.2 Shift in focus

Compared to the 2010 planning outline, the planning direction for ecological and environmental protection in 2019 has also changed, from focusing on pollution to eliminating backward production capacity to further optimize the energy structure, control the decline in emissions of a variety of air pollutants and thus improve air quality; from strengthening the environmental management of solid waste to the introduction of solid waste and hazardous waste prevention and control standards and the establishment of joint prevention and treatment mechanisms; from the single treatment of pollution sources to From strengthening ecological construction and environmental protection to ecosystem restoration and prevention. The change in planning direction not only shows the high concern of the government for the green ecological environment of the Yangtze River Delta, but also reflects the achievements in environmental protection and ecological construction in recent years.^[12] From a more single target implementation to the establishment of effective and feasible standards, systems, and continuous promotion of co-protection and joint treatment in all directions, emphasizing the integrated linkage effect of the environment and ecology as a system is a major shift in the 2019 Yangtze River Delta integration planning outline.^[13]

4.3 Changes in the scope of attention

The ecology-related content of the 2019 outline expands the scope of ecological governance concerns compared to 2010: from focusing on restrictive safeguarding ecological land to gradually developing to focus on areas beyond the ecological red line and implement strict industrial access standards for areas beyond the ecological red line to control pollution at source. The expansion of the scope of concern for ecological protection in the Yangtze River Delta region reflects the further tracing and upgrading of the thought of ecological protection in the Yangtze River Delta. Not only that, the thought of ecological integration also promotes the establishment of a unified law enforcement and regulatory agency in the Yangtze River Delta region and the joint establishment of a platform for monitoring the regional ecological environment and pollution sources, which helps the ecological protection in the Yangtze River Delta region to be managed in a cross-regional and comprehensive manner.

4.4 Changes in the main participants of ecological protection

The proposed ecological integration of the YRD is a new topic mentioned in the 2019 Outline. There was precedent in joint environmental governance before. In 2004, Jiangsu Province, Zhejiang Province, and Shanghai signed the "Declaration on Regional Environmental Cooperation in the Yangtze River Delta", the first declaration on regional environmental cooperation in China, which explicitly proposes to strengthen cross-regional border cooperation to solve environmental problems.^[14] Although there are precedents in cross-regional environmental cooperation, cooperation among vertical regional organizations remains one of the main obstacles in joint regional governance. Different area has different evaluation standards, such as different levels of economic development, and different ecological assessment indicators. These differences make regional cooperation hard to deepen. The concept of overall ecological governance can build a solid foundation for cooperation between different organizations, such as regional governments and multiple entities involved. Led by the idea of building ecological integration in the YRD, the 2021 "Yangtze River Delta Regional Ecological Environment Co-protection Plan" emphasizes the concept of co-protection and unified planning. Build an ecological governance system that can share standards, monitoring data, and evaluation results. The system helps to balance resources, such as labor division, complementary advantages, and integrated actions.^[15] The proposed ecological integration removes policy barriers for regional environmental governance and accelerates integrated cooperation on environmental governance.

4.5 New Focus

The 2019 Outline assists the cooperation among vertical regional organizations. The Outline mentioned the administrative barriers among local governments. Environmental governance is a cross-regional topic. Environment is a public good which means multiple subjects' interests need to be coordinated. Each local governance organization tends to maximize local interests in cross-regional matters, which is a natural barrier to cross-regional ecological governance.

On the one hand, breaking the administrative barriers between local governments requires strong cross-regional enforcement and regulatory agencies. On the other hand, the building of regional ecological compensation mechanisms is necessary. Union the strength of strong cross-regional execution and regulatory agencies can also help to promote the linkage of regional environmental governance to break the barriers. And the 2019 outline concerns about the above two points. In the section of the document on strengthening joint ecological and environmental protection and governance, the outline proposes that cross-regional ecological governance needs to promote collaborative supervision. The Yangtze River Delta needs to improve cross-basin and cross-regional ecological compensation mechanisms. The outline carries out a pilot ecological product value realization mechanism in Lishui, Zhejiang, and builds a pilot ecological compensation zone. The new focus of the 2019 outline plays a huge role in leading and promoting cross-regional governance of ecological governance, which reduces the realistic pressure for the implementation of ecological linkage governance.

