

Article

Can Ecological Governance Policies Promote High-Quality Economic Growth? Evidence from a Quasi-Natural Experiment in China

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Abstract: The implementation plan of the National Ecological Civilization Pilot Zone (Jiangxi) is an experimental policy aimed at exploring the path of ecological value realization, optimizing industrial structure, and ultimately promoting the green economic development of cities in ecologically distressed areas based on good ecological protection and construction. Its policy objectives are as follows: (1) provide policy references for the development of other ecologically distressed areas in other Chinese territories, and (2) achieve a win-win situation for both ecological improvement and economic development and promote the harmonious development of humans and nature. This study considers China's ecological governance pilot policy as a "quasi-natural experiment" based on a panel of 81 Chinese cities in Jiangxi Province, China, from 2014 to 2020. A DID model is constructed to study the impact of China's ecological governance policies on the quality development of Chinese cities in four dimensions: economic development, economic structure, ecological environment, and the disposable income of residents. The following impacts are observed: (1) Ecological governance policies have insignificant effects on GDP promotion, and the above findings still hold after a series of robustness tests, such as the parallel trend test and PSM-DID and placebo tests. (2) Ecological governance policies can significantly improve the rationalization of the economic structure, promote the improvement of ecological environments, and increase the disposable income of residents in the pilot cities. (3) Due to the strong control of local governments over regional economies in China, the stronger the government intervention in the economy, the greater its effect on policy inhibition. (4) The economic structure of ecologically distressed regions is relatively homogeneous, and the primary industry makes up a high proportion of agricultural production. Since China abolished agricultural taxes in 2006, local governments are unable to obtain government tax revenues from agricultural production. The ecological management policy can not only protect land fertility but also reduce the over-exploitation of land resources. It can indirectly increase the scale of agricultural production per unit of land (i.e., the same land resources can create more output value), prompt the transfer of agricultural labor to secondary and tertiary industries, and promote the development of secondary and tertiary industries, which in turn improves the source of local government tax revenue. Moreover, the increase in government tax revenue can increase investment in ecological environments. This in turn increases the tax revenue of local governments, and the increase in government tax revenue can increase investments in ecological and environmental management; this eventually results in a green and high-quality development path with respect to the positive cycle of ecological protection and economic development. Therefore, the scale of agricultural production per unit of land and government tax revenue are important mediating variables for ecological environment improvements, and the mediating effect is obvious.

Keywords: ecological dilemmas; ecological governance policy; low-quality growth; high-quality growth; ecological environment index



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1. Introduction

The occurrence of poverty and the extent of poverty are often closely related to the state of the ecological environment because the population in ecologically distressed areas often depends directly on the livelihood resources provided by nature [1]; moreover, the joint management of the two has become a major problem in the academic community for a long period of time. The frequency and intensity of natural disasters such as droughts and floods have been increasing, and these are harmful to agricultural and livestock production in ecologically distressed areas and can destroy the natural and physical capital of residents. As a result, residents remain in a poverty trap and fall into a vicious cycle of “ecological degradation–triggering poverty–further destruction–more poverty”. In order to break the vicious circle between ecology, poverty, and environment, the Central Economic Work Conference in 2017 made it a priority for the next phase of operations, insisting on the unification of ecological environmental protection and green development to achieve harmonious development between human beings and nature.

In 2015, the State Council issued the “Decision on Winning the Battle against Poverty”. It clearly pointed out that the new ecological development concept should be comprehensively promoted, among which respecting nature, conforming to nature, protecting nature, and achieving harmonious coexistence between human beings and nature form the promised definition of the new ecological development concept. Furthermore, a new ecological governance policy was innovatively proposed, which aims to break the vicious cycle that is observed in ecologically distressed areas and which people living in poverty experience, by implementing green development methods and completely eliminating poverty. On 2 October 2017, the General Office of the CPC Central Committee and the General Office of the State Council issued the Implementation Plan of the National Ecological Civilization Pilot Zone (Jiangxi); they pointed out “ecological protection and shared development demonstration zone” as one of the four strategic positions of the construction of the pilot zone, clearly proposed a focus on mechanism innovation, system supply, and model exploration, and actively explored ecological protection. The organic combination of ecological protection and high-quality growth was a result of combining the paths of economic development and ecological civilization, with the combination aiming to improve the level of synergy and create ecological protection and economic growth corresponding to the high-quality “Jiangxi model”. That is, the new ecological development concept began to shift from a theoretical context to a practical context, indicating that an ecological governance policy is an important path for China in order to accelerate the construction of an ecological civilization system and promote green development; it is also an effective means for solving ecological and economic dilemmas in ecologically distressed areas, which is important for promoting high-quality development, and also has important reference significance for other ecologically distressed areas. Subsequently, the Development and Reform Commission of Jiangxi Province and the Forestry Department of Jiangxi Province jointly issued the “Program for Promoting Ecological Protection in Jiangxi Province”, pointing out that the entire province of Jiangxi will be a pilot area for ecological governance, giving priority to moving ecological protection resources around, promoting the conversion of ecological value to economic value, allowing the general public to share the fruits of ecological civilization construction, and providing favorable support for the implementation of the new development concept. In this case, can the ecological governance policy guided by the new development concept achieve the goal of high-quality growth and completely break the vicious circle of development in ecologically distressed areas?

In view of this, this study focuses on the policy effects of the ecological governance policy on pilot cities in China. The pilot policy began in 2017 and involved all 81 cities in Jiangxi Province, 25 of which were piloted as key cities for ecological protection. In this context, we attempt to answer the following questions in this study: Did the ecological governance policy promote high-quality development in the pilot cities? What mechanisms are involved in the processes related to this impact? Are there heterogeneity and mediating effects of such a policy? Clarifying these questions is important for protecting the ecological

environment and promoting economic transformation in the global context of “double carbon”, and it is also important for achieving high-quality development in general and expanding policy space in the future.

