Research on Landscape Design of Country Parks in Cold Regions Based on Ecological Restoration

Xukun Wu*

School of Art and Design, Wanjiang University of Technology, Ma’anshan, 243000, China

*Corresponding author’s e-mail: 1931010013@ahnu.edu.cn

Abstract. As a special form of urban green space, country parks can provide precious resources, leisure space and a good natural environment for the region. As the suburbs of cities are areas with fuzzy boundaries in the urban-rural integration zone, urban planning often only pays attention to the construction of the central area and neglects the maintenance of the urban edges, forcing the suburbs to suffer from agricultural pollution, domestic waste pollution and industrial pollution, and the ecological environment continues to deteriorate. As a result, the suburban ecological security system has become fragile, and the city has lost its green protection circle. There are many cold cities in China, and each cold city has different ecological problems due to human activities and different geographical conditions. This article is based on the existing theoretical research in cold cities, and comprehensively analyzes the ecological problems faced by cold cities. Based on the ecological restoration technology, this article explores the landscape design of the ecological restoration of country parks in cold regions, and provides references for restoring the ecological barriers of cold cities and promoting the sustainable development of the cold city ecosystem.

1. Introduction

Many countries around the world have cities with severe cold weather. Due to the harsh weather environment, there are many cities that affect urban life. A wide-ranging international cold city movement has begun in various places [1].

Some mountainous areas in Northeast China, northern North China, southwest and northwest are all within the scope of severe cold regions, with a population of nearly 300 million. Most of China’s cold regions are affected by the cold wind from Siberia. The cold wind penetrates from the urban fringe to the city center, bringing strong winds and low temperatures. Under such climatic conditions, more residents will choose to stay indoors to avoid cold winds. As a result, cities will also increase the material consumption in construction, production and life in winter due to the influence of climate. The causes of environmental pollution in China's cold cities include air pollution caused by heating, ecological pollution caused by many human factors such as the production of chemical products, and mining of mineral resources. In response to this situation, we need to take ecological restoration methods to reasonably restore the cold city ecosystem. The construction of country parks in cold cities not only has the ecological significance of improving the ecological environment and increasing the biodiversity of cold cities. We rely on country parks in urban fringe areas and parks in the city to protect biodiversity and reproduce the unique ecological environment of cold cities. The country park system is located in the urban fringe area [2]. It can block, filter, or guide and deflect the winter cold
wind. As an ecological soft barrier on the urban fringe, it also contributes to the improvement of the ecological environment of the cold city and the biodiversity [3].

2. Country Parks and Ecological Restoration in Cold Cities

2.1. Climatic characteristics of cold cities
According to the thermal engineering design zoning of buildings, China's climate is divided into five climatic regions. The severe cold regions are: Northeast China, Inner Mongolia and northern Xinjiang, northern Tibet, Qinghai and other regions. The main basis is that the average temperature of the coldest month is below minus 10 degrees Celsius, and the auxiliary basis is that the number of days when the average daily temperature is below 5 degrees Celsius is 145 [4].

One of the first and most notable features of a cold city is the low temperature in winter, below zero, accompanied by a large temperature difference between day and night. Precipitation in summer is dominated by rain, and in winter in the form of snow, with a long icing period [5]. In addition, the evaporation in winter is small, the river flow is abundant, and the snow and ice landscape is prominent. In winter, there is less sunshine and shorter daylight hours, so plant resources are less abundant than in the south.

The four seasons of the cold city change obviously, and the vegetation in different seasons shows rich characteristics in the form and color. The coniferous trees commonly used in the north play a full role in the winter. The white snow is set against the scene of the green trees and the mist that often appears in Jilin area. It is hard to see in the south [6].

Compared with southern cities, northern cities have certain limitations in landscape construction. However, these limitations can be overcome by adapting measures to local conditions and face the winter landscape of cold cities with a positive attitude, taking "coldness" as a unique and characteristic resource creates unique and ingenious beauty, and realizes the real "four seasons garden" landscape [7].

2.2. Country Parks
Country parks are areas outside of urban built-up areas and within urban attachments. Most of them are located at the junction of urban and rural areas. It has a good natural ecological environment, cultural and historical scenery, and pastoral scenery [8]. It can protect and improve the ecological environment, and provide people with recreation and hiking. A public open space for outings, sports fitness, popular science education and other activities.

Country park is translated from "country park". The concept was first proposed in the United Kingdom and the country park was established in 1968. The "Webster Dictionary" defines country parks as follows: the power belongs to the government, and the area is mainly protected by landscape resources, animal and plant protection, natural and human resources.

Country parks in China refer to the countryside and forested areas far away from the downtown area. The purpose is to provide the general public with a vast world of return and appreciation of nature and a good place to play.

Country park has a certain green area and retains the natural landscape. As a bridge between the city and the town’s ecological culture, it is the art of the urban fringe area.

