

Research on the Regeneration Status and Development Mode of the Landscape of the Third Tier Construction Industry Sites in China under the Background of Urban Renewal

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Industrial sites are brownfields left in the process of urban development, which were originally considered as the burden of the city. However, in today's lack of land resources, industrial sites have become valuable assets of the city. Further excavation and effective use of them is one of the important ways to alleviate the tension of urban land use. The strategy of ecological reconstruction and sustainable design in the landscape of industrial sites is mainly reflected in the minimal intervention in the natural ecology of the site, the use of renewable materials and resources, the retention of native plants, human history and site memory. It makes the ecology of urban industrial site landscape more balanced, enhances the uniqueness and experience of urban industrial site landscape, meets the spiritual and physiological needs of people in the city, and realizes the sharing of industrial site landscape to the public's natural ecology, land, industrial spirit, history and humanity.

Keywords: urban renewal, industrial sites, landscape regeneration

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INTRODUCTION

Industrial sites include industrial historical and cultural resources, natural resources and urban land resources left by industrial development. Industrial site landscape is based on the industrial site, with the help of landscape design to re-integrate and properly retain the water, soil, vegetation, facilities, context and industrial resources in the site¹. Landscape ecology makes us understand that nature is the background and foundation of all human activities. With the help of landscape design,

designers improve social and urban problems, rethink the relationship between human and natural ecology, and create a landscape environment that meets the needs of urban development and is suitable for people's life, work and study. The long-term industrial production has caused the destruction of the regional ecological environment, the destruction of the habitat of wild animals and plants has led to the forced migration of regional organisms, and the ecosystem structure of biodiversity on the land tends to be simple, which

will lead to the decline of ecological function and the degradation of the ecosystem². After the adjustment of the social industrial structure, the abandoned industrial brownfield has become the only land that can be redeveloped in the urban area. If it cannot be reasonably used, it will affect the benefits of the land use. In the long run, it will affect the sustainable development of the local social economy.

The premise of ecological reconstruction is to respect the natural characteristics of the site, reuse the original natural resources and reduce the impact on the original ecological environment. The landscape design of industrial sites is based on the current situation and historical context of the site. Properly retaining the natural vegetation, water system, soil and ecosystem of the site can reduce human intervention³. In the design, combining with the original natural ecology, reshaping the landscape with the memory of site characteristics can make people relax and resonate from the senses, psychology and spirit. Ecological revetment and ecological flood control design were adopted to reconstruct the site, which protected a variety of birds to continue to breed and inhabit here⁴. This is conducive to maintaining the natural ecological balance of the site, and can better achieve the sustainability of the ecosystem in the industrial site landscape.

Sustainable design strategy advocates the adoption of raw materials, recycling of resources, and regeneration of waste materials to avoid new impacts on the site and ecology, which is also one of the important ways to reduce the burden of urban construction⁵. In the landscape design of industrial sites, the combination of waste materials in the site can reduce the design cost and later maintenance cost, and continue the cultural

memory of the site. The industrial "waste" is used to create a new park landscape, and the equipment of the iron and steel plant is transformed into a landscape device, which realizes the sustainability of materials and site resources. It reduces the demand and demand for new materials, reduces the consumption of production and transportation, and reflects the sustainable design strategy in the industrial heritage landscape. In addition, plants, as renewable resources, are also important elements in landscape design. It can change the temperature and humidity of the environment, reduce noise, alleviate the problem of urban heat island, and promote the ecological balance and sustainable development of the city⁶. In the landscape of industrial sites, sustainable design is also reflected in the rational use of site vegetation, which not only reduces the design cost, but also is one of the important ways to continue the site memory.

INVESTIGATION ON THE REGENERATION STATUS OF THE LANDSCAPE OF THE THIRD LINE CONSTRUCTION INDUSTRY SITES

The research content is the landscape ecological restoration strategy research of "three line construction" industrial sites in a certain area, and the landscape ecological restoration strategy is the focus of the research. Therefore, the paper analyzes from the five aspects of spatial layout, architectural style, ecological environment, landscape style and road traffic, and selects the updated and updating three line industrial sites for visit and research, in order to provide reference for the later industrial heritage. In terms of landscape ecological restoration, this paper puts forward some strategies that can be used for reference, and the selected projects are shown in Table 1 and Table 2.