In essence, ecological governance policy is a new exploration of development under the ecological concept, and it can be viewed as a precise investment in ecologically distressed areas. Existing studies tend to focus on the following aspects of the evaluation of ecological governance policies: First, a single static evaluation perspective is adopted for ecological governance policies, and the effectiveness of policies is judged qualitatively only from the perspective of environmental improvement [2]. Second, there is a lack of relationships that link ecological governance policies to high-quality economic development, especially with respect to the evaluation of economic growth, economic structure, and disposable income per capita [3]. Third, existing quantitative studies of environmental regulation indicators have difficulty avoiding endogenous problems, such as measurement errors, omitted variables, and biased sample selection, which lead to biased assessment results [4]. In contrast, the ecological governance policy in Jiangxi Province provides a quasi-natural experiment for the government and allows the achievement of higher-quality development, providing an opportunity to study ecological governance and high-quality economic development accurately and objectively. The assessment of policy effects exhibits a certain lag in time, and the policy effects of ecological governance have gradually received the attention of scholars in recent years as policy practice has advanced. It has been observed that ecologically distressed regions not only result from ecological environment deterioration but also face many problems such as economic transformation, e.g., unbalanced economic and social development, insufficient endogenous power, weak economic foundation, and unsound ecological-value conversion mechanisms [5]. Wang et al. (2003) [6] observed that ecological governance not only improves the regional ecological environment but also accumulates ecological resources that are necessary for regional development. In particular, ecological governance increases the fertility of land resources within an area. Other scholars have found that ecological governance can reduce local government spending on environmental governance, allowing them to invest tax revenues in the transformation of regional economic structures, which promotes the upgrade of industrial structures and green economic growth in ecologically distressed areas and achieves a balance between environmental and economic performances. These studies enrich the existing research system at the microperspective and provide a research basis for this study to identify ecological governance policies in greater detail. However, the above research perspectives are relatively one-dimensional and show certain limitations. Future-oriented high-quality development integrates a multidimensional perspective on the effects of ecological governance policies, which makes up for these limitations. Not only can the relationship between the environment and growth be grasped from a macroperspective but the dynamic relationship between the two can also be explained from a microperspective. Therefore, this paper studies the ecological governance policy effects from the perspective of a new development concept, which is an important supplement to existing studies.

This study enriches the research dimension of brand-new ecological governance policy effects and high-quality development, expands the boundary of related studies, and provides valuable policy insights for high-quality development in ecologically distressed regions. The possible marginal contributions focus on the following three aspects: (1) Expanding the boundary of ecological governance policy assessment, an assessment system is constructed for ecological governance policies and high-quality growth; a single ecological protection dimension is expanded to four evaluation dimensions, namely, economic growth, economic structure, ecological environment, and the disposable income of residents. (2) Ecological governance policies and high-quality growth are integrated into a unified theoretical and empirical analysis framework, which further explores the heterogeneity and mediating effects of policies and enriches the concept and content of ecological development. (3) Taking the exogenous shocks of ecological governance policies as the entry point, we identify the “net effect” of ecological governance policies on high-quality

development based on DID, PSM-DID, and intermediary models, which helps overcome the endogeneity problem and can contribute to a more rigorous identification strategy.

2. Literature Review and Theoretical Hypotheses

2.1. *The Relationship between Ecological Dilemmas and Low-Quality Development*

Ecological distress is a recognized state of low-quality development in which the population of an area has unsustainable access to subsistence necessities due to ecological damage caused by inappropriate use patterns, the intensity of claims on the ecosystem, the degradation of the ecosystem, and the reduced carrying capacity of the population. Kollmuss et al. (2010) [7] argue that ecological distress refers to the inability of a given group behavior. Donovan et al. (2001) [8] argue that ecological dilemmas comprise low-quality development caused by the inability to eliminate or modify the adverse effects of the natural environment in a given environment, resulting in the inability to obtain the basic resources required for survival and development, which in turn restricts the inhabitants' right to development. Specifically, ecological dilemmas are often caused by a combination of natural and perceived factors. First, relatively rapid population growth can lead to problems with the carrying capacity of the region's ecosystem; second, backward production methods can disrupt the local ecological balance; third, stagnant production technologies fail to increase the supply of production materials; fourth, misguided market signals can cause local enterprises and residents to choose some short-term behaviors in order to meet current demand and ignore more suitable practices which ensure ecological and environmental protection. Lin et al. (2021) [9] argue that the combined overlap of the above factors leads to a geospatial overlap and coupling relationship between ecological distress and low-quality development in the region: one is the high spatial–geographic overlap between ecologically fragile areas and ecologically distressed areas; the other is the high coupling between ecologically distressed areas and low-quality development areas. The spatial overlap and coupling relationship between regional ecological distress and regional low-quality growth exhibit a dynamic logical relationship between the two, in which the fragility of ecosystems poses a strong constraint on local economic development and at the same time reduces the carrying capacity of regional development, where human behavior is the root cause of ecological distress and the spatially specific way of life and production exerts excessive pressure on the ecosystem, i.e., ecological distress and low-quality development. The logical relationship of mutual cause and effect and mutual reinforcement is discussed in [10–12].

Ecological governance is a unique government approach to ecological distress. The term “eco-governance” refers to a new model of governance to transition from the trap of low-quality growth to sustainable development in ecologically distressed areas; this starts by changing the ecological environment of ecologically distressed areas, strengthening the infrastructure, and changing the production and living environment of ecologically distressed areas [13]. Subsequently, Siraj et al. (2022) [14] proposed “green eco-governance” based on the “dual carbon” objective, arguing that the management of ecological distress should be accompanied by the concept of green sustainable development. Biswas et al. (2022) [15] argue that global ecological governance has formally moved from a conceptual to the top-level design level, and that ecological governance goes beyond the zero-sum relationship between environmental protection and economic growth in ecologically distressed areas; ecological governance attempts to achieve economic development via ecological protection, protects the ecological environment by implementing economic development, and uses unique ecological resources in ecologically distressed areas to achieve green development transformation and achieve high-quality economic development and sustainable development. Li et al. (2021) [16] argue that ecological governance is the only way to achieve the “double carbon” goal, in which the restoration of the ecological environment is an important part of high-quality development, and ecological governance needs to develop and improve ecological environments. Wang et al. (2022) [17] argue that the key to ecological governance is to carry out “industrial-ecological integration” effectively, i.e., to use the advantageous natural resources of the area to develop ecological agriculture,

ecological industries, and ecological tourism according to local conditions. Zhou et al. (2020) [18] and Liao et al. (2022) [19] argue that ecological management not only restores the ecological environment but also provides a path for realizing ecological capital value. The realization mechanism of ecological revitalization with high-quality development is constructed from the dimensions of institutional leadership, industrial convergence, and technological innovation, which can achieve balanced and sustainable development with respect to ecology, economy, and society. In conclusion, ecological governance is not only a unique governance model for ecological difficulties but also a necessary path toward achieving high-quality development in ecologically distressed areas. The core goal of ecological governance is to restore and improve the ecological environment of ecologically distressed areas via ecological conservation and ecological construction by integrating ecological protection and ecological development (construction) measures, reduce the pressure of production and life on the ecosystem, and resolve the constraints of a fragile ecosystem on high-quality production and life within the area. Further goals involve promoting the development of ecological industries and cultivating the consumer market of ecological services according to local conditions so as to achieve the coordinated development of population, resources and environment in ecologically distressed areas.