2.3. Ecological restoration technology
Due to the rapid growth of urban population and the great pressure on the environment and resources of urban parks caused by the disturbance of human activities, people urgently need to master ecological theory to adjust the relationship between human activities and the environment of urban parks, so that urban parks can develop steadily [9].

Ecological restoration refers to ecological restoration of polluted environment, and ecological restoration refers to ecological restoration of non-polluted environment. The characteristics of ecological restoration in urban parks mainly refer to the rationalization of the contaminated
environment based on ecological principles, and the comprehensive improvement of the optimized combination of multiple restoration methods. The basic method of ecological restoration is shown in Figure 1.

![Figure 1. Basic methods of ecological restoration](image)

3. Ecological restoration of country parks in cold cities

3.1. Principles to be adhered to for ecological restoration of country parks in cold cities

The design of country parks in cold regions should follow the design principles of climatic characteristics based on the regional perspective of cold regions. In the process of landscape design and ecological restoration, more attention should be paid to low temperature, cold wind and atmospheric emissions, rain, snow and sunlight may affect the ecosystem and people.

The view of nature in cold areas affects our research and construction of the environment of cold areas. The correct view of nature in cold areas guides human beings to actively identify and accept the natural environment of cold areas, and scientifically treat the harsh weather in cold areas in winter, emphasizing people and cold. The land and nature develop in harmony and live in harmony. The design should follow the design principles of man-land coordination of the natural view of the cold region, follow the development law of the natural environment in the cold region, make reasonable use of the natural environment, and avoid the enslavement and destruction of nature by digging lakes and mountains.

The design process of country parks in cold regions should follow the sustainable design principles based on the ecological concept of cold regions, and put ecology first. For the fragile cold city ecosystem, specific design principles such as low manual maintenance and interference, ecological conservation are adopted, and the design is effectively combined with the cold natural environment to enhance the livability of the cold city.

3.2. Goals of Ecological Rehabilitation of Country Parks in Cold Cities

The main goal of the ecological restoration of country parks in cold cities is to restore the disturbed or damaged ecosystems in cold cities to their pre-damaged environmental state based on the above design principles, so that the local and surrounding ecosystems can be maintained A virtuous circle provides a high-quality ecological environment for surrounding residents or foreign tourists, and enhances the winter vitality of cold cities.

Due to the influence of different factors such as region, environment, society and economy, even the same cold area cities have different ecological restoration projects or technical goals. In addition to the natural factors that cause soil erosion, such as topography, geology and climate, human activities are important factors that cause soil erosion. Excessive forest logging has caused serious damage to forest vegetation; unreasonable use of land resources has led to the destruction of soil structure and reduced soil fertility; increased livestock and overloaded grazing have degraded a large number of pastures.

The prevention and control of land desertification and soil erosion is the basis of ecological restoration, as well as an important work and goal of ecological restoration in cold regions. Good
water and soil conditions can accelerate the self-repair of the ecosystem, restore the natural grasslands and characteristic landscapes in the area, and maintain the stability of the cold ecosystem. The water bodies of cold cities are mainly polluted by waste water produced by a large number of chemical plants in old industrial cities in cold areas, a large number of mining areas in the northeast and east of Inner Mongolia, and due to climatic or human factors such as low rainfall, global warming, and groundwater overexploitation. There are two types of problems caused by the river drying up.

4. Landscape Design of Country Parks in Cold Regions Based on Ecological Restoration

4.1. Landscape Land Design of Country Park in Winter City

Country parks usually vary in area, covering an area larger than urban parks and much smaller than national parks. China’s country parks neither have the attributes of national parks, nor are they limited in terms of area. Leisure activities are the highest utilization rate of tourists in country parks. The choice of venue should be careful to avoid conflict with the natural scenery, and minimize the interference between different activities, such as camping and picnic sites should choose open woods and grasslands with good sight views. Landscape projects must include identification and display of animals and plants, adoption of animals and plants, display of traditional culture, introduction of regional characteristics, etc. Along the road or set up signs to introduce animal and plant characteristics and growth habits, so that tourists can choose the purpose and route of travel independently. In the grass flower identification garden in the country park of the cold city, under each flower, clearly write the plant name, growth habit, flowering month, and ornamental characteristics of the plant. In cold regions, natural coniferous forest belts, Ganoderma lucidum ginseng, wild fruits and fungi, and cold-water fish, these animal and plant resources can be concentrated and displayed. According to the regional topography and landscape characteristics, the park is planned into different scenic spots, and recreational spaces suitable for the site are arranged.

Because the nature of cold country parks is not exactly the same as other types of parks, the functions of cold country parks are also different in the planning and design of cold country parks. Because the topography of the cold country park is complex, and based on the characteristics of the landscape, it is possible to analyze the land use of the cold country park according to the evaluation of the suitability of the land, and then divide the cold country park into different functional scenic spots. And develop routes, scenery spaces and activities.

