

Study on the Application of Ecological Restoration Concept in the Negative Space of Mine

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Abstract: With the deepening of the urbanization process, the industrial land originally located in the edge of the city has gradually come into people's vision, and these edge plots have gradually appeared in the new planning scope of the city. However, within these functional Spaces, there are still some plots that are difficult to be developed and utilized, thus becoming negative urban Spaces. The mining area belongs to such a regional block. We can clearly see that due to the destruction of the surrounding ecological environment, the nearby mining area is also full of grass and dust. Every city in the country has such a legacy area, these negative spaces seem to be forgotten in the great wave of urban development. How to coordinate the relationship between these negative spaces and the city has become a chronic problem on the road of urban development.

Key words: Negative space; Landscape design; Ecological Protection

1. Related Concept Analysis

1.1 Negative Space

Yoshinobu Shihara graduated from Harvard University and is a master architect in Japan. In his book *External Space Design*, he mentioned the definition of negative space. In the book, he wrote that "architectural space can be divided into a space that converges inward from the surrounding border and a space that diffuses outward with the center as the core ^[1]. Represented by reference A and B, the spatial scope of B surrounds the spatial scope of A, that is, B is included in A, and A is a part of B. On this basis, when the whole space of B is fully considered, then B plays a positive role in A, and B is called the positive space of A. On the contrary, when the whole space of B belongs to nature and is not a space of artificial intention,

then B plays a negative role on A, and B is called a negative space ^[2]. With the mutual flow of cultures, this book has attracted the attention of domestic scholars. The overview of negative space and positive space in this book has aroused a wave of responses, and domestic academic circles have greatly recognized and discussed it for many times, thus gaining a deeper understanding of space. Domestic universities have conducted many related researches on this subject. The "positive" treatment of the negative space has become particularly important, which has aroused widespread attention, and has been paid more and more attention with the development of society. Through consulting books and reading literature, we can find the explanation of the relevant contents of negative space in the article.

1.2 Negative Space of Mine

A mine refers to an independent production and operation unit that extracts ores with a certain mining scale ^[3]. In terms of quantity production, mines can be divided into three types, which are large mines, medium mines and small mines. Mines can also be divided into a variety of mining according to the type of ore produced, such as coal, iron ore, copper, gold, metal, non-metal and so on. Under the conditions of the progress of The Times, the types of mining and the amount of mining resources have occupied an insurmountable dominant position in the hard power competition between countries. China has a vast territory and rich reserves of mineral resources. As one of the first countries in the world to form a systematic exploration of mineral resources, as early as the Shang and Zhou Dynasties, China's mineral mining technology has gradually matured. At present, the earliest known mining and metallurgical site in our country is the copper mining site in the Shang Zhou period, which is located in Shafan Town, Ruichang, Jiangxi Province. The

excavation of the copper mine site has become a great highlight in the history of mineral processing in the world. Compared with copper mining, China's mining technology for coal is particularly systematic and mature. As far back as the Spring and Autumn and Warring States periods around 500 BC, coal has become an important product, known as stone stone or stone stone ^[4]. After Wei, Jin, Southern and Northern Dynasties and Tang and Song dynasties, the Ming Dynasty defined the term coal for the first time. The 17th century carried out the replacement of the Ming Dynasty and the Qing Dynasty, and in the middle period, that is, the end of the Ming Dynasty, there appeared the world's first book specifically documenting coal mining technology, the book is called "Tiangong Kaiwu", which was compiled by Song Yingxing. It also confirms the maturity of coal mining technology in the society at that time, and the development of coal mining industry occupies an important position.

The rapid development of coal mining industry has brought a certain economic foundation, a certain guarantee for China's economic construction, and a gradual prosperity of the country, but a lot of negative space has been generated, land resources have not only been destroyed but also caused waste, and the living conditions of residents around the mining area and the surrounding ecological environment have been seriously affected. It is urgent to put on the agenda to solve these problems. The State attaches particular importance to this issue. In March 2011, The State Council promulgated the Regulations on Land Reclamation, further clarifying the principles of "who damages, who reclaims", "who invests, who benefits", and determining the main body of responsibility, funding solutions, and regulatory measures ^[5]. The promulgation of the "Regulations" in the implementation, the first level is a reasonable management of China's land resources, the second level is a systematic improvement of China's land management system, the third level is to let governments all over the country understand the importance of this task, and pay attention to the reclamation and development of damaged land after mining. Under the background of laws and regulations, China's mining and ecological restoration of land resources after mining are developing towards green.

b Negative space of mine

Based on the comparison at home and abroad and the discussion and research on a series of landscape design such as mines and negative Spaces, the negative space of mines in this paper refers to the space that has not been fully developed or directly abandoned in the original mine development and utilization site because it has no development value.

1.3 Industrial Wasteland

Supply-side structural reform is beneficial to the modernization of urban development, but the optimization of industrial structure has also spawned a large number of industrial wastelands. Industrial wasteland refers to a lot that used to be used for industrial production and transportation, transportation and storage land related to industrial production, and was later abandoned, such as abandoned mines, quarries, factories, railway yards, docks, industrial waste dumping sites, etc^[6]. These industrial wastelands have made great contributions in the process of urban modernization, but with the shift of the center of urban development, these wastelands have seriously hindered the expansion of the city.

Industrial wasteland will produce a lot of pollution, most of which comes from the impact of the production process of enterprises, causing great damage to the soil, vegetation, air, hydrology and other conditions of wasteland. When industrial production stops, this area naturally becomes a wasteland that is difficult to treat. Therefore, despite the advantage of low demolition cost, the disposal of these industrial wasteland is still a big problem. Long-term pollution, coupled with the introduction of heavy metal pollutants into the soil in the abandoned industrial land, reduces the self-recovery ability of the soil, resulting in increased difficulty in later treatment. When it is washed by rain, the solution formed will continue to penetrate deep into the soil surface, expanding pollution, and even affect the use of groundwater resources and environment, resulting in secondary pollution.

