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Evaluation on Natural Protection Environment Based on Public Participation in Random Forest

Verbaarschot Ceci*

School of Chemical and Materials Engineering (SCME), National University of Sciences and Technology (NUST), H-12 Sector, Islamabad 44000, Pakistan

**corresponding author*

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Abstract: With the development of economy, the importance of reducing environmental pollution and preventing unexpected environmental events to ensure life safety has become increasingly prominent. In formulating and implementing environmental protection policies and measures, it is necessary to improve people's quality of life while ensuring ecological safety. How to deal with environmental problems is not only an important factor affecting people's quality of life, but also an important factor affecting the development of the whole society. Many researchers have provided new ideas for the study of natural protection environment, and this paper is based on this as the research direction and research basis. This paper explored the public participation in the natural protection environment, and then carried out academic research and summary on the research of the natural protection environment and the public participation in the random forest. Then the algorithm model was established, and relevant algorithms were proposed to provide theoretical basis for the research of natural protection environment based on public participation in random forest. At the end of the article, the simulation experiment was carried out, and the experiment was summarized and discussed. It can be seen from the data table that the financial expenditure of the environmental protection department in the region has been increasing every year since 2018, and had a downward trend until 2022. Finally, selecting City K as the research object, it was concluded that the age range with the highest enthusiasm for environmental protection after use was 18-30. Most of these people were spontaneously involved in environmental protection actions. It can be seen that the adoption of random forests can accurately improve the enthusiasm of the people at all stages of environmental protection. At the same time, with the in-depth study of random forest, the research of natural protection environment with public participation is also facing new opportunities and challenges.

1. Introduction

Human beings coexist with nature, which is both the basis for human survival and the material source for human social development and economic prosperity. With the rapid development of human society, the amount of various industrial and domestic wastes is increasing, resulting in more and more serious pollution of air, water and soil. The ecological balance of nature has also been strongly affected and destroyed, and many resources are becoming less and less, even on the verge of exhaustion. Soil erosion and land desertification are becoming increasingly serious threats to food production and human health. Therefore, maintaining ecological balance is a fundamental issue related to human survival and social development.

The natural protection environment has been studied. Whitburn Julie believed that understanding the drivers of environmental protection or destruction is very important for designing and implementing effective public policies to encourage people to participate in environmental protection [1]. Tomislav Klarin found that the concept of sustainable development has gone through different stages of development since it was put forward. The historical development of this concept has witnessed the participation of various organizations, which are currently stepping up the implementation of this concept. In its development process, this concept has been applied to complex global environmental research [2]. Aerts Raf studied that the existence, accessibility, proximity and greenness of green space determine its positive impact on health, but the role of biodiversity in green space remains to be studied [3]. Hemingway Jordon D investigated and analyzed the balance between organic carbon production and respiration in photosynthesis. In the earth ecosystem, most organic carbon is converted into carbon dioxide, but a small part of organic carbon escapes and is retained in the earth ecosystem [4]. Hanson Jeffrey O believed that environmental change is accelerating rapidly, and many species need to adapt to survive. Ensuring that the reserve covers the population under various environmental conditions can protect the process leading to such adaptation [5]. Ferrante Lucas analyzed that some measures themselves and the expectation of impunity they encourage have stimulated the increase of deforestation, which has led to climate change and land conflict with traditional peoples [6]. The above studies have achieved good results, but with the continuous updating of technology, there are still some problems.

The natural protection environment of public participation in random forest was studied. Christin Sylvain studied the application of deep learning in ecology. In just a few years, deep learning, with its flexibility and ability to process large and complex data sets, has completely changed many research fields such as bioinformatics [7]. Liu Tao believed that deep learning network has shown great success in some computer vision applications, but in the context of object-based image analysis, its implementation in natural land cover map is rarely explored, especially in the impact of training sample size on performance comparison [8]. Resende Paulo Angelo Alves studied that random forest models provide significant performance in the application of behavior-based intrusion detection systems [9]. Zelenika Ivana's research showed that interactive sustainable development education in the botanical garden environment can become an effective education model to mobilize the public to participate in sustainable development [10]. Brown Eleanor D examined the characteristics of citizen science that affect data quality, reasoning ability and ecological usefulness [11]. Kotsila Panagiota proposed that the natural-based solution is a new term used to promote the concept of urban sustainable development, which has attracted more and more attention in academic and policy circles [12]. The above research shows that the application of random forest has a positive effect, but there are still some problems.