Table 1.

Investigation project of "three line construction" industrial sites

| Name of original factory | Update status | Updated name |
|--------------------------|---------------|--------------------------------|
| A machinery factory | Updated | A scenic area |
| Institute B | Updated | B cultural and creative center |
| C machine factory | Updating | — |

Table 2.

| Landscape style design corresponding to design mode | |
|---|--|
| Landscape design mode | Landscape design |
| Open space model | Open, with the rhythm and beauty of space-time continuity |
| Industrial Museum model | Overall stable, with a sense of order, architectural style affects the entire site landscape |
| Mode of Creative Industry Park | The whole old as old + postmodern design elements, bright color block, artistic landscape and industrial culture integration |
| Complex development mode | It has an overall industrial style and a dynamic and flexible business atmosphere |

In the landscape design of industrial site reconstruction, the existing industrial heritage of the site is fully respected, and the changes of the site made by landscape design strive not to damage the original industrial heritage style, and good practical

results have been achieved. The original industrial buildings and machinery and equipment in the plant are used to form a new industrial landscape sketch. The Landscape Utilization of specific industrial elements is shown in Table 3.

Table 3.

| Landscape Utilization of industrial elements | |
|--|---|
| Industrial heritage elements | Landscape Utilization |
| Industrial plant | It is transformed into hotels, fighting halls, restaurants, shops, etc., making reasonable use of the wide space of the building, without too much transformation of the main body of the building, and changing the shabby appearance by adding modern industrial style decoration to form a commercial space. |
| Transportation facilities | As a landscape sketch, the car body is printed with the words "electronic nine Institute", which shows the brilliance of this place as an industrial land and full of historical memories. |
| industrial equipment | Industrial equipment is displayed as landscape sculpture. The strange appearance patterns and the hard and cold metal characteristics bring this time and space into the industrial age. |
| Industrial culture wall | The cultural propaganda wall at the entrance has been completely preserved. The mottled wall and the peeling paint reflect that this place is a long time ago. Once entering the park, it seems to be in the industrial period of "three line construction". |

The landscape design of industrial sites is different from other landscape designs. It starts from a site with its own industrial features. The new design should recognize that the original spatial layout and industrial elements are the material basis of the transformation, and establish an organic connection with the site history. The new design should not be deliberately modified and confused with the original industrial heritage, but can be clearly identified and interpreted. With the

passage of time, landscape design has gradually integrated into the site history, and become a part of the site history. In the renewal of the cultural and creative center, the new design does not cover the original industrial traces. Instead, it uses simple design techniques to integrate into the waste red bricks and rusty steel. Instead, it gives people different visual impact and forms a unique landscape style, as shown in Table 4.

Table 4.

| Coordination of landscape design and original industrial style | |
|--|---|
| New design elements | Landscape style |
| Construction shop | Through the art of secondary design, the design absorbs the elements of industrial landscape, changes the original single appearance and structure of industrial buildings, and creates a new landscape with practical use. |
| Hotel | We should change the appearance and scale of industrial buildings, sort out the disordered |

Due to the particularity of military enterprises, the layout of the third tier enterprises is special. It is close to the mountainous area, close to the mountains, and the factory address is hidden. The interior includes factory area, office area, residential area, commercial area, hospital, school, crop planting area, etc., which can meet the self-sufficiency of production and life. The environment is relatively closed, and the connection with the city is not close. The layout of the third line industry mostly adopts the layout mode of "large dispersion and small concentration". In order to keep the production secret and avoid being destroyed, many comprehensive factories are

divided into many professional small factories according to the different functions of the production line, which are distributed, scattered or linear, such as Yuejin Road Historical and cultural district. This "backer, scattered and hidden" layout and the particularity of military enterprises make it different from other centralized industrial sites, which makes the traditional renewal mode difficult to apply. Therefore, it is necessary to explore new renewal strategies suitable for "three line construction" industrial sites. We further investigated the understanding and satisfaction of the public and made statistics as Figure 1, Figure 2 and Figure 3:

Figure 1.
Survey results of public understanding of the history of "three line construction"

