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Research Article

Urban Ecological Planning Model Based on Information Entropy and Meteorological Suitability Evaluation Algorithm

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In order to improve the effect of regional urban ecological planning and ecological restoration, aiming at the problem of low accuracy of ecological planning and poor matching with the current situation, taking Yucheng County, Shangqiu City, Henan Province as an example, an urban ecological planning model based on information entropy and meteorological suitability evaluation algorithm is designed. The geographical environment of Yucheng County, Shangqiu City, Henan Province is analyzed. Based on the current situation of regional ecological environment, the meteorological suitability evaluation algorithm is introduced to establish the urban ecological planning model. Comprehensively considering land planning factors and meteorological factors, calculate the information entropy of each influencing factor, determine the weight, and optimize the ecological planning model. The experimental results show that this method has achieved good results in the accuracy of ecological planning and the matching degree of the current situation in the urban ecological planning of Yucheng County, Shangqiu City, Henan Province.

1. Introduction

In recent years, the process of urbanization has been accelerating, which not only provides a huge driving force for social and economic development, but also causes serious problems for the ecological environment [1]. The increase in the population makes the problem of urban water shortage more serious. The water body has been damaged to varying degrees, the pollution of the water environment is more serious, and the ecosystem has been affected to varying degrees, which is fed back to the urban image and urban natural style, resulting in a more serious negative impact. The development of urban industrialization has carried out predatory development of natural resources, resulting in huge consumption. The demand for coal and oil has increased significantly. Mining in the mountains has led to exposed rocks and serious damage to the mountains. Among them, urban ecological problems have become more a serious problem. Among them, air pollution, land use effect, and unreasonable water system planning occur frequently, which seriously affect the development of the regional ecological environment. In this regard, many scholars have studied urban ecological planning and ecological restoration. Xiao et al. [2], based on the spatial identification of ecological risk, constructed the mountain ecological restoration framework with "risk diagnosis-spatial identification-pattern construction-classification protection" from the perspective of regional ecological security and conducted dynamic ecological risk assessment and vegetation coverage dynamic analysis of the mountains of Jinan to identify important high ecological risk points in the area. From the perspective of ecological process integrity and ecosystem service optimization, the mountain ecological protection and restoration space system of "source-corridor-strategic point" is constructed, and the mountain classification protection and ecological restoration strategy of western New City is proposed. According to Li et al. [3], based on the basic concept of improving the quality of urban ecological environment, complementing the weakness of urban infrastructure, improving the level of public service facilities, and changing the urban development mode, the deterioration degree of the ecological environment of industrial cities is analyzed. Taking Jingmen, Hubei Province,

the representative of the "third-line" construction, as an example, an ecological restoration technology of "problem identification network construction task screening" is put forward. Li et al. [4] have taken Hefei, China as an example and proposed a spatiotemporal analysis method of urban ecological comfort index based on remote sensing data. Harmonic analysis using time series method and spatiotemporal information fusion based on nonlocal mean filtering improved the quality of long-term remote sensing data from 2003 to 2019. Using the entropy method, the normalized difference vegetation index, the normalized difference accumulation index, the surface temperature, and the aerosol optical depth were weighted and combined to establish the urban ecological comfort index. The case study was based on the seasonal and annual scales of HEFEI from 2003 to 2019. Yang et al. [5] proposed a new method of urban wetland planning and management based on the vulnerability of the ecological environment. Taking Jixi National Wetland Park as the research area, the ecological, geological, and environmental factors affecting the urban wetland were analyzed. Using remote sensing images, digital elevation models, environmental quality interpolation and other methods to generate factor layers, and establish a comprehensive evaluation index system. The fuzzy Delphi AHP method was used to calculate the comprehensive weight of each evaluation factor, and the ecological environment vulnerability evaluation model was established. The improved k-means clustering algorithm was used to classify the ecological environment of the study area and evaluate the vulnerability of the wetland ecological environment. Deng et al. [6] took the development and transformation of karst mountain cities in southwest China as an opportunity, combined with the practice of mountain ecological restoration in Anshun City, and discussed the ways of urban mountain restoration and utilization. We diagnosed the causes and current problems of the destruction of the mountain ecosystem combined with the natural characteristics of the karst mountain and put forward the strategies of classifying and repairing the mountain wound, reasonably optimizing the mountain vegetation community, improving the urban ecosystem, building a characteristic mountain park, and showing the mountain green. We coordinate the contradiction between urban development and mountain protection and fully reflected the characteristics of karst mountain cities. Chen et al. [7] under the background of the urban dual restoration development strategy, applied the concept and method of ecological restoration to the urban green space with good foundation in Lishui central area and founded the ecological environment assessment method applicable to the urban green space or the built-up area of small towns. The process and conclusion of the discussion can also provide some reference for the related research. Relying on the requirements of Lishui's new green space system planning, and based on the working framework of "organizing ecological assessment, preparing implementation plans, and implementing ecological restoration," the evaluation methods of various types of urban green space are compared and analyzed, and finally, the classification scoring method is used to evaluate the status quo. It can provide a new entry point for improving the quality of green space in urban built-up areas by using multifactor superposition method to identify the key areas for restoration. Wei et al. [8] conducted a case study in Quangang District and proposed the ecological restoration direction for the conflict land with deviation of core demand in the city. Based on the "people-oriented" land spatial planning theory, through the contradiction coordination mode of "self-existence and coexistence" and "optimization and balance," and taking the maximization of the overall social interests as the criterion, the land spatial ecological restoration planning decision-making path of "determining regions, clarifying interests, balancing needs, multidimensional evaluation, and coordinating contradictions" is constructed. The method of "multidimensional evaluation and coordination of contradictions" is adopted to select two plots with large conflicts of interests with agricultural space and urban space in the process of ecological restoration in Quangang District. Chang et al. [9] build a technical framework for ecological protection and restoration of mountains, rivers, forests, fields, lakes, and grasses aiming at improving urban ecological security and conducted an empirical study in Gujiao City, Shanxi Province, a typical coal resource-based city. Based on the regional characteristics of coal cities in mountainous areas, the types of ecological problems are systematically identified and spatially positioned. Based on the GIS platform, the multifactor comprehensive index evaluation method and the ecological service value equivalent factor method were used to grade the ecological importance of the city. We put forward the special planning of mountain, water, forest, farmland, and corresponding protection and restoration strategies.