2.2. The Multiple Effects of Ecological Governance

Many scholars believe that ecological governance has multiple effects. Li et al. (2021) [20] argue that the essence of ecological governance is to expand material goods so that ecological services can be reproduced in order to enhance the structure of resource use and improve the local development of environments; more specifically, the aim is to upgrade ecological assets from being productive resources to ecologically based resources that can be used to produce public goods or services necessary for local economic development. Simon et al. (2004) [21] argue that the economic restructuring process of eco-governance lies in the rapid transformation of industrial structure, including the increase in economic diversification and non-agriculturalization. Ecological governance can be used to transform the environment via targeted ecological investments, such as ecological engineering construction, ecological public-welfare jobs, ecological compensation, and ecological industries, in order to achieve improvements in local economies and livelihoods [22–24]. Yuan et al. (2022) [25] argue that ecological governance is the “double carbon” goal of specific practices and organic unity, which involves promoting the ecosystem and economic development to find a virtuous cycle, looking for static ecological resources as inputs to a dynamic value output, and providing residents in ecological distress the possibility of using ecological resources to achieve high-quality development and wealth.

Donovan et al. (2001) [8], Monica et al. (2019) [26], and Guo et al. (2020) [27] argue that the key to ecological governance is the conversion and multi-level utilization of ecological resource values, which comprise the basic layer, the industrial layer, and the service layer. The basic layer only comprises the direct organization of ecologically distressed residents so that they participate in national and ecological public-welfare jobs. The industrial layer refers to the formation of ecological industries by using the marketization of the use value of unique local ecological resources to develop and form local special industries and create ecological products with regional advantages. In contrast, the service layer refers to the formation of consumption structures based on the productive and living service functions of ecological resources and promoting the upgrading of consumerism in ecologically distressed areas. In summary, multiple effects of ecological governance can not only directly improve local environmental and economic performance, but also may affect the local industrial structure.

Enssle et al. (2020) [28] argue that ecological governance expands employment opportunities and income sources for people in ecologically distressed areas. Hessburg et al. (2021) [29] argue that ecological governance reduces the vulnerability of people in ecologically distressed areas, but long-term effects should continue to be observed. Long et al. (2022) [30] argue that the enrichment effect of ecological management is the construction

of a market path that can transform the value of ecological resources; moreover, ecological economization and an industrial ecology unify residents, enterprises, and ecological resources within a market mechanism, creating wealth for the benefit of the people to the greatest extent possible. Tu et al. (2021) [31] argue that the people-rich effect of ecological governance builds a sustainable, equal, and reciprocal mechanism, and ecological governance leads enterprises toward fulfilling their social responsibility, which realizes the win–win effect between enterprises and residents. From the above analysis, it can be observed that the mechanism of ecological governance policies that affect urban economies improves the local economic environment and increases the value of local ecological resources so that the same land resources can generate more value and increase the disposable income of residents. This will also induce the flow of surplus labor from the agricultural production sector to secondary and tertiary industries, which can increase the agricultural and non-agricultural incomes of residents, and the increase in income can in turn enhance consumption capacity, thus optimizing the rationalization of the entire urban economic structure. Based on the above analysis, we propose Hypothesis 1.

Hypothesis 1. *Ecological governance can directly affect the economic performance of pilot cities, improve the rationalization of economic structures, improve the ecological environment, and increase the level of well-being of residents.*

From China's historical experience in governing the environment for more than 70 years, the differences in geography, resource endowment, initial economic status, and administrative characteristics of different regions have led to large heterogeneity in terms of policy effects in different regions [32]. This heterogeneity is reflected in two aspects: First, there is variability in policy objectives among different levels of administration, such as differences in the geographic location and administrative characteristics of municipal districts, municipal counties, and county-level cities. The performance of the district-level government is directly under the jurisdiction of the prefecture-level municipal government, and the decision-making power of the district government departments is more constrained. In contrast, the government departments of municipal counties and county-level municipalities are relatively independent, while district-level governments are closer to prefecture-level municipalities and have a relatively rich access to policy support funds or political resources in order to examine issues such as market integration, administrative barriers and resource allocation. Moreover, there are differences in the effects of possible policies [33]. Secondly, in county-level municipalities and municipal counties, the variability in the economic base, economic structure, political rights, and ability to intervene in the economy is important and can cause the same policies to play a greater role in county-level cities [34]. Due to the difference in ecological environments, different cities have different responses to ecological management policies; for example, cities rich in hydraulic resources and cities rich in land resources, both of which have different ecological resource endowments after ecological restoration, thus face different choices in future developmental directions and require different economic restructuring. Based on the above analysis, we propose Hypothesis 2.

Hypothesis 2. *The variability of different cities in terms of economic level, resource endowment, geographic environment, administrative characteristics, and other factors makes the effects of their ecological governance policies and spillover effects heterogeneous.*

3. Research Methodology

3.1. Model Building

The 2017 NECP policy is a natural experiment, and we use the double difference method to estimate the impact of ecological governance policies on pilot cities. Based on controlling other factors as constants, the double difference method can test whether there is a significant difference between the development status of experimental and control

groups before and after the implementation of the ecological governance policy. Therefore, the following model was set:

$$Y_{c,t} = \beta_0 + \beta_1 DID_{c,t} + \beta_2 Ctrl_{c,t} + \delta_c + \gamma_t + \varepsilon_{c,t} \quad (1)$$

where $Y_{c,t}$ is the dependent variable and contains four variables: economic development, economic structure, ecological environment, and disposable income of residents; $DID_{c,t}$ is the core explanatory variable. In the sample period, if the city is a pilot city in the ecological civilization pilot zone, then $Treatment_c = 1$; otherwise, it is 0. The experimental group comprises the key selected city for ecological governance work in Jiangxi Province, and the control group comprises other cities in Jiangxi Province. Subscripts c and t denote the city and year; $Ctrl_{c,t}$ denotes control variables that vary with c and t ; δ_c denotes the city's fixed effects, controlling for individual effects that do not vary with time; γ_t denotes time effects, controlling for time factors that affect all cities over time; $\varepsilon_{c,t}$ denotes error terms. To control for potential serial correlations and heteroskedasticity problems, the empirical results in this paper are reported as robust standard errors of city clustering. The estimated coefficients, β_1 , are the policy effects of interest relevant to our study, and β_1 is significant if the policies are effective.