2.The Influence of Mine Negative Space

2.1 Irreversibility of Ecological Environment

Mining must be accompanied by the use of heavy machinery, however, the emergence of heavy machinery will cause irreversible damage to the ecological environment. For example, the destruction of surface appearance, groundwater

imbalance, sound pollution generated by mechanical operation, air pollution, etc. the emergence of these problems will eventually lead to the gradual loss of the ecological environment self-repair function. The large tonnage machinery required for mining and the large-scale transportation of materials after mining will lead to the destruction of a large area of vegetation, and the vegetation in the negative space of the mine will be no exception, or even more serious, because the operation of the machinery cannot be fixed, it will certainly mine a large area of land, resulting in the destruction of the soil structure. With the change of the surface environment, the problem of soil erosion will also follow. Mining requires the use of explosive blasting for mining activities, the fine powder particles generated during the blasting process diffuse in the air, it is difficult to concentrate on the pollution of the atmosphere to a certain extent, in addition, the destruction of the local ecosystem will bring a series of chain reactions and then affect the surrounding ecology.

2.2 Sustainability of Land Use

In addition to the direct impact on the ecological environment, mining will also lead to the reduction of the cultivated land area around the mine. The fully developed and utilized part of the mine can be constructed by waste land backfilling or large-scale reconstruction and restoration. However, the negative space of the mine cannot be constructed in the same way, because there is still a part of the ecological environment that has not been destroyed, and the difficulty of restoration and the cost of human and material resources required have been greatly increased, which is also the main reason for its large-scale abandonment in recent years.

The most direct person responsible for the ecological restoration of the negative space of the mine is the mining unit. However, with the change of social atmosphere and the disconnection of the capital budget of the mining unit, the ecological restoration work after mining is completely lagging behind, or even not done. As a country with a large population, China has more stringent requirements on the allocation of land resources, which should not only meet the needs of contemporary people but also avoid the impact on future generations, and ensure that the limited land resources are transformed into energy for social and economic development as

much as possible. The sustainability of land resources caused by the negative space of mines needs to be solved urgently.

2.3 The Beauty of the City Style

Part of the city image comes from the city style. The important components of the city landscape, city history and culture are inseparable from the city style. At the same time, the city style is one of the important factors to consider in the selection competition of different cities. With the rapid change of social development, the pace of transition from mines to urban centers has also accelerated, and the negative space of mines that were used to become more and more abrupt has become particularly important for the rational solution of these problems.

Compared with the mine after full development and utilization, the aesthetics of the negative space of the mine are more difficult to repair. The development history of ecological restoration project in China started later than that in Western countries, the ecological restoration method is relatively simple, and the types of negative space in mines are various, which is difficult to effectively restore in a short time. The aesthetic impact brought about by the point belt to the city is particularly prominent.

3.The Role of Negative Spatial Ecological Restoration in Mines

People's living environment can not be separated from the mining of mineral resources, China's mineral resources are relatively rich, and its mineral consumption ranks first in the world. In the history of China's industrialization, the mining of mineral resources has led to the abandonment of a large number of land resources, and the negative space of mines has since emerged, and short-term profits have caused huge ecological hidden dangers, and the number of negative Spaces has been increasing. With the increase of the number of negative Spaces, the local ecological environment is increasingly severe. From the perspective of geological structure, surface vegetation and hydrological conditions, ecological restoration should be carried out in the negative space of mines as soon as possible. The ecological restoration of the negative space of the mine is to reshape the ecological environment of the mine and to develop and utilize its secondary resources. While ensuring the orderly life of local people and safe production, we will rebuild

a safe, stable and healthy ecological environment to achieve the strategic goal of sustainable development.

4. The Direction of Ecological Restoration in Negative Space of Mine

The ecological restoration project of the negative space of the mine can be roughly divided into four different directions according to its different land production forms and different ecological environment background: Reuse of damaged agricultural land, prevention of geological disasters, development of abandoned mineral resources and construction of ecological landscape, ecological restoration of damaged agricultural land reuse, mainly through artificial planting, natural organisms and artificial culture, to avoid soil erosion, so that soil richness and nutrition can be preserved for a long time. Ecological restoration requires the joint efforts of local government departments and local people, the introduction of supporting engineering materials, reasonable planning throughout the process, and the improvement of damaged agricultural land soil to restore its original vitality.

Geological disaster protection should be the top priority no matter when and where, and the geological disaster prevention and control of the negative space of the mine should be put on the agenda. The negative space of the mine is some abandoned mining areas, due to its characteristics such as soft mountain land, so that it becomes a high-risk area of debris flow landslide. The area covered by vegetation should be increased to solidify the land. The abandoned mine left after the mine is closed is the most important and the most common kind of abandoned resources. These waste resources are of high historical, cultural and humanistic value, including mine water resource filtration and irrigation development, open industry heritage tourism project reconstruction, etc. One of the important components of ecological restoration is the construction of landscape, and the construction of ecological landscape in the negative space of mines is a landmark sign under the concept of ecological restoration, which generally includes the excavation of human landscape, the afforestation of wasteland steep slope and the landscape plan of ecological

park.

5. Conclusion

Through the analysis of related concepts and the summary of the types of negative space, the definition of the negative space of mine is summarized. The overview and development background of the concept of ecological restoration are described one by one, and then the landscape design in the negative space of the mine and the ecological restoration in the negative space of the mine are summarized, which mentions the characteristics of the landscape in the negative space of the mine, and finally the relationship between the concept of ecological restoration, landscape design and the negative space of the mine is analyzed.

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