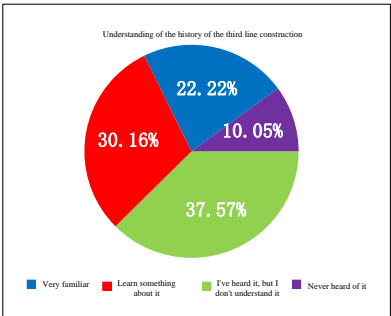


Figure 2.
Survey on the public's understanding of the direction of "three line construction" industrial sites

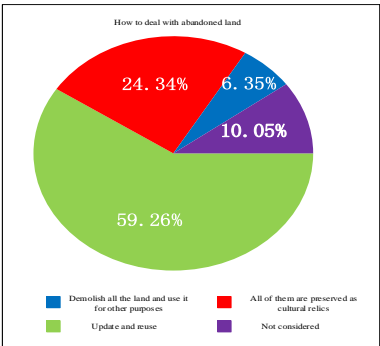
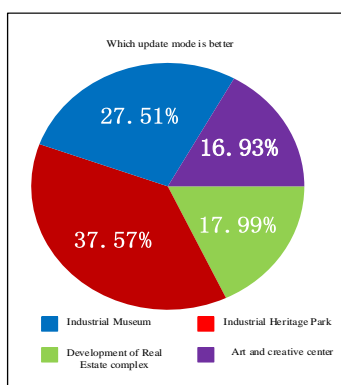


Figure 3.
Survey results of public awareness of the transformation mode



The largest proportion in the figure is the people who have heard about the history of the "third line construction" but do not understand it, about 38%, while those who know some and are very familiar with it are about 30% and 22% respectively. It reflects that although the public has heard about the history of "three line construction", they do not know much about it. The later update can add a detailed introduction to the historical period of "three line construction", not limited to the protection of industrial heritage. It can be seen from the chart that about 60% of the people agree that the industrial sites should be renovated and reused, while a few agree that they should be completely demolished and the land should be used for other purposes. It shows that the public still expect to retain this historical memory, continue the cultural heritage, and rebuild the spiritual place with regional historical features. It can be seen from the chart that industrial heritage park accounts for 38% of the total, followed by industrial museum, which accounts for 27% of the total, and real estate complex development and art creative center account for 18% and 17% of the total. It shows that the public is still inclined to improve the ecological environment of the site and transform the industrial sites by means of landscape, while they do not recognize the development of the real estate complex which is inclined to the pursuit of economic interests.

REGENERATION MODEL OF THE LANDSCAPE OF THE THIRD TIER CONSTRUCTION INDUSTRY SITES IN CHINA

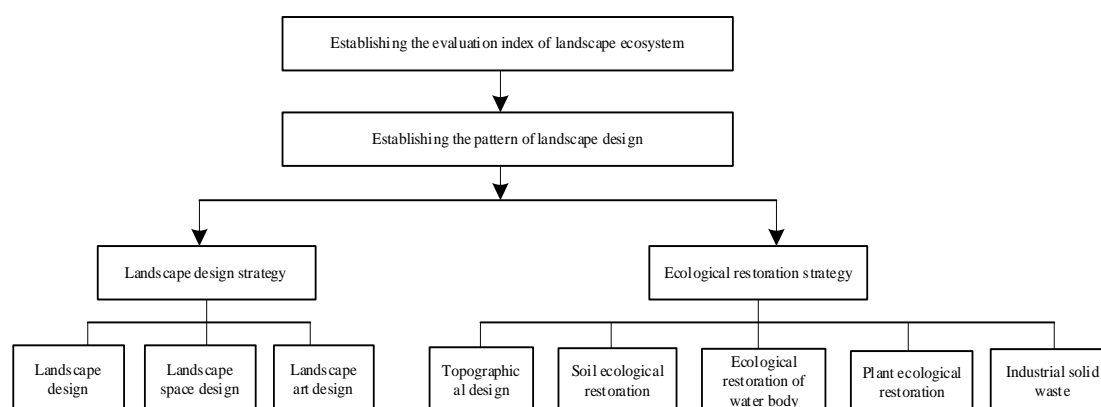
Landscape Regeneration Layout Planning of China's Third Tier Construction Industry Sites