This paper studies the natural protection environment of public participation in random forest, first explores the research of public participation in natural protection environment, then gives its

relevant content, and analyzes the application of random forest in natural protection environment. The relevant algorithms are used to provide theoretical basis for the experiment. Finally, from the perspective of regional development, the enthusiasm of urban people to participate in environmental protection under the random forest is analyzed and compared, providing reference significance for such research.

2. Exploring the Evaluation of Public Participation in Natural Protection Environment

2.1. Natural Protection Environment

Natural protection of the environment refers to how to effectively use energy to reduce environmental pollution and prevent environmental crisis. The formulation and implementation of environmental protection policies and measures should not only protect the environment, but also improve people's quality of life on the premise of improving people's quality of life. The solution of environmental problems is related to both the quality of human life and the development of human society. Environmental protection refers to the application of the theories and methods of environmental science to the better utilization of natural resources, the profound understanding of the causes and hazards of pollution and destruction, the systematic protection of them to prevent the deterioration of environmental quality, and the effective control of environmental pollution, so as to promote the harmonious development of human and environment [13].

2.2. Obstacles to Public Participation in Natural Protection Environment

The following summarizes several obstacles to public participation in the natural protection environment, as shown in Figure 1:

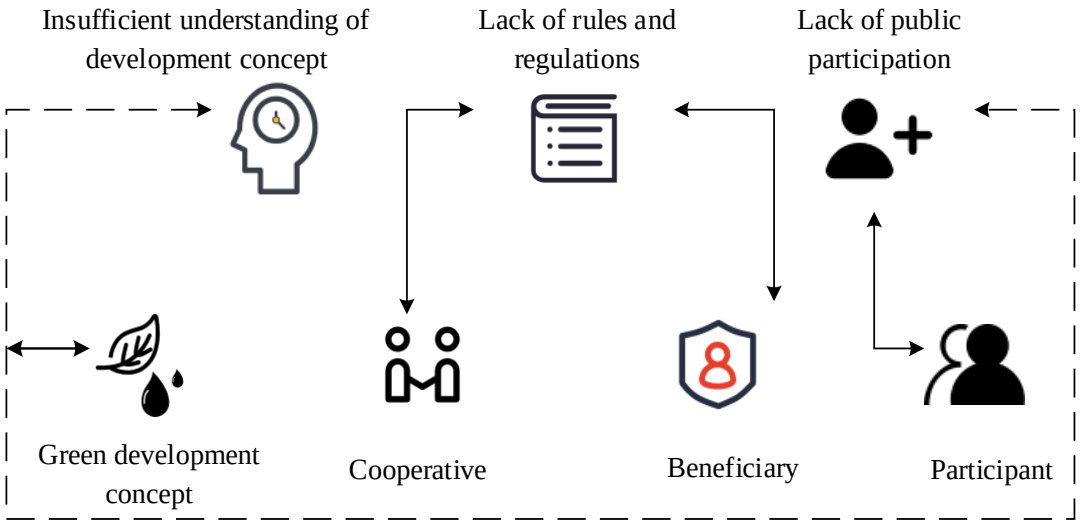

Figure 1. Existing obstacles

2.2.1. Insufficient Understanding of Development Concept by Relevant Departments

In some regions, the concept of "golden mountains and silver mountains" and the firm concept of green development have not been formed in terms of the concept of natural protection of the environment, and there is the problem of focusing on the development of light ecological protection. Relevant departments have not fully understood the implementation of various reform measures and

responsibilities of one post, the relationship between ecological protection and economic development, and the complexity, long-term nature and severity of ecological protection.