$$Y_{c,t} = \beta_0 + \beta_1 DID_{c,t} \times gspend_c + \beta_2 DID_{c,t} + \beta_3 gspend_c + \beta_4 Ctrl_{c,t} + \delta_c + \gamma_t + \varepsilon_{c,t} \quad (2)$$

Equation (2) $gspend_c$ is the share of city public expenditure relative to GDP, which measures the degree of city-government intervention in the local economy, with a larger value indicates a greater degree of intervention. Equation (2) mainly examines whether the policy effect is influenced by the degree of government intervention in the economy.

To explore whether there is a spillover effect of the policy on the surrounding areas of the experimental group, we set the dummy variable, in the sample period, to be 1 for the neighboring cities around the experimental group and 0 otherwise. We defined $DID'_{c,t} = near_c \times post_t$, and constructed the following model.

$$\ln PGDP_{c,t} = \alpha_0 + \alpha_1 DID'_{c,t} + \alpha_2 Ctrl_{c,t} + \delta_c + \gamma_t + \varepsilon_{c,t} \quad (3)$$

In Equation (3), the experimental group is the neighboring cities around the pilot ecological management city, and the control group is the original control group, excluding the neighboring cities around the pilot ecological management city. In Equation (3), if α_1 is significantly positive, this means that there is a positive spillover effect of the ecological poverty alleviation policy to the surrounding areas.

To explore the mediating effect of ecological governance policies on ecological improvement, we constructed the following test steps by following Judd et al. (1981) [35], Sobel (1982) [36] and Baron et al. (1986) [37].

$$E_{c,t} = \alpha_0 + \alpha_1 DID_{c,t} + \alpha_2 Ctrl_{c,t} + \delta_c + \gamma_t + \varepsilon_{c,t} \quad (4)$$

$$M_{c,t} = \beta_0 + \beta_1 DID_{c,t} + \beta_2 Ctrl_{c,t} + \delta_c + \gamma_t + \varepsilon_{c,t} \quad (5)$$

$$E_{c,t} = \theta_0 + \theta_1 DID_{c,t} + \theta_2 M_{c,t} + \theta_3 Ctrl_{c,t} + \delta_c + \gamma_t + \varepsilon_{c,t} \quad (6)$$

Equation (4) tests the direct effect of the policy on the ecological environment, Equation (5) tests the effect of the policy on the mediating variables, and Equation (6) tests whether the policy effect is indirectly influenced by the corresponding mediating variables.

3.2. Variable Selection

3.2.1. Dependent Variables

- Referring to Xi et al. (2021) [38] and Du et al. (2021) [39], we selected the logarithm of real GDP ($\ln GDP$) and the logarithm of real GDP per capita ($\ln PGDP$) for each city in order to measure the level of urban economic development.

2. We constructed an economic-structure rationalization index (RES) to measure the impact of ecological governance on urban economic structure, following the studies of Jan et al. (2022) [40], Hao et al. (2023) [41] and Zhang et al. (2023) [42], using the following equation:

$$RES = \sum_{i=2}^3 \left(\frac{Y_i}{Y} \right) \ln \left(\frac{Y_i/L_i}{Y/L} \right) \quad (7)$$

where Y denotes the total output value of secondary and tertiary industries; L denotes the number of employees in secondary and tertiary industries; i denotes the i industry ($i = 1, 2, 3$); Y_i/L_i denotes the output per capita of the i industry; and Y/L denotes the output per capita of secondary and tertiary industries. When the economy is in equilibrium, $Y_i/L_i = Y/L$ and $RES = 0$. Therefore, RES can indicate the degree of coupling between the economic structure and employment structure. The closer it is to 0, the more reasonable the economic structure of the city; the larger the value deviates from 0, the more the economic structure of the city deviates from rationalization.

3. We refer to Zhong et al. (2022) [43], Wu et al. (2022) [44], and Wang et al. (2022) [45], and based on the principles of science, feasibility, measurability, and data accessibility, we use the entropy value method to construct three subsystems containing ecological environmental protection, habitat environmental management, and the ecological environmental management of ecological environment indicators.
- First, the original data are standardized; the three levels of ecological environment indicators are all positive indicators, and the dimensionless processing formula for positive indicators is as follows:

$$u_{c,j} = \frac{\alpha_{c,j} - \min(\alpha_{1,j}, \alpha_{2,j}, \dots, \alpha_{n,j})}{\max(\alpha_{1,j}, \alpha_{2,j}, \dots, \alpha_{n,j}) - \min(\alpha_{1,j}, \alpha_{2,j}, \dots, \alpha_{n,j})} \quad (8)$$

where $\alpha_{c,j}$ represents the j indicator of the c city in Jiangxi Province; $\alpha_{j\min}$ represents the minimum value of the first indicator; $\alpha_{j\max}$ represents the maximum value of the j indicator and forms the initial matrix; $M = [u_{c,j}]_{n \times m}$, of ecological environment indicators; and $u_{c,j}$ is the value of the j indicator of the c city after processing, where $c = 1, 2, \dots, n$ represents the number of cities in Jiangxi Province and $j = 1, 2, \dots, m$ represents the number of indicators.