4.6 Structural changes

To study the changes in environmental protection policies in the 2019 Yangtze River Delta planning documents, this paper uses Content Analysis. Using NVivo to study word frequencies from the environmental protection parts in the YRD planning. The paper aims to demonstrate the difference between frequently used words in the 2010 Outline and 2019 Outline. The sample data were selected

from Chapter 8 (Resource Utilization and Ecological Environmental Protection) of the Regional Plan for the Yangtze River Delta Region issued by the State Council of China in 2010. Chapter 6 (Strengthening Ecological and Environmental Co-Protection and Mutual Governance) and Chapter 10 (Building a High-Level Ecological and Green Integrated Development Demonstration Zone of the Yangtze River Delta) of the Outline of the Yangtze River Delta Regional Integrated Development Plan issued by the State Council in 2019 were selected.

The above samples were selected with a focus on the evolution of ecological and environmental policies and to form a comparison of periods. In 2010, only Chapter 8 of the Outline of the Yangtze River Delta Regional Integrated Development Plan mentions the ecological environment. While in 2019, two chapters mention ecological environment and ecological green integration respectively. Therefore, the sample context for 2010 contains 1 Chapter. For 2019, the sample context contains 2 Chapters. Ecological green integration is also the focus point of the 2019 YRD Outline on the ecological environment. So, this paper will integrate the sixth and tenth chapters in the 2019 Yangtze River Delta Regional Integrated Development Planning Outline for joint analysis.

NVivo software is usually used for qualitative research to present objective, systematic, and quantitative data. Through the analysis of text, images, sound, and other data, the researcher can conduct an in-depth analysis of the variations and features in the material.^[16] Figure 1 shows the number of occurrences and weighted percentages of high-frequency words in the sample content. "Pollution" and "waste" are the two words that recur in the data of 2010 and 2019. The word "pollution" reoccur in both samples. The increased frequency of the word "pollution" indicates that prevention and treatment of pollution are still important for China's ecological and environmental policies. Although the frequency of "waste" is relatively low, it is still in the top ten ranking. This shows that the government continues to focus on the management of "waste" disposal. The 2010 Outline emphasizes on waste management system, regulatory system, and disposal capacity of various wastes. In contrast to the 2010 Outline, 2019 Outline focus on joint governance, especially cross-border issues such as joint waste governance and compensation mechanism for cross-regional hazardous waste.

Table 2 clearly shows the top 10 most frequent words in the 2010 Outline. The top ten frequent words can be classified into three categories. First, high-frequency land, land use, and arable land, which focus on land resources and land nature. Second, resources and pollution, where resources refer to the allocation of resources, such as land, land nature, arable land area, etc. Third, prevention and control of pollution. The above three directions are ranked to be the focus point in the 2010 YRD Outline.

Table 2 also shows the top 10 most frequent words in 2019. Since the regional integration policy was upgraded to a national strategy in 2018, integration is undoubtedly the top planning priority for 2019. The concept of ecological integration is new in the 2019 Outline. The concept of ecological integration emphasizes overall ecology planning. The terms "mechanism" and "standard" also indicate that systematization and standardization are the future development priorities. In addition, the Outline plan to unify a range of ecological resources. The appearance of the term "watershed" is likely to continue growing after the 2019 Outline because of the attached importance to ecosystem protection.

Table 2. 2010 and 2019 high-frequency words comparison. Source: own representation

Year	2010			2019		
	Words (Sorted by frequency)	Number of occurrences	Weighted percentage	Words (Sorted by frequency)	Number of occurrences	Weighted percentage
1	Land	16	1.43	Integration	13	1.49
2	Water	13	1.16	Mechanism	13	1.49
3	Land use	11	0.98	Standards	12	1.37
4	Pollution	10	0.89	Watershed	11	1.26
5	Arable land	10	0.89	Pollution	9	1.03
6	Rural	9	0.80	Green	9	1.03
7	Water Quality	9	0.80	Compensation	9	1.03
8	Protected Area	8	0.71	Yangtze River Delta	8	0.92
9	Waste	8	0.71	Yangtze River	8	0.92
10	Resources	8	0.71	Waste/Wetlands/ Systems	7	0.80

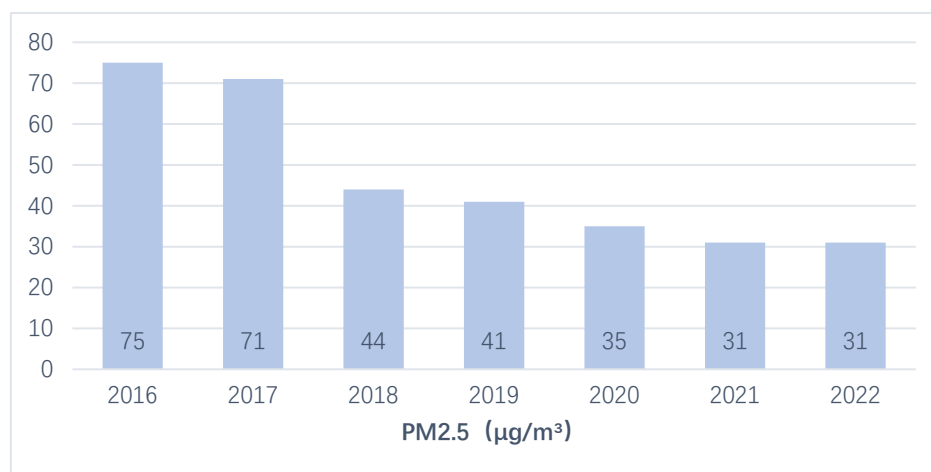
5. Progress and shortcomings of the 2019 policy