Although the above research methods can obtain urban ecological restoration planning, due to the lack of comprehensive considerations in planning and the lack of quantitatively uncertain influencing factors, accurate and effective urban ecological planning cannot be obtained. In order to solve the shortcomings of the above research results, taking Yucheng County, Shangqiu, Henan Province as an example, this paper designs a new method of urban ecological planning and ecological restoration, and applies meteorological technology, analyzes the basic situation of the region, and effectively evaluates the current environment. Innovatively, the information entropy and weight judgment matrix were used to quantify the measure and control the factors to influence the uncertain planning effect and optimize the urban ecological planning model, and designed the relevant optimization methods. Through experiments, it is analyzed that the adjustment method can play a certain role in urban planning and ecological environment restoration. The specific route of this paper is shown in Figure 1.

Firstly, the geographical environment of Yucheng County in Shangqiu, Henan Province is analyzed in detail. According to the determined environment, the current situation of the regional ecological environment is analyzed, and the problems existing in its planning are determined. Then, a variety of factors affecting the planning effect with strong uncertainty are quantified; the land planning model and water system planning model in urban ecological planning are designed.

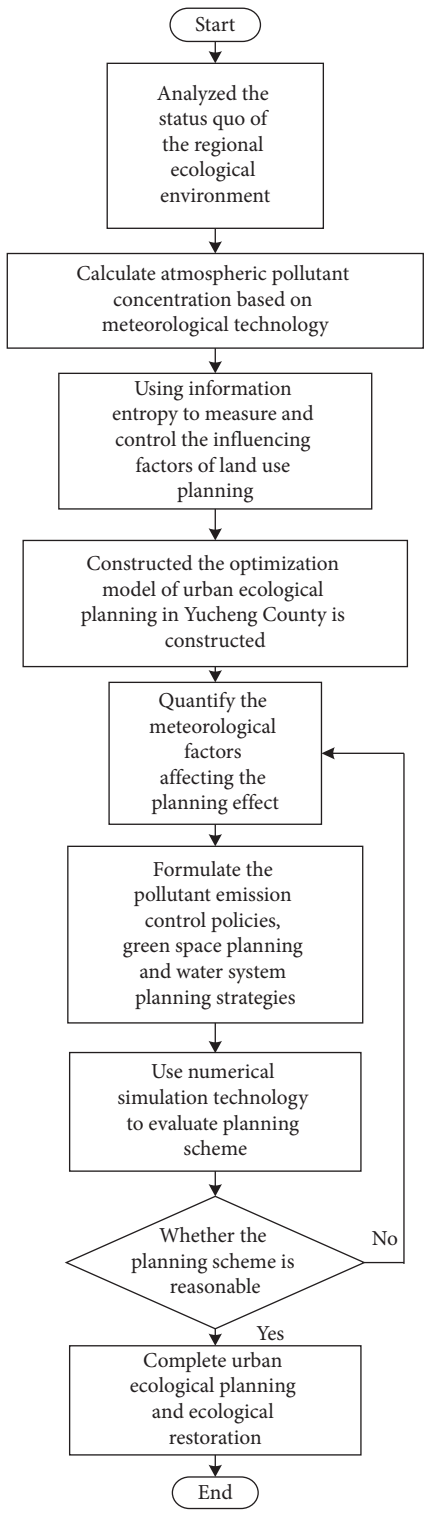

Figure 1: Research process.

Finally, through effective planning, meteorological technology is introduced to effectively evaluate the degree of air pollution and land planning in the region, so as to complete urban ecological planning and ecological restoration.

