

Rural Natural Environment Protection Strategies under Green and Low-carbon Environment

Hossein Bonakdari*

Department of Biological Sciences, University of Queensland, St Lucia, QLD 4072, Australia

**corresponding author*

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Abstract: The countryside itself has good prospects for development, but the current rural natural environment is no longer the beautiful and quiet scene in people's memory, and the discharge of a large amount of domestic garbage and industrial wastewater has brought great harm to the countryside, and also brought harm to the rural development. In recent years, the concept of green and low carbon has gradually taken root in people's minds, and people are paying more attention to environmental protection in their lives. In this context, it is urgent to improve the public's awareness of environmental protection. In order to make the public pay more attention to environmental protection, this paper first introduces the current situation and cause analysis of rural environment, and then proposes the fuzzy comprehensive evaluation method. This paper then proposes improvement strategies based on the concept of green and low-carbon, and analyzes the effect of rural natural environment protection. This paper finally concluded that 72% of the villagers thought that they were the main responsible party for protecting the environment and their awareness of protecting the natural environment had been greatly improved after taking measures to protect the rural natural environment. 53% of the villagers threw their domestic garbage into the trash can, an increase of 37% over the previous period, and their environmental protection behaviors also increased. The concept of green and low carbon would continue to influence the public's awareness and behavior of environmental protection and promote the development of rural natural environment protection in a good direction.

1. Introduction

In the face of increasingly serious environmental pollution and global warming, the development of low-carbon, energy-saving and environment-friendly technologies has become a major issue for the whole society. The development of rural areas is an important factor in global economic growth. While making significant contributions to economic development and tourism, it also brings serious

environmental pollution problems. In order to effectively solve the increasingly serious problems of environmental degradation and energy consumption, the protection of rural environment has become an inevitable choice for future development.

Natural protection is an eternal topic, and many scholars have investigated this field. Stefaniuk Ma ł Gorzata analyzed the public opinion survey on Polish society's environmental awareness of natural resources and their protection, drew conclusions on terms such as "environmental security", "natural resources", "environmental awareness" and "public opinion", and put forward a new definition of environmental awareness [1]. Dallyono Ruswan focused on the interactive meaning of semiotics resources in the environmental sports poster using multimodal perspective, and studied the contribution of visual and text resources to raising people's awareness of the importance of environmental protection [2]. Gordon Igor analyzed the environmental protection system during the economic downturn [3]. Mickiewicz Pawel took Poland as an example to study the environmental protection and comprehensive development planning in local space policy [4].

There are also many scholars who have studied environmental protection. Stelmasiak Jerzy analyzed the legal form of nature reserves as natural protection [5]. Bulajic Stanko analyzed the investment and expenditure investment in environmental protection in the following fields through statistical data: air protection, wastewater and waste management, soil and surface water protection and restoration, noise and vibration prevention and natural protection [6]. Zhang Bao-Yi clarified the attraction of green products to consumers, and analyzed the importance of each factor from the perspective of environmental protection design. He believed that developing green products is conducive to environmental protection, and is also a strategy for enterprises to increase the added value of products [7]. Among many studies on environmental protection, there are few studies on rural natural environment.

The concept of green and low-carbon has gradually taken root in recent years, and more and more people pay attention to low-carbon life. Zhao Jun summarized green low-carbon ironmaking technology [8]. Fan Mingyue combined the large green corridor with the underground complex and put forward a low-carbon building solution for urban climate revitalization [9]. Sartzetakis Eftichios S discussed the role that green bonds can play in financing the transition to a low-carbon economy [10]. Heine and Dirk finance low-carbon transformation through carbon pricing and green bonds [11]. Soomro Mansoor Mumtaz analyzed human resource management in the green economy [12]. Riaz Muhammad analyzed the fuzzy interactive aggregation operator and its application in low-carbon green supply chain management [13]. The fractional evolutionary game of green and low-carbon innovation of Jiang Nan manufacturing enterprises [14]. Under the influence of the concept of green and low carbon, the protection of rural natural environment is rarely analyzed.