2.2.2. Lack of Public Participation

The natural protection environment is closely related to the life of the public. The public is not only the beneficiaries of ecological environment governance, but also the participants of environmental governance. To a certain extent, the level of public participation would greatly affect the level of ecological environment governance [14]. In the current process of social and economic development, the degree of public participation in natural environment protection is relatively low, which is mainly reflected in the following aspects. First, public participation is passive. The protection of relevant departments is still in the top-down sector-led protection stage. Because of the department's preference for the public interest, the public interest subjects pay attention to the public interest and protect the public interest more passively. Second, the public participation of departments is basically at the conceptual level, and the overall evaluation of the construction of ecological civilization is low in cognition and practice.

2.2.3. Lack of Rules and Regulations for Regional Governance

At present, there are two ways of regional natural environment governance: one is government-led and the other is market-led. However, both of these ways cannot be separated from the participation of the public and the coordination of the regional environment. The pollutant discharging units can be strictly controlled by legal and economic means, and the pollutant discharging units that exceed the standard can be severely punished. In order to achieve effective control of water pollution, the pollutant discharge tax is implemented. In the cooperative governance model, it is beneficial for a variety of subjects to share environmental responsibilities by incorporating the public choice theory and the perspective of new regionalism.

2.3. Measures for Public Participation in Natural Protection Environment

The following summarizes the measures for public participation in the natural protection environment, as shown in Figure 2:

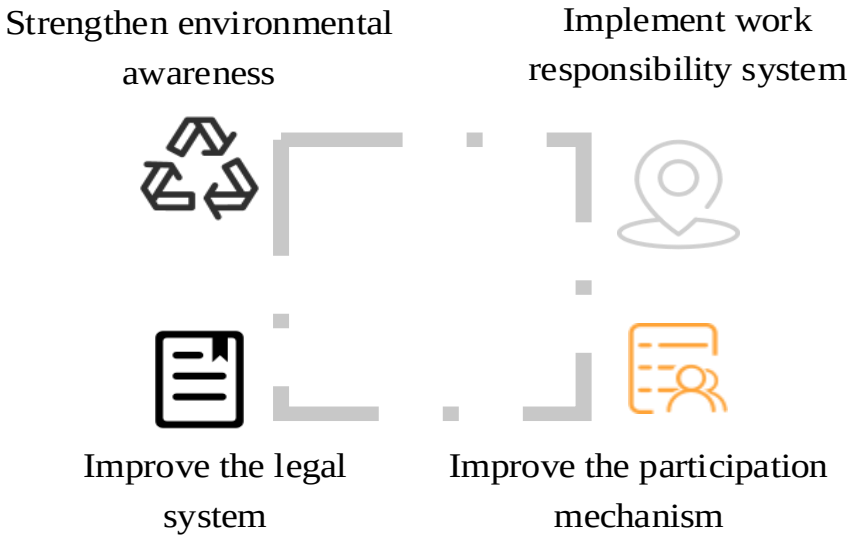

Figure 2. Measures of public participation in the nature conservation environment

2.3.1. Strengthening Environmental Awareness

People's awareness of environmental protection is not strong in the process of ecological environment management, which limits public participation. Therefore, people should strengthen the popularization of basic ecological construction and environmental protection knowledge to enhance the environmental protection awareness of natural protection. The first is to use the power of public opinion to improve people's awareness of environmental protection through various media and enhance people's awareness of environmental protection. The second is to strengthen the concept of legal system, increase the publicity of environmental protection laws and regulations, vigorously advocate the correct values of environmental protection, energy conservation and emission reduction, publicize the hazards of pollution and illegal cases to the public, and let the masses take up the weapons of law to safeguard their legitimate interests. The third is to set a good example of environmental protection. Through the evaluation of environmental protection achievements, it can generate enough power for the public participating in ecological environmental governance [15].

2.3.2. Implementation of Work Responsibility System

People should strictly implement the responsibility system of ecological environment protection, pay equal attention to supervision and inspection of government and enterprises, strengthen the system of party and government responsibility, double responsibility for one post, accountability for dereliction of duty and environmental protection for industry management, and strengthen the coordination and communication with party committees and governments at all levels and relevant departments to ensure the effective implementation of ecological environment protection. People would also fully implement the grid supervision system, further improve the four-level grid environmental supervision system at the city, county and village levels, and achieve strict prevention at the source, strict control in the process, and strict punishment for the consequences. People should further improve the evaluation and assessment mechanism for the goal of ecological civilization, take the quality of the ecological environment as a hard indicator, incorporate it into the performance assessment of local people's governments at all levels, and implement the one-vote veto system for environmental protection to ensure that the quality of the ecological environment is effectively improved.