2. Urban Ecological Planning and Ecological Restoration Method Design

2.1. Geographical Environment Analysis of Yucheng County, Shangqiu, Henan Province. Yucheng County is located in the east of Henan, mainly focusing on the coincidence points of Henan, Shandong, and Anhui. It borders Xiayi in the East, Shangqiu New Area in the west, Bozhou City in Anhui Province in the south, Dangshan County in Anhui Province in the northeast, and Shan County in Shandong Province across the old Yellow River. The geographical coordinates are 115°4026′–116°1156′ E and 34°00′26″–34°37′12″ N. The geospatial map of Yucheng County is shown in Figure 2.

The county seat is located in the southwest of the intersection of Longhai Railway and Yubo highway. It is 23 km away from Shangqiu City in the West and 240 km away from Zhengzhou, the provincial capital. It is 120 kilometers east to Xuzhou, an important town in Northern Jiangsu, 60 kilometers south to Bozhou, and 45 kilometers north to Shan county, Shandong Province. After the adjustment of the jurisdiction, it includes 25 townships, with a total area of about 1432 square kilometers. By the end of 2015, the total population of Yucheng County was 1,129,400, and the urbanization level was 40.1%. There are three kinds of microshaped landforms in the original county, one is the Yellow River high beach, and the area is slightly inclined to the old course of the Yellow River, high in the West and low in the East, with an altitude of 54–58 m, in a strip shape. The area is 119.2 square kilometers, accounting for 7.7% of the total area of the county. Second, the Back River depression, on the south side of the old Yellow River, is 7–9 meters lower than the beach. It covers an area of 138.2 square kilometers, accounting for 8.9% of the total area of the county. The third is the slightly inclined plain, in the south of Beihe depression, with an altitude of 39–47.6 m. The total area is 1290 square kilometers, accounting for 83.4% of the total area of the county. Yucheng fold fault structure is relatively developed, with Bozhou fault in the East, extending from the old road of the Yellow River to Bozhou in the southwest. The middle is the new layer of Shangqiu, and the northwest southeast finally reaches the new layer of Tingzhou in the west of Yingpan township: the west is WangWen fault, and the east-west direction connects with the new layer of Shangqiu in Dahou township. The dry herringbone arrangement: the southwest is Shaji fault, which extends to Bozhou. The basement depth in the area of mengzhuze site in the northwest is 1400 meters, the shallowest part in the area of nanjinggou is 600 meters, and the deepest part is 4000 meters. Yucheng County has a warm temperate continental monsoon climate. There are abundant light, heat, and water resources. The average temperature of the county is 14.1, the average annual precipitation is 735.3 mm, the average sunshine hours over the years is 2360.2 hours, the annual sunshine rate is 53%, and the total annual radiation is 117.14 kcal/cm^2, which is warm all year round. On the whole, there are abundant light and hot water resources throughout the year. The rain and heat are in the same season, and the frost free period is long, which is conducive

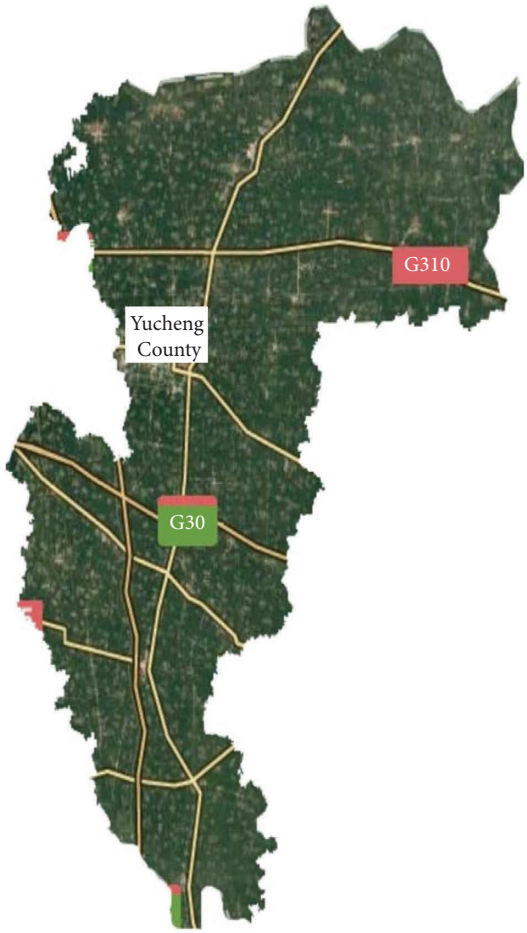

Figure 2: The geospatial map of Yucheng County.

to the growth of a variety of crops. However, the interannual and intra-annual climate changes are fierce, and the special climate does great harm to agriculture.

2.2. The Current Situation of Urban Ecological Planning and Ecological Restoration in Yucheng County, Shangqiu, Henan Province. Yucheng County is rich in green space resources. In order to meet the national standard of Ecological Garden City, Yucheng County has actively carried out green space construction and made some achievements. The current situation of green space mainly analyzes different types of green space resources in the urban green space system according to the requirements of "seeing green at 300 m and entering the park at 500 m," and evaluates the deficiencies of ecological environmental green space elements in the green space system [10, 11].