In order to improve the public's awareness of environmental protection, this paper takes the rural natural environment as the theme, takes the concept of green and low carbon as the idea, uses the fuzzy comprehensive evaluation method and the questionnaire survey method to investigate the rural resident population, and investigates the villagers' awareness and behavior of environmental protection before and after adopting the strategy of rural natural environmental protection based on the concept of green and low carbon, It is concluded that after the rural natural environment protection measures based on the green and low-carbon concept are adopted, the local permanent population's awareness of natural environment protection has improved and their natural environment protection behaviors have increased. Compared with other people's experimental results, this paper uses the fuzzy comprehensive evaluation method to analyze.

2. Current Situation and Cause of Rural Environment

At present, there are many environmental pollution problems in the rural environment, and the

causes behind them are also complex, as shown in Figure 1:

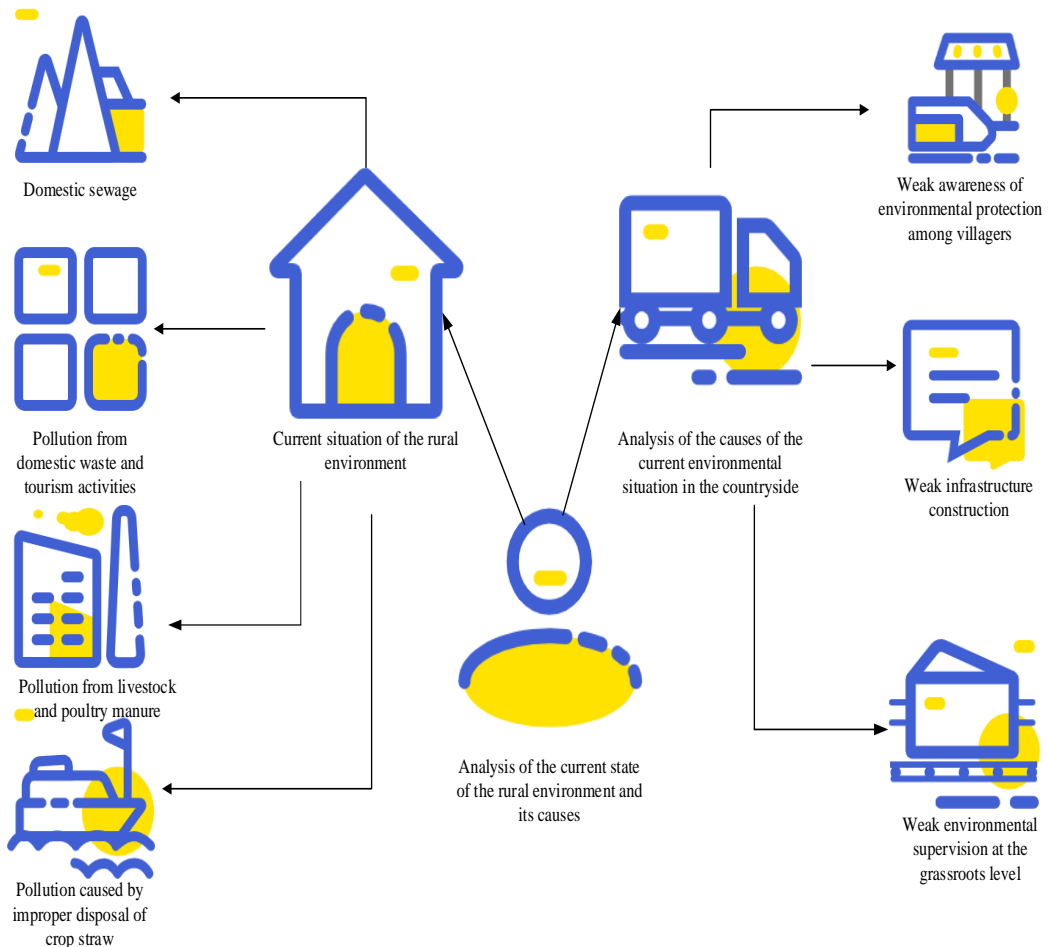


Figure 1. Analysis of the current state of the rural environment and its causes

2.1. Current Situation of Rural Environment

2.1.1. Domestic Sewage

The essence of rural ecological environment is to promote the development of rural economy and realize the sustainable development of social economy based on the natural environment without social interference [15]. With the rapid development of rural tourism, the development and utilization of rural tourism resources has gradually intensified, and the water consumption of local households has increased significantly. Due to the lack of a complete sewage treatment system, a large amount of domestic sewage is difficult to be treated in time, leading to its flow into natural rivers and lakes, causing further damage and pollution to the aquatic environment, not only affecting the tourism experience in the process of tourism, but also threatening the sustainable development of rural ecotourism environment Sustainable development of inland ecotourism environment.

2.1.2. Domestic Garbage and Tourism Pollution

Due to the backwardness of rural infrastructure, there are certain limitations in garbage disposal. Not all garbage can be collected in a timely and centralized manner. There were serious omissions

and delays in this process, which led to the aggravation of rural environmental pollution, the deterioration of tourism experience, and the increase of life risks of rural villagers [16]. With the continuous development of rural tourism, the amount of pollutants produced by various activities of tourists and villagers has gradually increased, which has brought greater pressure on the rural garbage management system. Different levels of garbage pollution have seriously affected the mood of tourists and endangered the health of villagers. At the same time, due to vehicles rolling over crops and grasslands, tourism activities would cause crop damage and soil pollution, bringing more problems to the protection of the original tourism environment in rural areas.