2.3.3. Improving the Legal System

Natural protection of the environment is a major issue related to social development and people's welfare. There must be a perfect legal system to provide a legitimate basis for it. Therefore, it is necessary to improve the current legal system of administrative management, so as to ensure that there are laws to be followed and strictly enforce the law. Those who destroy the ecological environment shall be severely punished according to law, and their civil and criminal responsibilities shall be investigated according to law. Only if the standards are set more clearly, the cost of illegal acts is raised higher, and the enforcement is more strict and fair, can the environmental protection work be carried out more smoothly.

2.3.4. Improving the Participation Mechanism

At present, the participation mechanism of natural protection and environmental organizations is not perfect and lacks systematic laws and regulations. It is also difficult to implement. First of all, people should improve the laws and regulations on public participation in basin environmental

governance and establish corresponding regulations and systems. Secondly, people should establish an open and orderly supervision environment to promote the standardization of laws and regulations. To prevent and correct all kinds of illegality, citizens' environmental legal awareness should be constructed from the perspective of law. Finally, a sound basin environmental information disclosure system has been established to give full play to the role of the public, let the public actively participate in the basin environmental protection work, and ensure that the public can obtain relevant information about the basin environment to ensure the smooth progress of environmental protection work.

3. Application of Random Forest in Natural Protection Environment

The ecological and environmental protection area in a certain area is selected and the use of random forest is used to optimize the natural protection planning in the area. The specific usage is as follows:

The algorithm first optimizes the approximate step size of a large area, then fixes one parameter, and performs a small step size fine search for the other parameter. Because the optimal combination obtained by the algorithm is basically consistent with the near-optimal combination obtained by a certain parameter, it is difficult to guarantee the overall optimization. This method can not be well used for parameter optimization of stochastic forest model.

In the random forest method, an improved rectangular expanded grid method is introduced and its parameters are optimized.

Based on the overall accuracy of image classification, there are:

$$Z(j,i)=\left(\frac{E'}{E}\right) \tag{1}$$

In the formula: E is the number of pixels.

First, the value range of the two parameters in the first step is determined. If it is formed into a plane area and the area $P\times Q$ is divided into a larger grid, the parameter combination of each grid point is as follows:

$$j=J_{\min}+(p-1)(J_{\max}-J_{\min})/P \tag{2}$$

$$i=I_{\min}+(q-1)(I_{\max}-I_{\min})/Q \tag{3}$$

Among them, p=1,2, P and q=1,2,..., Q

The objective function is solved for each lattice, and a rectangular area is selected as the new parameter at its maximum. It is segmented, and so on. The combination of parameters obtained through the test grid for the first time is (j_1,i_1), and then the range of parameters passed the test for the second time is:

$$j_1-(J_{\max}-J_{\min})/P\le j_2\le j_1+(J_{\max}-J_{\min})/P \tag{4}$$

$$i_1-(I_{\max}-I_{\min})/P\le=i_2\le i_1+(I_{\max}-I_{\min})/Q \tag{5}$$

4. Evaluation on Natural Protection Environment Based on Public Participation in Random Forest

The natural protection of the environment is to apply the theories and methods of environmental science into practice, recognize the causes and hazards of pollution and destruction on the basis of

better use of natural resources, and make a determination to protect the environment, prevent the deterioration of environmental quality, and effectively control environmental pollution to promote the coordinated development of human and environment. The following applies random forests to the study of natural conservation environment in which the public participates, and selects areas where the work related to the natural environment is not perfect according to the relevant information published on the Internet to carry out the study. First, the financial expenditure of environmental protection in the region this year would be counted, and then the natural environment in the two cities in the region would be compared and analyzed. One place would be selected to use the method mentioned above to analyze whether the method is effective by using the data of the participation rate of citizens in the natural protection environment before and after the use. Table 1 shows the financial expenditure and changes of environmental protection departments in the region from 2018 to 2022:

Table 1. Financial notes and changes of the environmental protection department in the region from 2018 to 2022