2.2.1. Current Situation of Urban Green Space. In recent years, Yucheng County has continuously strengthened the construction of landscaping, actively carried out the construction of garden green space, vigorously renovated and carried out greening of river channels, and widely carried out road greening and courtyard greening. The landscaping course has made great progress and achieved good results in the design and planning. It mainly includes the greening of parks, protection, squares, and other places. In 2018, the total green area in the central urban area of Yucheng County was 760.76 hm^2 [12, 13], the per capita park green area was 9.32 m^2, the green space rate was 35.05%, and the green coverage rate was 39.68%.

The current situation of urban green space is analyzed according to the green space coverage rate and other relevant information in this area see Table 1 for details:

(1) Park green space. In the functional green space planning, the starting point of the planning is mainly the needs of citizens and tourists, including various entertainment and service facilities [14]. The built-up area of Yucheng County has a green area of 178 hm^2, and a certain number of parks with different functions are set up including comprehensive park, community park, amusement park, and special park, as shown in Table 2.

Yucheng County comprehensive park includes People's Park, Mulan Cultural Park, and Lianghekou Park, with a total area of 90.94 hm^2. It is a good place for people's leisure, entertainment, and fitness in the county [15, 16].

(2) Protective green space. The planning of this functional green space mainly takes the improvement and protection of the urban environment as the starting point and mainly reflects the urban function. The current protective green space in Yucheng County is about 42.96 hm^2. These protective green spaces are mainly distributed along the main urban roads and water bodies. Some of the existing protective green belts are not wide enough, have no level change, and the continuity of the protective forest belt is poor [17, 18]. They cannot play a good role in protection and isolation, and the number is small, which cannot meet the needs of urban development, as shown in Figure 3.

(3) Attached green space. Attached green space is the subsidiary green land in all kinds of land other than green space in urban construction land. It is widely distributed and has a large proportion in the city. It is one of the foundations of urban greening. The area of auxiliary green space in the built-up area of Yucheng County is about 476.19 hm^2 [19, 20]. The auxiliary green land includes road green space, residential green space, and unit green space.

2.2.2. Green Space Problems. (1) Unbalanced layout and service blind area. The rapid economic development and the construction of the new area have brought about great changes in the original urban space. The current park construction cannot meet the needs of urban development, the existing green space allocation is unreasonable [21], the distribution of large parks is relatively concentrated, and the service scope is limited: there is a serious lack of small green space, the layout has not formed a trend of uniform distribution, and the green space distribution does not match the population density distribution, which cannot meet the needs of residents.

(2) The culture is not prominent and the landscape is not harmonious. The current construction of park green space and square has not made enough efforts to the urban cultural

Figure 3: Green space present situation.

landscape, and failed to effectively reflect the profound historical and cultural communication of Yucheng County. In addition, the quantity and effect of some river sections landscape are not coordinated. The current situation of some river sections on both sides of the cross river is simply hardened without reasonable planning, and the landscape is insufficient: houses occupy the river green space or give way, which affects the riverside landscape style. The networking and cultural atmosphere of Xianghe river system are not prominent enough, so it is necessary to strengthen the protection and development of Xianghe River and improve the overall image of the city [22, 23].

(3) The park has a single type and incomplete functions. The existing parks in Yucheng County are built by relying on the urban reclaimed water system. The type of park green space in the city is single, and there is a lack of other types of parks, it is difficult to meet the leisure needs of different types of residents. The number of other types of parks is less, which cannot meet people's multilevel psychological and physiological needs such as culture, leisure, and fitness. The park green space lacks maintenance, and the quality needs to be improved urgently. The water body lacks management, resulting in pollution and smelly water, which is not conducive to citizens' play and rest. The plant level, color, and community are slightly single. The surface of the lawn is exposed and there are weeds. There is a lack of public service facilities, resulting in disorderly parking of vehicles and safety hidden electricity problems [24].

2.3. Application of Meteorological Technology in Urban Ecological Restoration. Modern climatology can intuitively reflect the impact of urban ecological environment destruction and human activities. As one of the important indicators of urban residential environment and ecological environment, meteorological conditions can have an impact on urban ecological construction. Based on the analysis of wind speed, wind direction, precipitation, and other factors and special climate, urban planning and design based on meteorological environment research can significantly improve the urban ecological environment [25]. In the construction of urban ecological restoration, the use of meteorological technology in the settlement of urban heat island effect, urban ventilation corridor planning and construction, ecological restoration and air pollution control, ecological performance evaluation, and other fields is of great significance to the improvement of urban livability and the improvement of planning rationality.

Meteorological technology has a good application effect in urban ecological planning and ecological restoration, and can play a leading role in supporting the formulation, improvement, and final determination of planning scheme in spatial layout. Therefore, in the urban ecological planning and ecological restoration of Yucheng County, Shangqiu, Henan Province, this paper uses meteorological technology to calculate the pollutant concentration as the influencing factors of the suitability evaluation function and constructs the urban ecological restoration planning model of Yucheng

County. In order to optimize the model, the effect of land use is taken as the evaluation model factor to obtain the optimal urban ecological planning model. According to the model, ecological planning and modification strategies were formulated based on meteorological data analysis.