2.1.3. Animal Manure Pollution

The two main sources of rural economy are land cultivation and animal husbandry. However, with the expansion of rural areas, the scale and quantity of local aquaculture and animal husbandry are increasing. Many people have not taken effective animal husbandry measures, resulting in the widespread presence of livestock manure. In the rainy season, these pollutants are discharged into the environment with the rain, causing a pungent smell, and attracting a large number of mosquitoes, flies and mice, causing serious pollution of the rural ecological environment, posing a major challenge to the restoration and protection of the rural ecological environment.

2.1.4. Pollution Caused by Improper Treatment of Crop Straw

In the process of rural economic development, farming land is an important way for farmers to obtain economic income. However, the rural infrastructure is not perfect, and the harvested crops and straw are often stacked on the roadside or river bank, wasting resources. At the same time, many rural residents use wheat straw as combustion material, and the gas generated by burning wheat straw would cause serious air pollution problems. Some combustion residues would directly enter the rivers, causing further pollution of rivers and lakes, not only affecting the overall quality of the original rural ecotourism environment, but also increasing the investment in repairing and protecting the environment.

2.2. Cause Analysis of the Current Situation of Rural Environment

The main reason for the deterioration of the ecological environment is that human beings have engaged in various activities that conflict with the ecological environment. At present, there are many cases of improper disposal of domestic garbage and deforestation. The government should formulate policies to prevent these problems.

2.2.1. Villagers' Awareness of Environmental Protection is Weak

Because they are accustomed to traditional agricultural and living habits and production operations, most villagers have no strong awareness of environmental protection and have not formed an awareness of environmental protection. In addition, due to the lack of environmental protection knowledge, it can not master some basic environmental protection measures and methods, which directly affects rural environmental protection.

2.2.2. Weak Infrastructure Construction

Compared with the relatively complete urban sewage collection and treatment pipelines and large sewage plant systems, the infrastructure for domestic sewage and industrial solid waste

treatment in rural areas is seriously insufficient, due to the insufficient long-term investment in environmental engineering, and some pollutants are not effectively treated before discharge, which aggravates the pollution in rural areas.