- Secondly, the entropy method and the comprehensive evaluation method are used to determine the weights of indicators at all levels, and the specific steps are listed as follows:

- (1) In the first step, the share of c city in the j indicator is calculated by using the following formula:

$$p_{c,j} = \frac{u_{c,j}}{\sum_{c=1}^n u_{c,j}} \quad (9)$$

- (2) In the second step, the entropy value θ_j of the j indicator is calculated with the following formula:

$$\theta_j = -\frac{1}{\ln n} \sum_{c=1}^n p_{c,j} \ln p_{c,j} \quad (10)$$

- (3) In the third step, the weights of the j indicator are calculated by using the following formula:

$$\rho_j = \frac{(1 - \theta_j)}{\sum_{j=1}^m (1 - \theta_j)} \quad (11)$$

$(1 - \theta_j)$ in Equation (11) is the utility evaluation of the j indicator, and the higher the utility, the higher the importance of the indicator.

- Finally, the comprehensive index method is used to calculate the index for each city in Jiangxi Province from 2014 to 2020.

$$E_{c,j} = \sum_{c=1}^n \rho_j \times \alpha_{c,j} \quad (12)$$

The construction of the ecological environment index ($E_{c,j}$) is shown in Table 1.

Table 1. Construction of the ecological environment index ($E_{c,j}$).

Level 1 Indicators	Secondary Indicators	Meaning of Indicators	Three Levels of Indicators	Unit	Weights
Ecological Environment Index ($E_{c,j}$)	Ecological Protection	Reflect the level of protection of urban ecological resources	Artificial forestation	Hectare	0.0940
			Newly Closed Forest	Hectare	0.0831
			Degraded forest restoration	Hectare	0.0900
	Habitat Management	Reflect the level of urban infrastructure development	Length of road per capita	Meter	0.0833
			Daily per capita domestic water consumption	Liter	0.0866
		Reflect the living environment level of urban residents	Parkland area per capita	Square Meter	0.0866
			Green coverage area per capita	Square Meter	0.0826
			Green space per capita	Square Meter	0.0822
			Number of public toilets above category 3 per capita	10,000 persons/seat	0.0755
	Ecological and Environmental Governance	Reflect the level of urban pollution management and environmental quality improvement	Garbage disposal capacity	Ton/day	0.0644
			Centralized treatment rate of sewage treatment plants	%	0.0898
			Sewage pipe length	Kilometers	0.0818

- We followed Li et al. (2022) [46], Wu et al. (2022) [47] and Ren et al. (2023) [48], and measured the improvement in the level of disposable income of residents using the logarithm of urban residents' disposable income ($\ln \text{cincome}$) and the logarithm of rural residents' disposable income ($\ln \text{rincome}$).

3.2.2. The Core Explanatory Variables

The core explanatory variable is the interaction term $DID_{c,t}$ ($DID_{c,t} = Treatment_c \times post_t$) for the national ecological poverty alleviation pilot cities in Jiangxi Province, where $Treatment_c$ and $post_t$ are policy group dummy variables and time dummy variables, respectively.

3.2.3. Adjustment Variables

The extent of local government intervention in the local economy is measured by using the ratio of urban public-finance spending to GDP ($gspend_c$).

3.2.4. Control Variables

In addition to ecological governance policies that can affect urban development, there may be other factors that can influence it; therefore, the interference of these exogenous factors needs to be controlled. Drawing on Guo et al. (2020) [27], Du et al. (2021) [39] and

Wu et al. (2022) [44], we selected the following control variables: The urban population density (*popden*) was chosen to represent the effect of economic agglomeration on the level of urban economic development. The ratio of savings balances of urban residents to the urban real GDP was used to represent the urban residents' savings rates (*sav*). Financial efficiency was measured by the logarithm of the balance of CNY loans of financial institutions (*lnbank*). The number of enterprises above the scale per 10,000 capita (*industry*) was used to measure the degree of the industrial scale. The ratio of the number of non-agricultural employees to the total local population (*nagri*) was used to express the degree of urbanization. The logarithm of the number of beds in medical and health institutions (*lnmedical*) was used to measure the level of social medical care. The logarithm of the number of beds in social welfare institutions (*lnwelfare*) was used to measure the level of social welfare. The logarithm of the total power of agricultural machinery (*lnpower*) was used to measure the level of mechanization of agricultural production.

3.2.5. Intermediate Variables

We chose the following mediating variable: The ratio of the value-added agricultural output to crop acreage was chosen to measure the scale of agricultural production per unit of land (*asize*). Because the size of agricultural production per unit of land is directly related to the increase or decrease in the disposable income of rural residents, the size of agricultural production per unit of land was chosen as the mediating variable. We used the logarithm of government tax revenue (*lnntax*) to measure the sustainability of ecological poverty alleviation policies. While improving the ecological environment and infrastructure, ecological poverty alleviation provides basic conditions for more enterprises. The continued entry of enterprises will increase the local tax revenue, and government tax revenue will continue to influence the continuity of ecological poverty alleviation policies; thus, the logarithm of tax revenue was chosen to measure the sustainability of ecological poverty alleviation policies.

3.3. Data Sources and Descriptive Statistics

According to the availability of data, the study area was 81 cities in Jiangxi province, of which the experimental group comprised 25 key cities for ecological poverty-alleviation work, and the other 56 cities comprised the control group. The data were mainly obtained from the China County Statistical Yearbook, Jiangxi Provincial Statistical Yearbook, China Forestry Statistical Yearbook, EPS database "China Urban and Rural Construction" and the annual county database of the China Economic Network Statistical Database from 2014 to 2020, with some data referring to the statistical bulletin of the year. The outliers were eliminated, and some missing data were accounted for by using the moving average method. To eliminate the effect of inflation, the national consumer price index CPI (with 2013 as the base period) was used to adjust all nominal variables, and some data were treated by taking the natural logarithm to reduce the interference of heteroskedasticity on the empirical results. Table 2 shows the descriptive statistical analysis for all variables.

Table 2. Descriptive statistics of variables.

Variables	Meaning of Variables	Mean	SD	Min	Max	N
<i>lnGDP</i>	Natural logarithm of real GDP	14.0092	0.6200	12.5698	16.5701	567
<i>lnPGDP</i>	Natural logarithm of real GDP per capita	10.2609	0.4390	9.2388	12.0177	567
<i>RES</i>	Economic structure rationalization Index	0.0502	0.0689	0.0000	0.4334	567
<i>E</i>	Ecological environment index	0.3086	0.0589	0.1682	0.4845	363
<i>lnincome</i>	Natural logarithm of urban per capita disposable income	10.1461	0.1663	9.7385	10.5172	567
<i>lnrincome</i>	Natural logarithm of disposable income per capita in rural areas	9.3359	0.2743	8.5613	9.9817	567

Table 2. Cont.