2.3.1. Calculation of Air Pollutant Level Based on Meteorological Technology. In the urban planning of Shangqiu Yucheng County, the monitoring of air pollution is very important. In meteorological technology, the current air pollution concentration level of Shangqiu Yucheng County is determined by means of air pollutant concentration index and air quality index, and the concentration index of air pollution is used to focus on the planning of urban space such as greening and planting in Shangqiu Yucheng County. The value range of general urban air pollution concentration index is [0, 500]. The higher the air pollutant concentration index is, the more serious the pollution is. When the value presents different pollution concentrations, determine the air pollution concentration in Shangqiu Yucheng County and reflect the air mass fraction of the concentration by using the following formula:

$$\varphi_i = \frac{L_i - L_j}{B_i - B_j}\left(C_p - B_i\right) + L_i. \tag{1}$$

In the formula, L_i represents the quality fraction of pollutant types, C_p represents the current concentration of air pollutants, B_i represents the corresponding air pollution concentration index, B_j represents the air quality score and air pollution concentration index, and L_j represents the current change of urban air pollutant concentration.

According to the determined air pollutant quality score of Shangqiu Yucheng County, the maximum pollutant air quality score of all Yucheng County in Shangqiu was obtained as follows:

$$L_{i'} = \text{MAX} \quad \left\{C_p\right\} | p = 1, 2, 3 \ldots n|. \tag{2}$$

In the formula, $L_{i'}$ represents the air pollutant quality subindex of Shangqiu Yucheng County and n represents the types of air pollutants.

According to the determination of the air pollutant quality index of Shangqiu Yucheng County, the urban ecological planning of Yucheng County should consider improving the greening degree as much as possible to reduce the air pollution in the modified area.

Considering the difference between the mass concentration and volume of pollutants released by the pollution source in Shangqiu Yucheng County, the solid particle pollutants in the gas can be regarded as discrete particles. Therefore, in the application of meteorological technology, the discrete term model is used to simulate the pollutants in this part. The motion equation of the pollutant is as follows [26]:

$$\frac{\partial f_{\text{up}}}{dt} = V_D\left(f - f_{\text{up}}\right) + \frac{G_X\left(p_i - p_0\right)}{p_i}. \tag{3}$$

In the formula, $\partial f_{\text{up}}/dt$ represents the particle acceleration, V_D is the particle mass, f_{up} is the particle density of the contaminant, G_X is the diameter of the tiny particles, and pi is the relative Reynolds number.

Taking the air pollution level obtained by the above formula as the influencing factor of the ecological planning suitability evaluation function, the urban ecological restoration planning model of Yucheng County is constructed.

2.3.2. Construction and Optimization of Urban Ecological Planning Model in Yucheng County. In the urban ecological planning of Yucheng County, effective planning is mainly aimed at air quality and urban land. Based on the pollutant level obtained in the previous section, combined with the urban land use effect, the urban ecological planning model of Yucheng County is constructed. According to the model, the pollutant emission control policy and green space planning are improved to complete the urban ecological planning.

The land space planning in the urban ecological planning of Yucheng County is affected by three or more factors, and the change of each factor has an impact on the direction and degree of the planning results. Therefore, this paper uses the multifactor analysis method to fully consider the impact. The main factors of urban ecology in Yucheng County, combined with information entropy and factor weight, optimize the urban ecological planning model. The planning of land space in the urban ecological planning of Yucheng County needs to fully consider that the air pollution level is the main factor affecting the urban ecology of Yucheng County and effectively evaluate the adaptability of urban land, so as to achieve the effective allocation of urban green space in this area and make it have better ecological effect.

When planning for it, the suitability evaluation function of Yucheng County land is first determined. We set the suitability evaluation function of Yucheng County land. The maximum value is $\max h_i$. The land use type is converted to a cost-minimum numerical value $\min h_j$. Land-type spatial coordination is $\max v_i$. Considering that the quantification of land information in meteorological technology is also the key to effective ecological restoration in urban planning of Shangqiu Yucheng County, combined with the level of urban pollutants, urban ecological planning model of Yucheng County is as follows:

$$\max h^+ = L_{i'} \times \frac{a_1 \max h_i + a_2 \max v_i}{a_3 \min h_j}. \tag{4}$$

In the formula, $a_1/a_2/a_3$ represents three different fractions of land planning use.