2.2.3. Weak Grassroots Environmental Supervision

Due to the lack of sufficient professionals, rural areas have insufficient awareness of the importance of environmental work and lack of comprehensive knowledge, resulting in inadequate environmental monitoring and control. In addition, the municipal government, as the main supervision and law enforcement agency, has not done enough to investigate and deal with industrial pollution sources within its jurisdiction and cannot prevent them. In addition, the imperfect environmental assessment system at the grass-roots level is also one of the main reasons affecting rural environmental governance.

3. Fuzzy Comprehensive Evaluation Method

The fuzzy comprehensive evaluation method is a combination of qualitative and quantitative analysis, which can objectively and effectively evaluate the evaluation objectives. The establishment of fuzzy comprehensive evaluation model basically includes the following steps:

(1) Determine a set of evaluation scales

$$Q = \{Q_1, Q_2, \Lambda Q_m\} \quad (1)$$

In the formula: Q_1, Q_2, \dots, Q_m represents m evaluation scales.

(2) Define the weight of the evaluation scale set and index. The index set is as follows

$$A = \{A_1, A_2, \Lambda A_m\} \quad (2)$$

In the formula, A_1, A_2, \dots, A_m are m indexes included in the index set A .

The weight vector is

$$N = \{N_1, N_2, \Lambda N_m\} \quad (3)$$

In the formula, N_1, N_2, \dots, N_m are the weights of m indicators.

(3) Build affinity matrix

Assuming that the fuzzy relation of Q can be expressed by Y , then Y is an $n.m$ matrix.

$$Y = y_{ij} = \begin{pmatrix} y_{11} & \Lambda & y_{1m} \\ \Lambda & \Lambda & \Lambda \\ y_{n1} & \Lambda & y_{nm} \end{pmatrix} \quad (4)$$

(4) Build the fuzzy subset Z of the rating object on the rating table P .

$$Z = N \circ Y \quad (5)$$

For multi-level rating, combine the last rating results of the previous level, construct the subordinate matrix of the previous level, and repeat the above process until the final fuzzy subset is obtained.

(5) The final result of the comprehensive evaluation shall be obtained according to the principle of maximum relevance.

4. Improvement Strategy Based on Green and Low-Carbon Concept

Under the concept of green and low carbon, the following measures need to be taken to achieve the protection of rural natural environment, as shown in Figure 2 for details:

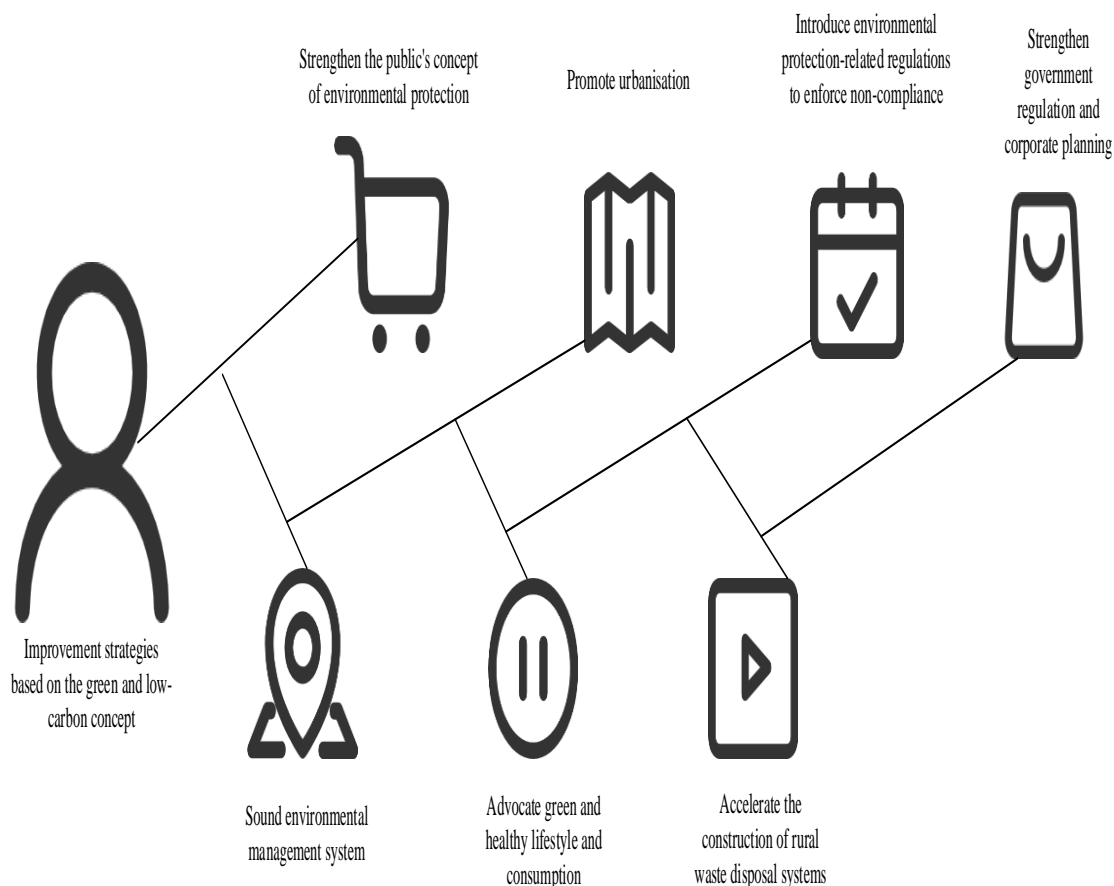


Figure 2. Improvement strategies based on the green and low-carbon concept

4.1. Strengthen the Public's Concept of Environmental Protection

At present, the main goal of improving the environmental situation in rural areas is to improve the public's environmental awareness. Through the concept of green and low carbon, the government mainly focuses on the implementation of environmental protection measures in rural areas, for example, the importance of publicizing and promoting environmental protection activities. In addition, as part of the activities to improve the concept of environmental protection, the government would carefully analyze the relevant environmental protection policies, urban integration and rural environmental service construction in rural areas, and clearly explain the value of the current implementation of environmental protection work, so as to achieve the goal of enabling the majority of rural villagers to establish a profound and sincere concept of environmental protection.

4.2. Improve the Environmental Protection Management System

In the protection of rural ecological environment, it is necessary to establish and improve the environmental management system and strict environmental management operation mechanism.

From this starting point, while creating a healthy environment management atmosphere, it should also pay attention to strengthening rural environmental management. For example, the environmental management department should consciously design and implement some prevention and control measures according to the current environmental policy and the actual situation of environmental management. In addition, in the process of establishing an environmental management mechanism, it is necessary to further innovate the existing environmental management model, such as establishing an environmental compensation mechanism, vigorously expand the scope of upstream and downstream environmental cooperation by using various means such as planning, laws and regulations, and markets, and then on this basis, expand environmental compensation and urban-rural compensation to the entire region, and ultimately improve the environmental management system.

4.3. Promote the Development of Urbanization

The new orientation of environmental protection in rural areas would also affect the development of urbanization. In promoting the process of urbanization, it must recognize that urbanization is an effective way to manage the rural environment. In addition, urbanization should be considered as a way to strengthen the land-centered natural ecosystem, which can effectively reduce the environmental pressure in rural areas.

4.4. Advocate Green and Healthy Lifestyle and Consumption

Rural villagers can start from the small things around them and try to choose environmentally friendly consumption methods. For example, in order to reduce the emissions of motor vehicle traffic, they can reduce the frequency of using cars and, if possible, use more environmentally friendly means of transportation, such as cycling or walking; When shopping, they can avoid using plastic bags and choose to use their own environmental protection bags. Only by making environmental protection a conscious habit can it maximize the environmentally friendly behavior in rural areas.