Variables	Meaning of Variables	Mean	SD	Min	Max	N
<i>gspend</i>	Degree of government intervention in the economy Population density	0.2662	0.0808	0.0340	0.5245	567
<i>popden</i>	Population density	0.0277	0.0143	0.0049	0.1094	567
<i>sav</i>	Savings balance/GDP	0.8507	0.2788	0.2419	1.9669	567
<i>lnbank</i>	Natural logarithm of loans by financial institutions	13.7800	0.6133	11.8576	15.7334	567
<i>industry</i>	Number of enterprises of scale per 10,000 people	2.5033	1.8909	0.3396	21.1429	567
<i>nagri</i>	Percentage of non-agricultural population	0.3437	0.0875	0.0659	0.7042	567
<i>lnmedical</i>	Number of beds in medical institutions	7.3347	0.5973	5.2575	8.7662	567
<i>lnwelfare</i>	Natural logarithm of the number of beds in social welfare institutions	7.2846	0.7091	3.2581	8.6161	562
<i>lnapower</i>	Natural logarithm of total power of agricultural machinery	3.0664	0.7503	0.6098	4.7904	566
<i>asize</i>	Scale of agricultural production per unit of land	3.4432	2.1156	0.7161	14.5001	554
<i>lntax</i>	Natural logarithm of government tax revenue	11.5297	0.6289	9.4847	14.1445	564

4. Analysis of Empirical Results

The empirical results were divided into the following four parts: (1) an estimation of the effects of ecological governance policies on urban economic development, economic structure, ecological environment, and the disposable income of residents using the DID approach; (2) a discussion of the heterogeneity and spillover of policy effects; (3) robustness tests as a method to exclude estimation bias caused by omitted variables; and (4) tests of the transmission mechanism of the effects of ecological governance policies at the scale of agricultural production and government tax revenues.

4.1. Baseline Regression Results

The baseline regression results are presented in Tables 3 and 4, which mainly estimate the combined effect of ecological governance policies on pilot cities to test hypothesis 1. The estimation was performed according to Equation (1). In Table 3, models (1) to (4) are tests of the effects of ecological governance policies on urban economic development; the results show that there is no significant positive causality on county economic development from ecological poverty-alleviation policies, and the policies cannot promote urban economic development, which may be due to the small-scale ecological governance industries, or the shift from ecological value to economic value cannot be revealed in the short term. Models (5) and (6) are tests of the impact of ecological governance policy on urban economic structures; the results show that the ecological governance policy improved the rationalization of economic structure in the pilot cities at a 10% significance level, and can promote the optimization of the urban economic structure. In Table 4, models (7) and (8) are tests of the impact of ecological governance policies on urban ecological environments, and the results show that there is a significant positive causal relationship between ecological poverty-alleviation policies and the improvement in the local ecological environment at the 1% significance level; i.e., the policies significantly promote the urban ecological environment. Models (9) and (10) are tests of the impact of ecological governance policies on the disposable income of residents, and the results show that they significantly increased the disposable income of urban and rural residents at the 1% significance level; i.e., ecological governance policies will improve the level of disposable rental income of residents in the pilot cities.

Table 3. Baseline regression results (1).

Variables	Economic Development				Economic Structure	
	lnGDP		lnPGDP		RES	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>DID</i>	0.0130 (0.0567)	0.0491 (0.0272)	0.0434 (0.0294)	0.0432 (0.0239)	−0.0497 * (0.0252)	−0.0485 * (0.0237)
<i>Treatment</i>	0.0129 (0.0485)		−0.1635 ** (0.0625)		0.0528 ** (0.0214)	
<i>post</i>	−0.0350 (0.0201)		0.0982 *** (0.0154)		−0.0386 *** (0.0081)	
<i>Ctrl</i>	Yes	Yes	Yes	Yes	Yes	Yes
Individual effects	No	Yes	No	Yes	No	Yes
Time effect	No	Yes	No	Yes	No	Yes
N	561	561	561	561	561	561
<i>R</i> ²	0.9250	0.9920	0.8537	0.9833	0.2445	0.6638

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4. Baseline regression results (2).

Variables	Ecology		Disposable Income of Residents			
	<i>E</i>		<i>Incincome</i>		<i>lnrincome</i>	
	(7)	(8)	(9)	(10)	(11)	(12)
<i>DID</i>	0.0704 *** (0.0180)	0.0678 *** (0.0151)	0.1625 *** (0.0114)	0.1811 *** (0.0123)	0.2041 *** (0.0244)	0.2197 *** (0.0200)
<i>Treatment</i>	0.0775 (0.0116)		−0.0734 * (0.0356)		−0.3229 *** (0.0484)	
<i>post</i>	0.0193 (0.0133)		0.1193 *** (0.0103)		0.1455 *** (0.0225)	
<i>Ctrl</i>	Yes	Yes	Yes	Yes	Yes	Yes
Individual effects	No	Yes	No	Yes	No	Yes
Time effect	No	Yes	No	Yes	No	Yes
N	358	357	561	561	561	561
<i>R</i> ²	0.5385	0.8727	0.7634	0.9694	0.7212	0.9751

Note: ***and * indicate significance at the 1% and 10% levels, respectively.

4.2. Heterogeneity and Spillover Effects Test

Considering that the heterogeneity of the economic base, geographical environment, ecological environment, and administrative characteristics of different cities leads to variability in policy effects in different districts and counties, we conducted heterogeneity analysis for the baseline regression results, and mainly tested whether the policy effects are influenced by the degree of municipal government intervention and whether there are spillover policy effects, in order to test Hypothesis 2.

The test results are shown in Table 5. The regression results of Models (1) and (2) show that the intervention of the city government in the economy reduces the policy effect, and the coefficient of the policy (*DID*) is negative, which has a greater impact on the real GDP per capita of the city. The coefficient of the interaction term (*DID* × *gspend*) was significant at the 1% significant level and the coefficient was positive; in contrast, the coefficient was significantly negative. One possible reason for this is that the finance of the ecological governance policy is managed by the provincial and municipal government.