In formula (4), the degrees of land planning use are measured by the information entropy. Information entropy is the average amount of information after the redundancy is excluded from the information, which can eliminate the uncertainty of things. The higher the uncertainty, the more information it contains. The probability of occurrence of certain factors is quantified, so this paper uses information entropy to measure and control the influencing factors of the degree of land planning and utilization, so as to optimize the urban ecological planning model. Assuming that the effect of land use in an area is expressed as $X = (X_1, X_2 \ldots X_N)$, the probability of land space occupation is as follows:

$$R = (r(X_1), r(X_2)), \ldots r(X_n). \tag{5}$$

At this point, the information entropy of the land is calculated as follows [27]:

$$\omega(X) = -\sum_{i=1}^{n} h(x_i) \log_2 R(x_i) \tag{6}$$

In the formula, $h(x_i)$ represents the uncertainty of the land spatial effect and $R(x_i)$ represents the effect of the land use. The land area and total area of each type of land were obtained by using the ecological environment basic database of Yucheng County, Shangqiu City, Henan Province. The land use probability is the ratio of the land area that has been used to the total land area. According to the abovementioned land planning model of Yucheng County, in order to make its land planning effect better, it is necessary to calculate the closeness of its planning effect in order to optimize the effect of the designed land planning of Yucheng County. Assuming the standard fuzzy vector V_i of the evaluation index P and the symmetrical approach degree of the fuzzy vector Q_i, the final approach degree of land planning in Yucheng County is as follows:

$$G(P, Q_i) = 1 - \frac{1}{n} \sum_{n}^{i} \left| U_{Qi} - \mathrm{UP}(V_i) \right|. \tag{7}$$

In the formula, $G(P, Q_i)$ represents the level of index closeness and the U represents the ranking of individual factors.

The regular grid model in digital elevation model is used to plan effectively. Finally, the urban ecological planning model of Yucheng County constructed by considering the pollutant level and urban land use effect is follows:

$$\max W = \sum_{i}^{S_i} \partial \left(\max h^{+} + \max G(P, Q_i) \right) \tag{8}$$

In the formula, S_i represents the planning results of different grid areas in Yucheng County, i and ∂ represent the weights of each influencing factor.

To determine whether the model can effectively plan the ecology of the region and use the meteorological principle to compare and evaluate the spatial layout of the planning scheme with numerical simulation techniques, the meteorological elements such as temperature, pressure, wind speed, wind direction, and humidity in meteorology are taken as the influencing factors of Yucheng ecological planning model, which are judged through the weight, and the judgment matrix set is as follows [28]:

$$K\partial = Y_{\max} d. \tag{9}$$

In the formula, K represents the average ground observation meteorological data, sounding data, and various planning data matrices at the planning plot level of 20 observation stations in Yucheng City in 10 years, including the annual average data of wind field, pressure, wind direction, wind speed, air temperature, and relative humidity at different altitudes of the city. $Y_{\max}$ represents the maximum impact eigenvalue and d represents the influence effect of associated elements.

According to the abovementioned constructed urban ecological planning model of Yucheng County, pollutant emission control policies, green space greening area, and water system planning strategies are formulated.

The change of urban underlying surface (the contact surface between the bottom of the atmosphere and the land surface) will cause a series of changes in near ground temperature, wind speed, and comfort, which will lead to the change of urban meteorological environment. The more construction land is increased, the greater the pressure on the environment. Therefore, effectively controlling the expansion of construction land in the process of urban development is not only beneficial to the intensive and economical use of land, but also of great significance to the improvement of the atmospheric environment.

In terms of green space layout, the green space should be arranged according to the characteristics of wind direction and speed. First of all, planting a large area of green space within the city should give priority to the southwest. Because the dominant wind direction of Yu city is southerly and northerly, but in weak wind weather, the dominant wind direction is southwest, which makes it easy for pollutants in the southwest of the city to be transported to the city. In order to avoid external pollutants entering the city, priority should be given to planting a large area of forest land in the southwest, followed by the southeast and east. Secondly, the ecological restoration planning of Yucheng City should strengthen the construction and protection of the prevailing wind wedge-shaped green space within the city, so as to make the city "breathe smoothly". The ventilation direction of the ventilation corridor should be adjusted in the southwest region, and the ventilation corridor should be increased in the southeast region [29].

The construction of wedge-shaped green space should be centralized and leave enough width. The construction land passed on both sides of the centralized construction group is more conducive to ventilation than scattered in the wedge-shaped green corridor. Therefore, we can focus on the rectification and demolition of illegal construction in the ventilation corridor in combination with the demolition of illegal construction in the urban-rural fringe, so as to improve the ventilation and diffusion capacity in the corridor, promote the diffusion of pollutants, and improve the atmospheric environment in the city.

3. Experimental Analysis

3.1. Experimental Scheme Design. In order to verify the effectiveness of this study, an ecological restoration simulation experiment was carried out in Yucheng County, Shangqiu City, Henan Province. Based on the planning, the accuracy of land and water system planning and the remediation effect of air pollution are analyzed.

FOXBASE, a database management system, was used to manage the basic data database of the ecological environment in Yucheng County, Shangqiu City, Henan Province.

Using ecological restoration simulation software SIM-CREATOR V3.1, the ecological restoration of Yucheng County, Shangqiu City, Henan Province based on the data of FOXBASE database of management system was simulated. The graphic editing adopts AutoCAD drawing software to draw the ecological restoration plan of the experimental area, as shown in Figure 4.

3.2. Experimental Results. In order to reflect the effectiveness of this method, the experiment is carried out by comparing this method with the methods of Xiao et al. [2] and Li et al. [3]. Firstly, land planning is carried out in an area of 1000 square meters in Yucheng County, Shangqiu, Henan Province.