4.2. Landscape matrix function and layout design

The functional group construction is based on the analysis of ecological sensitivity and combined with the analysis results of the wind environment. First, the ecologically sensitive areas are divided into protected areas, and a small number of observation decks and popular science cards are arranged to reduce the entry of tourists. Reduce the layout of event venues and combine with the construction of windbreaks to reduce the impact of winter cold wind.

For areas with intensive human flow activities, if the wind speed is high and the human body comfort is low, it should be planted with trees, shrubs and herbs. In areas with low wind speed, trees or flowering shrubs and other ornamental tree species should be used according to the actual viewing needs; relatively evacuated ornamental nodes are planted with windbreaks in areas with high wind speeds, and planted according to node needs in areas with low wind speeds.

At the beginning of the design, the original resources should be investigated and analyzed, and appropriate and reasonable artificial intervention measures should be taken for the plants in the original site that are growing well and have outstanding landscape effects, such as proper spacing, retaining high-quality seedlings, and reducing competition and injury. Based on the natural regeneration ability, it promotes the self-renewal ability of the entire ecosystem such as woodland, soil, water, and animals, so that it "lives" in the site to form a more stable ecosystem. According to the existing plant situation classification protection, promote its regeneration development and cultivation,
make it continuously updated, and use these original resources to realize scientific landscaping. The shrubs and trees in the country parks of cold cities are shown in Figure 2.

![Figure 2. Shrubs and trees in country parks in winter cities](image1.jpg)

Planting herbaceous plants that highlight wild interest. Make full use of wild herbs with strong vitality, which have fast reproductive capacity, good adaptability, low management and low maintenance, natural and elegant shape, and rich colors, which can well reflect the wild charm of country parks. Common wild herbaceous vegetation in cold regions mainly includes dandelion, loudoucai, purpura, etc., Luanwei, northern valerian, water barnyardgrass, these herbs are not only resistant, early breaking the soil, many also have medicinal value, and do not need Economic investment can reproduce and grow naturally. For the current situation of low investment in the construction of country parks in cold regions, the effect of using a large number of wild herbs is obvious and attractive. The combination of water barnyardgrass and northern valerian is shown in Figure 3.

![Figure 3. Water barnyardgrass with northern valerian](image2.jpg)

4.3. Landscape Supporting Design of Country Park in Winter City

According to the design features of the ecological restoration of country parks in cold regions, in addition to the first, second and third level park roads that the site should have, special trails such as bicycle trails and skier trails should be designed in combination with the park landscape in the trail system of the site, and provide continuous climate protection facilities, lighting facilities and rest service facilities in the road system to add fun and comfort to country parks.
Country parks in cold regions need better infrastructure, including commentary systems, marking systems, movable seats, trash cans and other facilities. The commentary system in the country parks of ecological restoration has the dual function of popular science education and publicity services. In view of the special climate and conditions in the cold regions, especially the rain and snow weather and road icing that will occur in early spring, late autumn and winter, external traffic outside the park needs to be considered. The traffic organization framework of country parks in cold cities is shown in Figure 4.

5. Conclusion
The application of ecological restoration technology in the landscape construction of urban parks and green spaces has already had a certain degree of practicality. The reasonable application of ecological restoration technology not only improves the environment where humans live, but also plays a positive role in the construction of urban parks and green spaces. The guiding effect is an indispensable part of the sustainable construction and development of urban parks and green spaces. The cold country park is an important part of the leisure space in the cold area, with rich natural resources, landscape elements, cultural and historical accumulation. In the research of this article, due to the limitation of research materials and time, the investigation of country parks in cold cities in the scope of this article is not comprehensive enough. It is awaiting further review of the information in the follow-up, comprehensive on-site in-depth research, and supplementation and improvement of relevant content.

References
[1] Li, B.Y. (2013) Research on the Planning and Design of Cold Country Park. Northeast Forestry University.
[2] Chen, J.Y. (2018) Research on the role of water restoration in waterfront landscape design. Modern Horticulture, 14:69-71.
[3] Quan, Y. (2016) Research on the Design Strategy of Ice and Snow Theme Park in Cold Region. Harbin Institute of Technology.
[4] Chen, F. (2016) Research on Landscape Vitality Evaluation of Public Space in Severe Cold City. Harbin Institute of Technology.
[5] Guan, H.L. (2019) Research on the planning of suburban forest park from the perspective of ecological restoration. Beijing Forestry University.
[6] Wang, K. (2020) Study on Technical Methods of Ecological Restoration of Mine Environment. Chinese Place Names, 6:56.
[7] Yu, J.L. (2019) Research on the Design of Improving the Vitality of the Adaptable Landscape in Cold Regions. Xi'an Academy of Fine Arts.
[8] Ma, J. (2019) Research on Mountain Ecological Restoration Technology——Taking Olympic Forest Park as an example. Modern Horticulture, 15:40-43.
[9] Gao, K., Lin, S., Sun, W., et al. (2017) Exploration of ecological restoration in mining areas from the perspective of ecological technology aesthetics——Taking Baiyun Obo Mine Park as an example. Landscape Architecture, 8:66-69.