	Financial expenditure (100 million)	Rate%
2018	571	/
2019	624	9.3
2020	687	10.1
2021	723	5.2
2022	645	-10.8

It can be seen from Table 1 that the financial expenditure of the environmental protection department in the region has been increasing every year since 2018, and had a downward trend since 2022. Compared with the previous year, the fiscal expenditure in 2019 increased by 5.3 billion yuan, with a year-on-year growth rate of 9.3%. Compared with the previous year, the fiscal expenditure in 2020 increased by 6.3 billion yuan, with a year-on-year growth rate of 10.1%. Compared with the previous year, the fiscal expenditure in 2021 increased by 3.6 billion yuan, with a year-on-year growth rate of 5.2%. Compared with the previous year, the fiscal expenditure in 2022 decreased by 7.8 billion yuan, and the year-on-year rate decreased by 10.8%.

Here, the protection intensity of the two cities was analyzed through the four factors of water body, forest, atmosphere and land in the natural environment, as shown in Figure 3.

Figure 3a shows the degree of protection of City H in natural environmental factors, and Figure 3b shows the degree of protection of City K in natural environmental factors. It can be seen from Figure 3 that the degree of protection of City H in the four factors in the figure was above 7, while that of City K in the four factors in the figure was below 7, and the objects of protection of the natural environment in the two cities were different. For example, City H had more protection for the atmosphere, while City K lacked such protection. The water body protection degree of City K was 1 lower than that of City H; the forest protection degree of City K was 3 lower than that of City H; the atmospheric protection degree of City K was 6 lower than that of City H; the degree of land protection of City K was 3 lower than that of City H. Therefore, it can be seen that the natural protection work of City K in the two cities was not very smooth. In order to make the article more scientific, people choose it as the subject of the following experiment and compare the enthusiasm of public participation before and after the use of the random forest method. For the purpose of statistics, the age of the masses is taken as the constraint range of the sample, such as less than 10 years old, 10-18 years old, 18-30 years old and more than 30 years old, as shown in Figure 4.

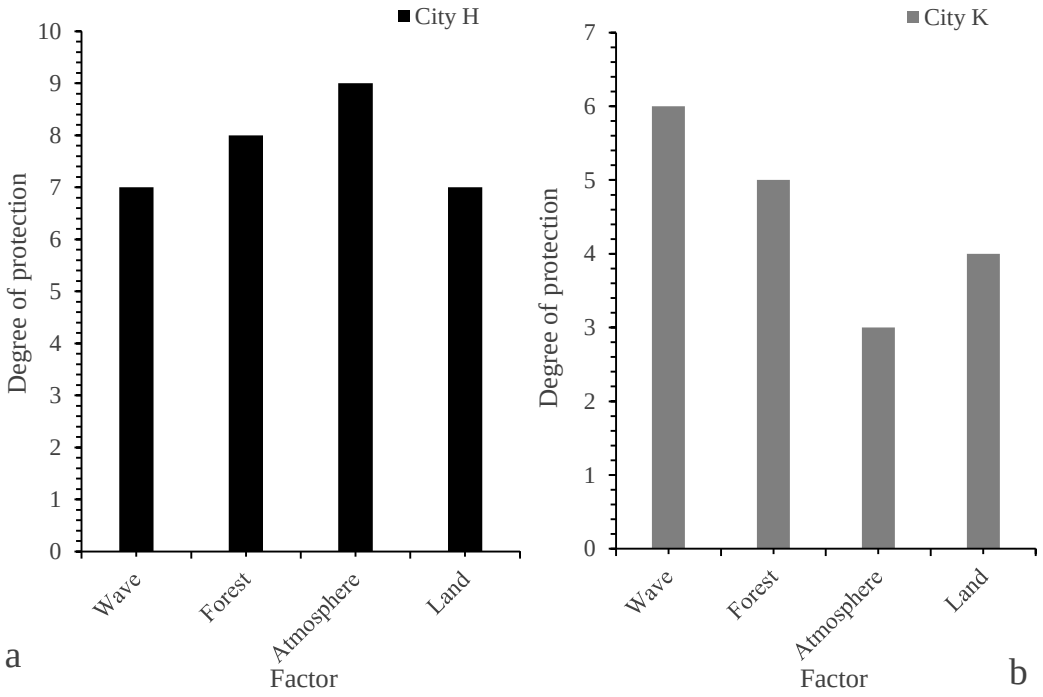

Figure 3a. Protection degree of the urban H natural environment
Figure 3b. Protection degree of the urban K natural environment