At first, the ecological governance of the YRD is facing a serious situation: large development

differences between the Yangtze River Delta region exist. Different industrial structures, high regional development intensity, high consumption of resources and energy, structural pollution, and other outstanding problems will hold back the development of integration. Large differences exist in the ecological environment between regions, and the environmental quality of some cities does not yet match the level of economic and social development.^[17] The integration of ecological governance of the YRD requires supporting policies for implementation, and the 2019 outline is more of a guide to the general direction. Therefore, it lacks direction on the details of supporting measures and solutions to key issues.

Secondly, due to the existing administrative system and regional development model, deep-level cooperation between governments is still problematic, and the administrative barriers between regions are difficult to be broken down completely. This makes it difficult to coordinate interests in cross-regional governance.^[18] The concept of joint protection and governance requires not only the ideal concept of co-business, co-construction, and sharing, but also real joint and coordinated governance in collective action. Further improvements require cooperation in law enforcement and regulatory agencies to break cooperation barriers.

But at the same time, the ecological integration of the YRD has also achieved great results. 2013, the Yangtze River Delta Air Pollution Prevention and Control Collaboration Mechanism was established, and since then, the three provinces and one city have taken many measures to effectively manage air pollution. For example, the implementation of high pollution vehicle traffic restrictions, the implementation of "three oil and track" and other measures. The data shows that the annual average PM2.5 concentration in the YRD has dropped from 71 $\mu\text{g}/\text{m}^3$ in 2016 to 31 $\mu\text{g}/\text{m}^3$ in 2022, a 56% decrease in the annual average PM2.5 concentration.^[19] In 2016, air pollution values in the Yangtze River Delta reached their peak in recent years. (As shown in Figure 4)



Source: Ministry of Ecology and Environment of the People's Republic of China, *Air Quality Status, 2019*.

Figure 4. Annual average PM2.5 concentration in the Yangtze River Delta.

Among them, Shanghai launched the implementation of the "Shanghai Clean Air Action Plan (2013-2017)" in 2013, introducing specific and feasible guiding approaches in six major areas, including energy, industry, transportation, construction, agriculture, and social life. With the launch of a series of practical approaches, at the end of the subsequent 2016, the national planning target was achieved one year ahead of schedule, with the annual average PM2.5 concentration falling to 39 $\mu\text{g}/\text{m}^3$ for the first time, and the annual average concentration in the Yangtze River Delta in 2016 was 75 $\mu\text{g}/\text{m}^3$. The effective experience and leading role of Shanghai in the prevention and control of air pollution in the Yangtze River Delta can be seen. In 2018, a new round of clean air action was launched, continuing to promote the deep treatment of key areas and industries, strengthening the pollution prevention and control of power plants, boilers, key enterprises, industrial volatile organic compounds, and mobile sources, and the effect of the action is also evident, with the PM2.5 concentration in 2018 breaking through from 71 in the previous year. In addition to PM2.5, the 2019 plan also adds ozone concentration as a double indicator, proposing double control and double reduction, which is enough to see that the policy gradually increases the treatment of air pollution.

6. Conclusion

In summary, the biggest shift in the 2019 outline is the new concept of putting integration into ecology. The concept of ecological integration does not only introduce the concept of co-policing into environmental protection, but also transforms the important concerns of environmental protection. For example, the 2019 outline extends from a focus on pollution to a focus on improving energy structures, from a focus on resources to a broader concept of ecosystems, and from a focus on areas within protected areas to areas outside. At the same time, the concept of integration introduces more participating subjects for ecological protection and establishes a policy foundation for inter-regional joint protection of the ecological environment.

Although the 2019 outline still suffers from over-generalization and lack of supporting policy tools and inter-governmental cooperation, the Yangtze River Delta integration, especially in terms of data on ecological protection, has clearly made great achievements. Through the comparison and data analysis of the two important planning documents, the aim of Yangtze River Delta integration is constantly being updated to meet the development of the times, especially in terms of environmental protection.

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