4.5. Promulgate Relevant Regulations on Environmental Protection to Impose Restrictions on Violations

It takes a long time to form environmental habits, and the implementation of laws and regulations would effectively shorten this time. When people are faced with the question of which behavior to choose, the pressure of institutional constraints would force them to act in an environmentally friendly manner. For example, if a penalty is imposed on acts that damage the environment such as deliberate deforestation and pollution, such acts may be greatly reduced.

4.6. Accelerate the Construction of Rural Garbage Treatment System

How to deal with domestic pollution is an important issue in the environmental protection of rural ecotourism. Effective measures should be taken to improve the garbage recycling capacity in rural areas and comprehensively realize the environmental protection of rural ecotourism. First of all, it should actively strengthen the construction of rural sewage treatment facilities, focusing on the domestic sewage treatment system, so that domestic sewage can be treated in time, prevent domestic sewage from being discharged into Rivers and Lakes, and effectively reduce water pollution. In the construction of rural sewage treatment system, it is necessary to do a good job of site survey, in-depth understanding of geological, topographic and other conditions, and then design

a more economical and efficient sewage treatment system to effectively protect the original ecological environment of rural tourism. Secondly, it should actively strengthen the construction of the urban garbage management system, set up sufficient garbage bins at key points along the tourism line, avoid problems such as littering by tourists, and promote the systematic and centralized recycling of all garbage to effectively improve the efficiency of garbage management. At the same time, non-profit garbage recycling stations and garbage composting facilities should be established in rural areas to recycle recyclable garbage and reduce the amount of garbage, so as to improve the garbage management capacity in rural areas and achieve the expected environmental protection objectives of rural ecotourism.

4.7. Strengthen Government Regulation and Enterprise Planning

The government should strengthen the macro-control of rural tourism, adopt relevant environmental protection policies in the development of rural tourism, supervise the operators of rural tourism projects to develop projects according to regulations, take the protection of the natural environment in rural areas as the basic principle, scientifically and reasonably plan and develop rural tourism projects, make full use of rural tourism resources, combine local characteristics, and achieve an organic combination of protection. The government can also set up professional rural tourism institutions. At the same time, the government can set up a professional rural tourism environmental protection management agency to supervise the standardized activities of rural tourism development units and strengthen the evaluation, approval and management of rural tourism development projects.

