Ecosystem Restoration, Conservation, and Diversity under Climate Response

Xiaohui Peng

Guangdong Zhonghui Mobile Laboratory Testing Technology Co., Ltd, Guangzhou, Guangdong
510000 China

18477044@qq.com

Abstract. The ecological crisis caused by climate change is a wake-up call for human survival and development. The answer is self-evident: do nothing or do something actively. Based on the problematic ecological situation, it is necessary to carry out scientific restoration and adequate protection of the ecosystem and firmly take the road of sustainable development on the basis of respecting the law of nature and protecting biodiversity. This work mainly discussed the issues of ecosystem restoration, protection, and biodiversity under climate response, exploring the current ecological crisis caused by climate change, and exploring the path of scientific ecosystem restoration and preservation to realize the harmony between man and nature.

Keywords: Climate response; Ecosystem; Restoration problems; Protection.

1. Introduction

Climate change is a worldwide crisis, and the restoration and protection of ecosystems are also a global problem. At present, all countries have also increased their attention to the ecological crisis caused by climate change, to explore its causes and mechanism, and to explore the practical path of ecosystem restoration and protection. China started to pay attention to the climate problem late. Still, the continuous increase of investment and attention shows the determination and courage of China in the restoration and protection of the ecosystem [1]. It has accumulated some experience in the restoration and protection of the ecosystem under the climate response and made some achievements in restoring the ecosystem.

2. The Ecological Crisis Caused by Climate Change

Climate change has become a serious challenge facing all countries in the world today. Since the 1950s, the atmosphere and oceans have continued to heat up, ice and snow stocks have fallen, and sea levels have risen. These changes have been unprecedented in previous decades and even thousands of years. With the increase of temperature range and rate, the frequency and intensity of extreme climate events have increased, which has brought a severe impact on people's production and life, such as the "Great Yangtze River Flood" in 1998, the "Hurricane Katrina" event in 2005, the "Super Typhoon Haiyan" in 2013, and the heavy rain in Zhengzhou city and Hangzhou city in 2021. Climate change, mainly characterized by frequent climate change and extreme climate, has had an enormous impact and threat on natural, ecological and economical, and social systems, especially the effects of climate change on ecosystems is gradually prominent. Climate change will not only affect ecosystems but also receive feedback from them. The protection, restoration, and management of ecosystems play a vital role in addressing climate change.

3. The Impact of Climate Change on Ecosystems

3.1 Climate change affects forest ecosystems

The effects of climate change on forest ecosystems are reflected in various factors (temperature, precipitation, and CO₂ concentration) and forest ecosystems. Temperature, precipitation, and other changes will change the physical and chemical basis of life, change the growth rate of trees, and

affect the composition of forest tree species. With the warming of the climate, the probability of pests and diseases will increase, and the potential danger of forest fires will increase. Climate warming affects the function of water conservation in the forest system [2]. The decrease of water supply in a certain area may lead to the migration of population in the area, resulting in the coordinated development of the economy, resources, and environment.

3.2 Climate change affects river, lake, and wetland ecosystems

Climate warming and precipitation reduction can easily lead to an increase in the actual evaporation of rivers and lakes, and even reduce runoff or disconnection of the main streams of significant rivers and reduce lake and wetland areas. In this case, the risk of vegetation desertification increases, and biodiversity faces challenges.

3.3 Climate change affects grassland ecosystems

Climate warming can affect the respiration of the plant itself and soil and the spatial distribution of vegetation. Lack of precipitation dramatically increases the possibility of drought stress during plant growth and accelerates the decomposition rate of soil organic matter.

3.4 Climate change affects marine ecosystems

Climate change will affect the spread of Marine pathogens and cause Marine ecological disasters. Overall, the impact of climate change on ecosystems is direct and comprehensive.

4. The Chinese Government's Measures on Ecosystem Protection and Restoration

The Chinese government has also issued relevant policies guidelines in ecosystem restoration and protection, which makes the restoration and protection work of China's ecosystem carry out smoothly. In 2004, the Ministry of Water Resources issued *Several Opinions on the Protection and Restoration of the Water Ecosystem*. In 2005, the Ministry of Water Resources identified Guilin, Wuhan, and some other cities as pilot cities to carry out river improvement work based on ecological restoration, landscape construction, waterfront space, and water quality protection. In 2015, the Ministry of Water Resources and other relevant departments of The State Council started compiling the *National Water Resources Protection Plan*. In 2018, the Ministry of Water Resources issued the *Opinions on Accelerating the Construction of Water Ecological Civilization*. The central government pays great attention to water ecological civilization and the restoration and protection of ecosystems [3].