The land use planning of the study area in this paper is as follows: the land use probability of large-area planting green space is 5.8%, which is arranged in the southwest of the city. The land use probability of large-area forest land is 5.2%, which is arranged in the southwest of the city, followed by the southeast and east. The land use probability of the ventilation corridor is 3.9%, which is mainly arranged in the southeast of the city.

The application effects of the three methods are analyzed. The sensitivity of the method was tested before the experiment, and the parameter value of planning time was changed under the condition that other parameters remained unchanged, and the land planning results were judged to be affected by time-varying parameters. There is a correlation, and the correlation is greater than the set threshold $P = 0.5$, so the following planning accuracy results are reasonable. The experimental conditions of the methods of reference 2 and reference 3 are consistent with the method in this paper. The planning accuracy results of the three methods are shown in Figure 5.

By analyzing the results in Figure 5, it can be seen that the planning accuracy obtained by using three methods for the land planning of 1000 square meters in Yucheng County, Shangqiu, Henan Province is compared with the accuracy set before the experiment, and the results are different. Among them, the planning accuracy of the Xiao et al. [2] method is up to 89%, and the planning accuracy of the Li et al. [3] method is up to 91%. The planning accuracy of this method is up to 93% and are consistent with the ideal value. Although the planning accuracy of the other two methods also meets the requirements, it is lower than this method and inconsistent with its ideal value. This is because this paper deeply analyzes the geographical environment of Yucheng County, Shangqiu City, Henan Province, builds the urban ecological planning model of Yucheng County based on the current geographical environment, uses the standard fuzzy vector to calculate the closeness of the planning effect, and optimizes the designed land in Yucheng County. The method has good planning effect, because it comprehensively considers land planning factors and meteorological factors, uses multifactor analysis method to calculate the information entropy of each influencing factor, and determines the weight, so as to obtain high-precision land planning results.

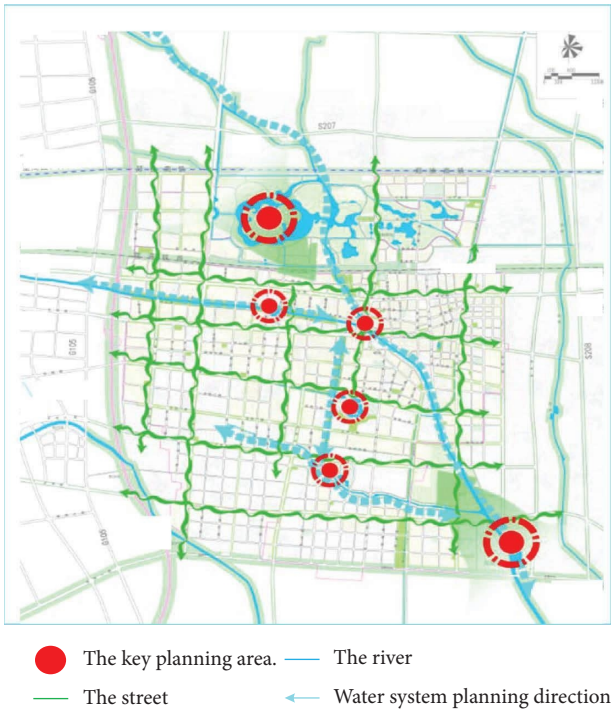

Figure 4: Ecological restoration plan map of the experimental area.

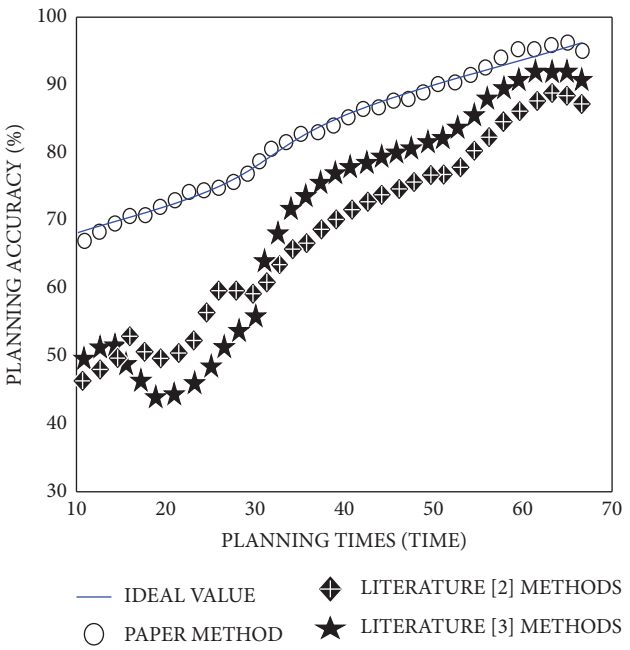

Figure 5: Comparison results of land planning accuracy of different methods.

By comparing the methods of this paper, the methods of Xiao et al. [2] and Li et al. [3], the experiment analyzes the planning accuracy of the three methods in the regional water system planning of Yucheng County, Shangqiu, Henan Province, as shown in Figure 6.