5. Effect Analysis of Rural Natural Environment Protection

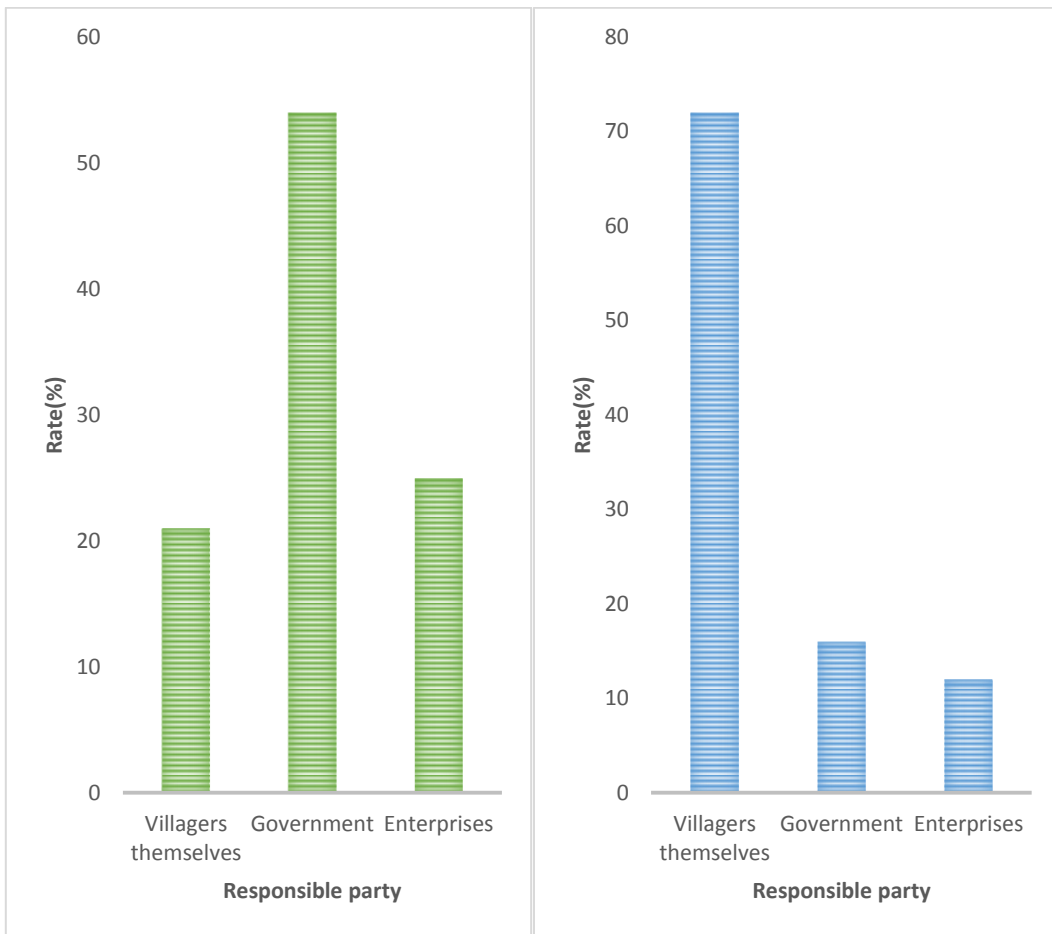
In order to analyze the effect of rural natural environment protection, this paper selected the permanent residents in rural areas to conduct a questionnaire survey, and adopted a random questionnaire survey. A total of 452 questionnaires were collected, and 100 questionnaires were randomly selected from the collected questionnaires as representatives for analysis, and the basic information of the selected respondents was recorded in Table 1:

Table 1. Basic information of survey respondents

Age	Proportion (%)
Less than 20 years old	16
21 to 50 years old	39
51 years old to 70 years old	36
After 70 years old	9

5.1. Environmental Protection Awareness

In the survey of the environmental protection awareness of rural villagers, the question of "who should be responsible for the protection of the natural environment" was selected for the survey, and the results of the questionnaire were recorded in Figure 3:



A. Attitudes of residents before taking measures to protect the natural environment in the village

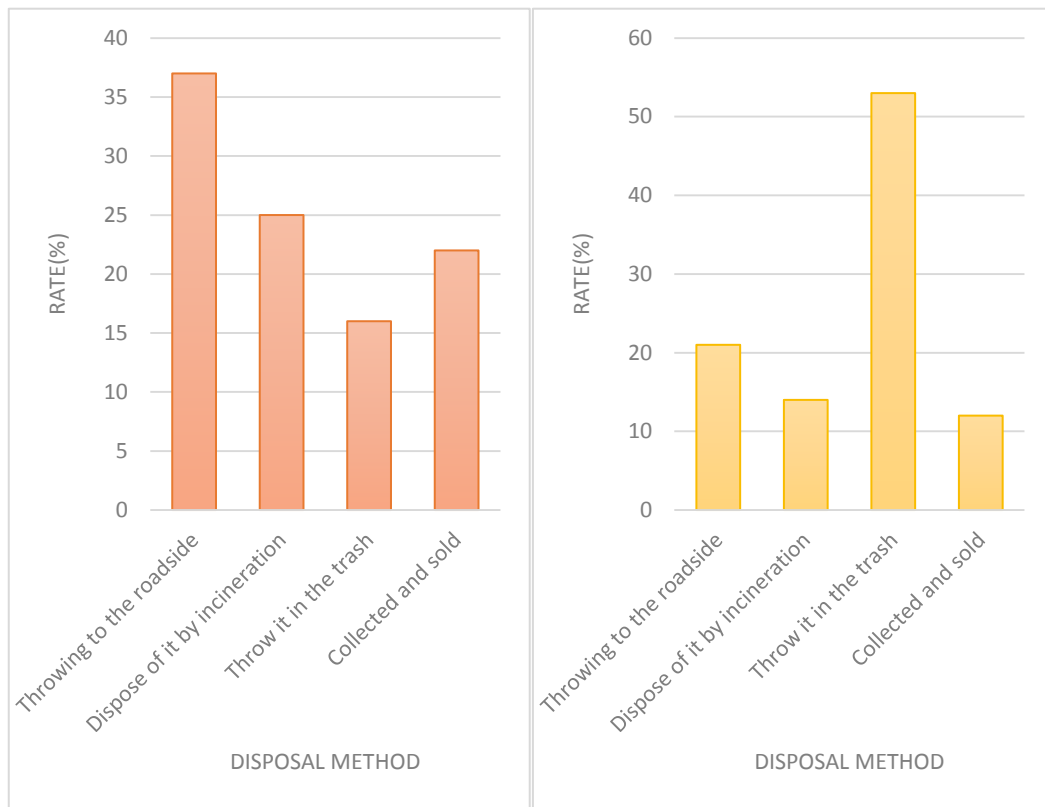
B. Attitudes of residents after the adoption of measures to protect the natural environment in the countryside

Figure 3. Attitudes of residents before and after taking measures to protect the natural environment in the countryside

In Figure 3, A represents the villagers' attitude before taking the rural natural environment protection measures, and B represents the villagers' attitude after taking the rural natural environment protection measures. Before taking the rural natural environment protection measures, most villagers believed that the government was the responsible party for protecting the natural environment. However, after taking the rural natural environment protection measures, 72% of the villagers believed that they were the main responsible party for protecting the environment. Most of the villagers began to protect the environment spontaneously, and their awareness of protecting the natural environment was greatly improved.

5.2. Environmental Protection Behavior

For the investigation of environmental protection behavior, this paper selects the question of "how to deal with domestic garbage" to analyze the investigation results, and records the investigation results before and after the adoption of natural environmental protection measures to Figure 4:



A. Behavior of residents before taking measures to protect the natural environment in the village

B. Behavior of residents after taking measures to protect the natural environment in the countryside

Figure 4. Behavior of residents before and after taking measures to protect the natural environment in the countryside

In Figure 4, A represents the villagers' behavior before taking the rural natural environment protection measures, and B represents the villagers' behavior after taking the rural natural environment protection measures. Before taking measures to protect the rural natural environment, 37% of the villagers chose to throw their domestic garbage at the roadside, 25% chose to burn it, 16% chose to throw their domestic garbage into the garbage can, and 22% chose to collect and sell their domestic garbage; However, after taking measures to protect the rural natural environment, 21% of the villagers chose to throw their domestic garbage to the roadside, 14% chose to burn it, 53% chose to throw their domestic garbage into the trash can, an increase of 37% over the previous year, and 12% chose to collect and sell their domestic garbage. In general, rural villagers pay more and more attention to environmental protection, and also pay attention to environmental protection in their lives.

6. Conclusion

In order to analyze the effect of rural natural environment protection, this paper adopts the fuzzy comprehensive evaluation method and questionnaire survey method to investigate the rural permanent population, and investigates the environmental protection awareness and environmental protection behavior of the permanent population before and after the adoption of the rural natural environment protection strategy based on the concept of green and low carbon, and finally draws a feasible conclusion. After adopting the rural natural environment protection measures based on the

green and low-carbon concept, the local permanent population's awareness of natural environment protection has improved and their natural environment protection behaviors have increased. Advocating the concept of green and low carbon can enhance the public's awareness of natural environmental protection, thus realizing the protection of the natural environment.

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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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