In terms of terrestrial ecosystems, the government has organized the formulation, revised, and implemented the national development plan of forest ecological stations since the reform and opening up. In 2003, it clarified the importance of environmental station construction in forestry science and technology innovation. In 2007, the Forestry Bureau officially established the "Center for Research and Management for Field Observation of Terrestrial Ecosystems", which is divided into three centers: forest, wetland, and desert, thus providing a specific scientific decision-making basis for the construction of modern forestry in China. Under the active promotion of the State Forestry Administration, large-scale ecological projects such as 3-North Shelter Forest Program, national wetland protection, and federal desertification control have been implemented, which play an essential role in the preservation and restoration of land ecosystems.

In terms of marine ecosystems, in recent years, the State Oceanic Administration has actively promoted the construction of maritime ecological civilization practice, compiled the *National Plan for Marine Functional Zones* and the *13th Five-Year Plan for The National Ecological Island Project*, formulated the *Plan of the State Oceanic Administration on Marine Ecological Civilization Construction*, and provided "road map" and "timetable" for marine ecological civilization construction. In the face of coastal water pollution, environmental damage, biodiversity decrease,

disasters, and other issues, the government will focus on the implementation of the blue bay, south mangrove forest and north willow, and ecological reefs projects, which can effectively protect and restore coastal wetlands, gulf estuaries, and other marine ecosystems, and increase the capacity of coastal ecosystems to adapt to the adverse effects of climate change.

5. Ecosystem Restoration Strategies Under Climate Response

5.1 Raise public awareness of environmental protection

The starting point of the government, enterprises and the public for ecosystem protection and restoration is to protect the ecological environment and promote the construction of ecological civilization. Still, the public's awareness of the adverse effects of climate change is fragile. Only by strengthening education and guidance and making the public aware of the critical role of the ecosystem in coping with climate change, and enabling the public to be mindful of dealing with climate change in an adaptive way can the restoration and protection of the ecosystem be genuinely achieved.

5.2 Take system adaptation measures as a national policy

In China's ecological civilization construction, the task of protecting ecosystems in critical areas such as water resources, oceans, and forests has been clearly defined, and corresponding plans, policies, and laws have been formulated to ensure the implementation of ecological civilization construction. To promote environmental progress, policy objectives, critical areas, specific methods, and further arrangements are usually clearly defined in these policies. Still, it is not explicitly proposed to deal with the adverse effects of climate change utilizing ecosystem protection and restoration. This is not only a simple environmental problem but also a problem of development. In protecting and repairing the ecosystem, it will encounter various development economic concerns, such as natural capital, vulnerability, household income increase, and green infrastructure. Therefore, when formulating ecological civilization construction policies, ecosystems should be linked with climate change [4]. In national policy formulation, it should focus on the development mode of climate change based on ecosystem adaptation to tackle climate change.

5.3 Improve the laws and regulations on ecological restoration

Although relevant governments and functional departments have issued and implemented some laws and regulations to protect ecosystems, rules and regulations on ecosystem protection and restoration are still relatively scarce [5-6]. There are no direct regulations on mangrove protection, and relevant regulations on ecological water protection are still weak. For one thing, it is necessary to formulate and improve the legal system related to ecosystem adaptation and emphasize the status and role of addressing climate change through ecosystem protection and restoration; for another, it is necessary to actively publicize the guidelines, policies, and regulations, and promote the typical cases in the process of ecological system regulation. Only by combining the improvement of the legal system of ecosystem protection and restoration with the transformation of the value concept based on ecosystem adaptation to cope with climate change can the effective laws and procedures for protecting ecosystem and biodiversity to cope with the adverse effects of climate change be formulated.

5.4 Establish a reasonable communication mechanism

In today's highly developed globalization, China's development in all aspects cannot be separated from the world. Developed countries have accumulated rich experience and technology in the protection and restoration of ecosystems. Through active international cooperation and exchanges, it will help China better carry out the preservation and restoration of the ecosystem. In addition, it is necessary to open up public participation channels for ecosystem protection and restoration and

provide support for the public to participate in and even make decisions on significant ecosystem remediation projects, including local communities, associations, scientific and technical workers, and other parties suggest. Only by following the local situation can the government work out a reasonable and effective strategy for ecosystem protection and restoration. By establishing adequate and appropriate communication and exchange mechanisms and sharing information from domestic and international perspectives, China can better formulate ecosystem-based strategies to address climate change.

6. Summary

The ecological crisis brought by climate change has seriously restricted the sustainable development of society. Ecological threats caused by multiple climate changes, especially the destruction of the ecosystem, must be paid attention to the restoration and protection of the ecosystem. The environmental hazard caused by various climate changes, especially the ecosystem damage caused, must be paid to restore the ecosystem and protection. Through the ideological education of the people, the improvement of laws and regulations, and the improvement of communication mechanism, the government should play a guiding role to truly realize the restoration and protection of the ecological system, the biological diversity, and the earth environment on which human beings depend for survival.

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