The marginal impact of fiscal expenditure on ecological poverty-alleviation policies is small, and the direct effect of current municipal fiscal expenditure on economic growth is negative; from this we can infer that the purpose of the municipal fiscal expenditure is not fully consistent with the goal of the ecological governance policy. The regression results of models (3) and (4) both indicate that the coefficient of the interaction term ($DID \times gspend$) is positive and insignificant, at least in a statistical sense, indicating that the degree of government intervention measured by the scale of on-budget fiscal spending does not provide better contributions to the policy effect. The reason for this may be that the implementation of the ecological management policy is planned and unified by the provincial government, and the intervention of the municipal government plays a limited role which is perhaps not reflected in the short term; perhaps the extra-budgetary financial support of the municipal government after the implementation of the policy comes from the transfer payments from the provincial government and the funds are earmarked for ecological management, which are not included in the statistics of the general public budget revenue and fiscal expenditure. The regression results of model (5) show that the coefficient of the interaction term ($DID \times gspend$) is significantly positive, indicating that the degree of municipal government intervention in the economy can directly affect urban residents; i.e., the ecological governance policy directly improves the business environment and rationalizes the economic structure of the city, and urban residents are the direct beneficiaries. The regression results of model (6) show that the coefficient of the interaction term ($DID \times gspend$) is positive and insignificant, verifying the conclusions of models (3) and (4): the higher the degree of municipal government intervention in the economy, the less effective the policy implementation in ecological governance at the village level. Regarding the policy spillover effect, it can be observed in model (7) of Table 5 that the coefficient of DID' is positive at the 10% significance level and is relatively small at 5.4% from the economic significance level, indicating that there is a significant but not a strong positive spillover effect from the policy. Therefore, although the ecological poverty alleviation policy does not significantly enhance the economic development of pilot cities, it has a positive spillover effect, and the improvement in the ecological environment in pilot cities has positive externalities that can radiate into the surrounding areas and promote their economic development.

Table 5. Heterogeneity and spillover effect regression results.

Variables	Economic Development		Economic Structure	Ecology	Disposable Income of Residents		Spillover Effects
	lnGDP	lnPGDP	RES	E	Incincome	Inrincome	lnPGDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>DID</i>	−0.1304 (0.0755)	−0.1518 ** (0.0538)	−0.0717 *** (0.0079)	−0.0278 (0.0271)	0.1072 *** (0.0281)	0.2053 *** (0.0545)	
<i>DID × gspend</i>	0.5498 ** (0.2270)	0.5957 *** (0.1739)	0.0706 (0.0675)	0.0786 (0.0891)	0.2216 *** (0.0522)	0.2216 *** (0.0522)	
<i>gspend</i>	−0.6369 *** (0.1684)	−0.6249 *** (0.1561)	−0.0633 (0.0889)	−0.0550 (0.0892)	−0.0618 (0.0492)	0.1756 * (0.0964)	
<i>DID'</i>							0.0539 * (0.0270)
<i>Ctrl</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	561	561	561	357	561	561	386
<i>R</i> ²	0.9927	0.9847	0.6517	0.8541	0.9701	0.9756	0.9755

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.3. Robustness Tests

We further tested the policy effects of ecological governance using the PSM-DID method to ensure the robustness of the above regression results and only tested variables with significant policy effects. Specifically, first, previous control variables are used to predict the probability of each city being selected as a pilot city (*Logit* regression); and then radius matching, nearest neighbor matching, and kernel matching methods are carried out to match the experimental group with the control group so that there is no significant difference between the experimental group and the control group (as much as possible) before setting up the ecological poverty alleviation policy to reduce the endogeneity problem caused by self-selection bias. Second, the DID approach is used to identify the net impact of ecological poverty alleviation policies on economic growth, economic structure, ecological environment and the disposable income of residents' in the pilot cities on the basis of the first step. Since the propensity score can solve the bias problem of observable covariates to the greatest extent and the double difference method can eliminate the effects of unobserved variables—such as those that are constant over time and those that simultaneously change over time—the combination of the two methods can identify the policy effects more accurately. The regression results are presented in models (1), (3), (5), (7), (9), and (11) in Tables 6 and 7, and it can be observed that the estimated coefficients, signs, and significance levels of the radius matching are generally consistent with the baseline regression results in Tables 3 and 4; thus, the estimated effects of ecological governance policies on the urban economic structure, ecological environment, and livelihood well-being are robust. Additionally, considering the possible inverse effects between the selected variables and ecological governance pilot cities, in order to reduce the potential endogeneity problem, all control variables lagged by one period, and the regression was re-run; the results are shown in models (2), (4), (6), (8), (10), and (12) in Tables 6 and 7, and it can be observed that the coefficient signs and significance are consistent with the baseline regression results shown in Tables 3 and 4. However, because the control variables lagged by one period, the degree of control became weaker, leading to a slight increase in the coefficients, which again validates the robustness of our findings. The three estimates from radius matching, kernel matching and nearest neighbor matching are similar [49]; Therefore, Tables 6 and 7 only report test results that match the radius.

Table 6. Results of robustness tests (1).

Variables	lnGDP		lnPGDP		RES	
	Radius Matching	First Order Lag	Radius Matching	First Order Lag	Radius Matching	First Order Lag
	(1)	(2)	(3)	(4)	(5)	(6)
<i>DID</i>	0.0001 (0.0221)	0.0644 (0.0367)	0.0094 (0.0198)	0.0541 (0.0342)	−0.0451 *** (0.0130)	−0.0336 *** (0.0096)
<i>Ctrl</i>	Yes	No	Yes	No	Yes	No
<i>L.Ctrl</i>	No	Yes	No	Yes	No	Yes
Individual effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
N	409	481	409	481	409	481
R^2	0.9935	0.9843	0.9747	0.9697	0.6516	0.6742

Note: *** indicate significance at the 1% levels.

Table 7. Results of robustness tests (2).

Variables	<i>E</i>		<i>Incincome</i>		<i>Inrincome</i>	
	Radius Matching	First Order Lag	Radius Matching	First Order Lag	Radius Matching	First Order Lag
	(7)	(8)	(9)	(10)	(11)	(12)
<i>DID</i>	0.0632 *** (0.0147)	0.0656 *** (0.0160)	0.1625 *** (0.0194)	0.1688 *** (0.0095)	0.2043 *** (0.0181)	0.1958 *** (0.0226)
<i>Ctrl</i>	Yes	No	Yes	No	Yes	No
<i>L.Ctrl</i>	No	Yes	No	Yes	No	Yes
Individual effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
N	250	306	409	481	409	481
<i>R</i> ²	0.9005	0.8763	0.9765	0.9602	0.9790	0.9709

Note: *** indicate significance at the 1% levels.