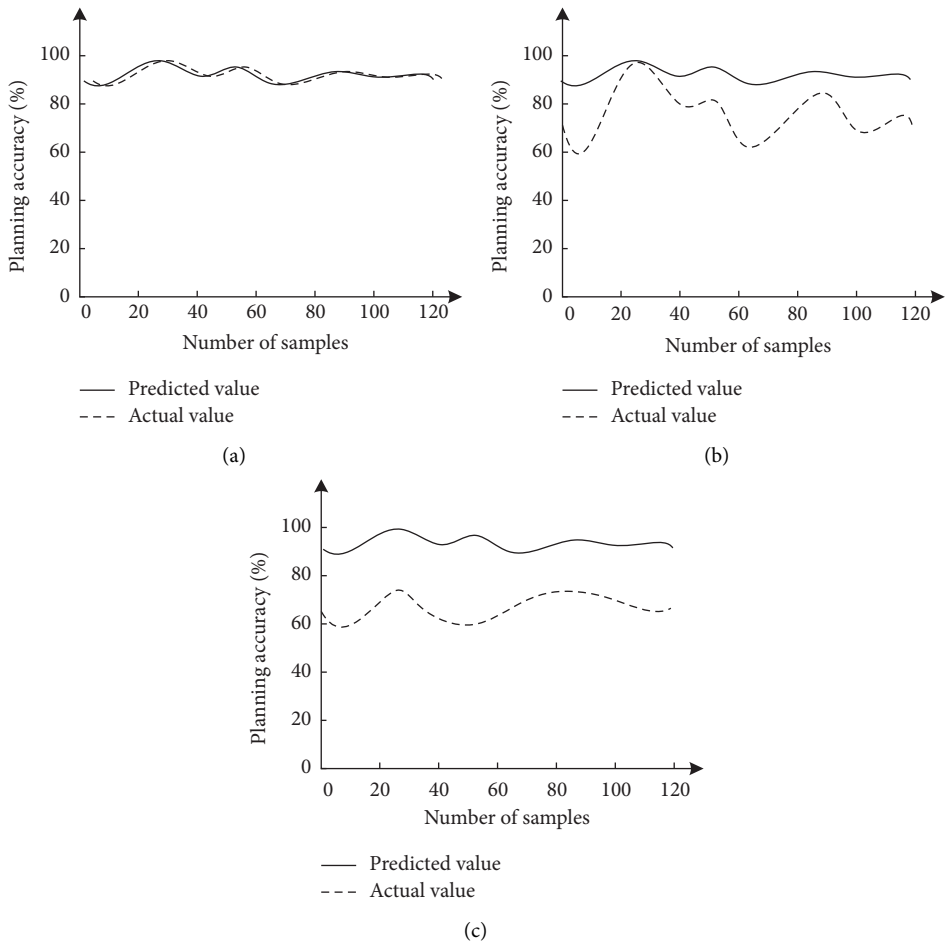

Figure 6: Accuracy analysis of regional water system planning in Yucheng County, Shangqiu, Henan province. (a) The proposed method. (b) Literature [2] methods. (c) Literature [3] methods.

By analyzing the experimental results in Figure 6, it can be seen that the practical results obtained in the precision planning of the regional water system by using the three methods are inconsistent. Among them, the effect of this method is better than the other two methods, and is close to the ideal value. The value of the other two methods is lower than that of this method, and there are some fluctuations. This is because this paper uses meteorological technology to calculate the influencing factors of pollutant concentration, and builds an urban ecological restoration planning model as the suitability evaluation function of urban ecological restoration construction. Adding land use effect and water system planning effect as evaluation model factors, the optimal urban ecological planning model is obtained. Considering a variety of uncertain factors, the fuzzy vector is used to calculate the closeness of the planning effect of the model, and the effect of the land planning model in Yucheng County is optimized, so the obtained results are close to the ideal value.

Table 1: Analysis of current situation of urban green space.

Name	The measure of area (hm^2)	Function
Park green space	178	Urban greening, etc
Protective green space	42.96	Beautiful city, etc
Attached green space	479.16	Other
Total area	760.76	—

Table 2: Details of green space in some parks.

Name	Floor area (hm^2)	Position	Other
The people's park	49.5	Industrial avenue	Comprehensiveness
Mulan cultural park	15.11	Mulan avenue	Comprehensiveness
Two estuary park	26.33	Lijiang road	Comprehensiveness

4. Conclusion

Regional urban ecological planning and restoration are related to the development of the whole society. This paper studies the regional ecological planning and restoration of Yucheng County, Shangqiu, Henan Province, and restores the ecological problems in this area with the help of meteorological technology. According to the determined environment, the current situation of the regional ecological environment is analyzed, and the problems existing in its planning are determined. On this basis, the ecological planning optimization model is established by considering the air pollution degree, land planning effect, and meteorological influence factors. Based on meteorological analysis, urban ecological planning and ecological restoration strategies are proposed to realize urban ecological planning and ecological restoration. The experimental results show that this method can effectively realize regional ecological planning and restoration. Compared with other methods, the accuracy of land planning and regional water system planning are relatively high, which has certain feasibility.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The author declares no conflicts of interest.

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