Figure 3. The protection degree of the natural environment of the two cities

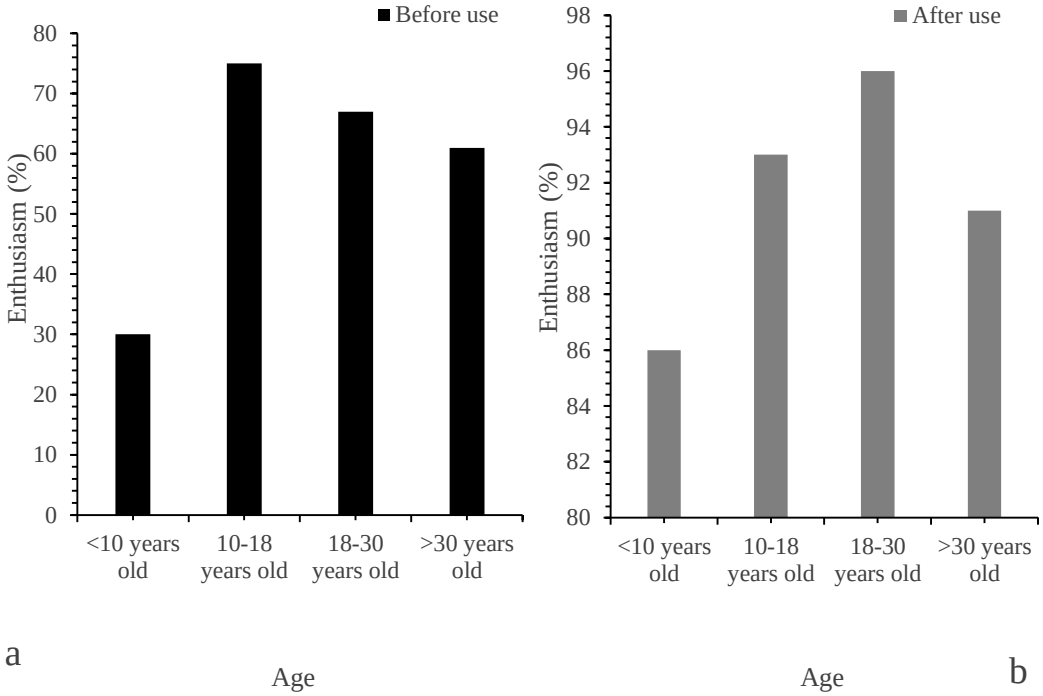

Figure 4a. The enthusiasm of the people of all ages before the use
Figure 4b. The enthusiasm of the people of all ages after the use

Figure 4. The enthusiasm of the people of all ages before and after the use

Figure 4a shows the enthusiasm of people of all ages in the city before use, and Figure 4b shows the enthusiasm of people of all ages in the city after use. It can be seen from Figure 4 that the enthusiasm of people under 10 years old for natural environment protection before use was only 30%, which showed that parents and schools lacked awareness of environmental education, and children's enthusiasm for natural environment protection has increased to 86% after use. For example, parents can often cultivate children's habits of not littering in daily activities. Teachers can play videos about the earth environment in class to stimulate children.

5. Conclusion

Natural protection of the environment refers to the protection and rational use of natural resources by human beings to prevent pollution and damage to the natural environment, to create appropriate conditions for people's life and work, and to coordinate the relationship between human and nature so that human and nature can coexist harmoniously. The paper probed into the problems existing in the current natural protection environment and gave solutions, and then applied the relevant algorithms of random forest to the City K in the region. Finally, it was concluded that the age range with the highest enthusiasm for environmental protection after use was 18-30. Most of these people participate in environmental protection actions spontaneously. It can be seen that the adoption of random forest can accurately improve the enthusiasm of the people at all stages of environmental protection.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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