4.4. Ecological Governance Policy Mechanism Test

The results of testing the mediating effects affecting the ecological environment are shown in Table 8. Model (1) in the first step indicates the effectiveness of ecological governance policies on ecological environment improvement, and models (2) and (3) in the second step test the effectiveness of ecological governance policies at the scale of agricultural production per unit of land and government tax revenue, respectively. The estimation results of model (2) indicate that the ecological treatment policy promotes an increase in agricultural production scale per unit of land, and the improvement in the ecological environment increases the local agricultural carrying capacity per unit of land, indicating that the ecological poverty alleviation policy improves the per capita efficiency and output value of agricultural production. The estimation results of model (3) show that the ecological governance policy improves the government's tax revenue, indicating that the relevant industries supported by the policy exhibit self-sufficient and sustainable development, and this also indicates that the ecological value gradually shifts toward an industrial value under the effect of policy protection and transformation. Based on the test results in the first and second steps, the third step explores whether the policy indirectly promotes ecological improvement at the scale of agricultural production per unit of land and government tax revenue. The estimation results of models (5) and (6) show that the selected mediating variables are all partially mediated, and both are consistent with theoretical expectations. The negative *Intax* coefficients in model (6) may be because the ecological treatment policy closes some higher-polluting enterprises, or the local government provides tax relief for the transformation of high-polluting enterprises, resulting in a decline in local tax revenue in the short term. Overall, the ecological poverty alleviation policy not only directly contributes to an improvement of the ecological environment, but also promotes the improvement of the local environment via a series of indirect measures that increase the scale of agricultural production per unit of land, optimizing the government's tax structure.

Table 8. A test of mediating effects affecting the ecological environment.

Variables	Step 1	Step 2		Step 3	
	<i>E</i>	<i>asize</i>	<i>Intax</i>	<i>E</i>	
	(1)	(2)	(3)	(4)	(5)
<i>DID</i>	0.0678 *** (0.0151)	0.4352 * (0.2344)	0.2366 ** (0.0828)	0.0651 *** (0.0066)	0.0711 *** (0.0071)
<i>asize</i>				0.0079 ** (0.0034)	
<i>Intax</i>					−0.0174 ** (0.0081)
<i>Ctrl</i>	Yes	Yes	Yes	Yes	Yes
Individual effects	Yes	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes	Yes
N	358	548	558	347	355
<i>R</i> ²	0.8727	0.8922	0.8844	0.8764	0.8762

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusions and Recommendations

We analyzed the policy effects of ecological governance and their transmission mechanisms using municipal-level panel data in Jiangxi Province from 2014 to 2020. The findings show that (1) ecological governance policies do not significantly improve municipal economic development but have a direct contribution to the rationalization of the economic structure, the improvement of the ecological environment, improvements in the disposable income of residents. (2) Ecological governance policies exhibit positive spillover effects in the surrounding areas, and the stronger the local government's ability to intervene in the economy, the greater the inhibiting effect on local economic transformation, which is not conducive to ecological governance. (3) The ecological governance policy achieved its goal by increasing the scale of agricultural production per unit of land and optimizing the tax structure of the government, but there are still many aspects that need further improvement.

Based on the above research findings and the current developmental status, we proposed the following policy recommendations: (1) Improving ecological environments and promoting the harmonious development of ecological protection and economy in the form of a complex project that is long-term in nature, and the direct economic benefits of ecological improvement will slowly take effect., The effect on economic growth is not obvious in the short and medium term; thus, it needs to be incorporated into national medium- and long-term environmental management operations, and ecological revitalization development plans, by using national administrative means. Revitalization and development plans and programs increase financial investments in ecologically distressed areas, ensure the continuity and solidity of the policy, and establish a long-term mechanism to consolidate and expand ecological governance results. (2) In view of the heterogeneous effect of the policy, especially in some municipalities with substantial economic interventions, the implementation of the ecological governance policy is not effective. In this regard, first, the assessment of improvements to the ecological environment should be incorporated into the administrative assessment system of grassroots cities. Second, for some pilot cities that have closed old or polluting industries due to ecological protection reasons, they should provide timely financial subsidies or tax relief in order to help them with economic transformation. Third, we should guide and support pilot cities to develop green industries based on local resource endowments, innovate ecological industrialization paths, expand the scale of green industries, and build mechanisms for realizing the value of ecological products. (3) The scale of agricultural production per unit of land, and government tax revenue, are keys

to guaranteeing the continuity of ecological poverty-alleviation policies. First, the backwardness of agricultural-production technology leads to natural contradictions between agricultural production and environmental protection. Thus, we should increase scientific and technological investment to develop agricultural technology and improve the scale of agricultural production per unit of land, which not only effectively increases the disposable income of rural residents, but also indirectly promotes the achievement of environmental protection goals. Second, for cities experiencing ecological transitions, higher-government departments should focus on changes in municipal tax revenue. Some cities with difficult tax revenue should be given timely financial support and assistance; some cities with improved tax revenue should be promptly included in the observation; and some cities that realize the cycle of green industry tax revenue should be promptly withdrawn from policy protection in order to achieve the goals of environmental improvement, self-sufficiency and green development.

Accordingly, there are some expectations and suggestions for future research. First, there are 14 ecologically distressed regions in China with different ecological environments which can lead to heterogeneity in the economic structure of each ecologically distressed region; therefore, the ecological governance policies for different ecologically distressed regions also exhibit heterogeneity in their stimulation methods, mechanisms, and governance paths. The current study is limited to one of these regions. Since the environments under different regions are different, they need to be discussed separately so that future studies can be more focused. Second, future research should continue to add dimensions to the assessment of policy effects; for example, the disposable income of residents can be expanded to the perspective of people's well-being, and the impact of ecological governance policies on residents' welfare can be explored from more perspectives. Third, ecological governance is a dynamic development concept, and with the development of society and higher-quality economic growth, the region will also face new problems. A prudent attitude should be adopted for the implementation of policies, and new theories should be continuously absorbed from real problems so that a complete theory of ecological governance can be formed, which has certain reference values for the development of other ecologically distressed regions around the world.

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