At present, the research on the application of industrial landscape regeneration of industrial sites in China has been explored in many aspects in the actual project. In the process of exploration, it should be improved with the continuous improvement of design feedback and mass aesthetic. There are some common problems. Industrial landscape regeneration is often more effective than outdoor landscape in the reconstruction of industrial heritage buildings. However, outdoor industrial heritage landscape is as important as an important part of the overall landscape⁷. The use of cultural and Creative Park industrial landscape regeneration mode, for the use of industrial indoor workshop space reservation, the use of regional space re zoning, re zoning space lack of crowd participation, the use of space development is not complete, tourists stop in less area, such as memorial, place introduction books, lack of image data. Because of the lack of connectivity between the transformation area and the surrounding area, the directional function of landscape cannot be

played. Starting from the integration of the overall layout, the design makes the landscape in the environment relevant, guides the crowd to stop and give play to the charm of the cultural landscape of

industrial sites. Based on this, this paper optimizes the layout planning structure of the landscape regeneration of the third line construction industry sites, as Figure 4:

Figure 4.
Planning structure of landscape regeneration layout of third line construction industry sites



Industrial sites emphasize sites. Sites are archaeological concepts and relics left by human activities. By analogy, industrial sites are relics left by industrial activities. Broadly speaking, industrial sites include industrial heritage and industrial brownfield. Industrial heritage is the general name of unique industrial culture and art resources⁸. These heritages include industrial buildings, structures, mines, industrial conveying devices, as well as living quarters, cultural and educational sites, religious sites, etc. Industrial sites refer to the abandoned industrial land that can be transformed. Therefore, to define industrial sites, we should start with the protection of industrial history and culture, the design of industrial landscape, the reservation and reuse of industrial buildings, and the design of public art⁹. In the transformation of industrial cities, a large part of the industrial sites left behind are located in the center of the city, with good location conditions. Industrial buildings have strong transformability. It is a common way of industrial site design to move the culture and art industry into them¹⁰. The vector calculation method is used to analyze the degree of environmental persecution, and the data details in the environmental process are described. In the description process, the comparison method is used to classify and calculate.

The process can be expressed by the following formula:

$$S = \sqrt{\sum_{i=1}^m s_i^2} \quad (1)$$

In the formula: s_i indicates the factor item of landscape reducing effect analysis, which can be used to evaluate the effect of reducing effect, and natural number is used to limit the scope of reducing effect in the process of analysis¹¹. Through the weighted analysis of the formula, in the process of continuous use of polynomial limit, we can obtain the important role of landscape in environmental reduction, which is characterized by high value-added industrial agglomeration. According to the data collection process, we can analyze the process and form of the reduction effect. Through the formal comparison, we can specifically experience the effect of landscape on environmental reduction, and obtain certain results. Nemerow index is used to express the process of proportioning.

$$z = \sqrt{\frac{[\max(E_i / R_i)]^2 + (E_i / R_i)^2}{S}} \quad (2)$$

In the formula: E_i expresses the enlightenment

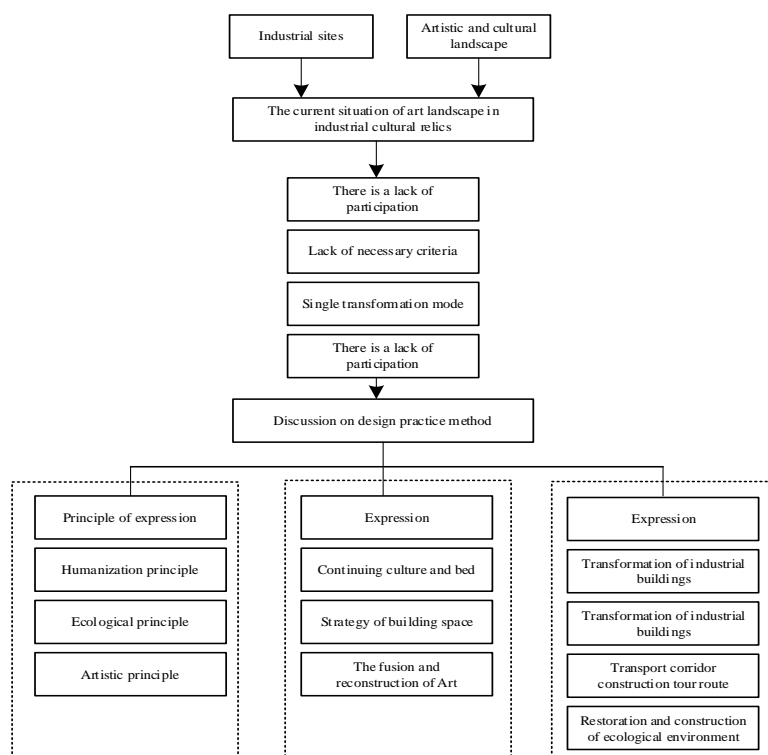
information of function analysis; R_i indicates the warning information of landscape to environment; The difference of E_i and R_i represents the similarity difference index of action analysis process and warning process; $(E_i / R_i)^2$ extreme value and the supplementary value can be used to compare and analyze the warning effect of landscape on the environment. According to the above calculation results, information replacement is carried out for the effect, and permanent replacement is used for the enlightenment warning information of environmental process, so as to evaluate the warning effect. In the process of evaluation, the relationship between the information replacement coefficient K and the Nemerow index is established as follows:

$$G = \sqrt{z * K} \quad (3)$$

Iterative calculation based on the formula can transform the warning information and connect the process of landscape impact on the environment

through comparison. Creative industry is the combination of culture, art, science and technology. For example, the design industry, film, music, radio, and pure art industries require that the space should not only meet the closed creation environment, but also need open and comfortable exchange and assembly venues¹². This requires the regeneration of cultural industry landscape to have the dual attributes of function and art. Industrial sites play a business card role in the city. The reconstruction of some industrial sites has attracted a large number of tourists to stop and visit, which meets the beautification of the city's visual environment¹³. Through the transformation of industrial sites into cultural tourism scenic spots, this is a mode of industrial site transformation. Based on this, this paper constructs the layout planning model of the landscape regeneration of the three line construction industrial sites. The details are as Figure 5:

Figure 5.
Planning model of landscape regeneration layout of three line construction industry sites



For the industrial sites with strong cultural and historical significance, because of the complexity

and diversity of their design scope. In general, it takes the form of transforming the existing industrial heritage buildings into industrial culture and art museums, taking industrial culture and art exhibitions as the main body, and combining with the surrounding environment to create industrial culture and industrial landscape regeneration¹⁴. This way of transformation is mainly to preserve industrial culture and art, to meet the needs of contemporary residents' cultural and artistic life, and combine with the natural landscape of the site to restore the activity of the site. The environmental renewal of industrial sites is different from ordinary

environmental renewal. Usually, designers are faced with a series of adverse environmental conditions. Before the renewal, it is necessary for us to analyze the environment of industrial sites, rationally analyze the geographical, economic, ecological, landscape and other influencing factors, and find out the crux of the biggest impact on the site, so as to "suit the remedy to the case" and realize the construction¹⁵. The ecological restoration of Yiye site provides basic guarantee for its further development and utilization. Based on this, the environmental impact factors of landscape regeneration are classified as Table 5:

Table 5.

Classification of environmental impact factors of landscape regeneration

| Geographical factors | economic factors | Ecological factors | Landscape factors |
|--|--|--|------------------------------------|
| Location relationship with urban center | Economic development potential of lots | Remaining pollutants (water, soil, air, animals and plants, microbial pollution) | The embodiment of landscape style |
| Landform features | Industrial production | Ecological restoration of natural environment | Suitability of landscape space |
| Relationship with surrounding cultural tourist spots and residential areas | - | Stability of environmental ecosystem | Appreciation of landscape art |
| - | - | Environmental biodiversity | Perfection of landscape facilities |

According to the evaluation results of various factors of the site, the impact of each factor on the site development is weighed to determine the renewal planning approach and objectives. Only with a deep understanding of the site, can we determine the way and mode to arrange various ecological elements in a specific environment to achieve the best environmental restoration¹⁶. In this process, we need to pay special attention to the extreme elements, find out the factors that are worth promoting and unfavorable factors in the renewal, and clarify the main contradictions, so as to help designers make correct decisions and planning. In the process of industrial heritage value investigation, we should be true and detailed. According to the need to understand the content of

the formulation of detailed problems, not only in the enterprise management department to obtain the first-hand materials of enterprise development, but also should visit the enterprise old leaders, old employees, record oral information¹⁷. Secondly, the detailed investigation of the site, including geographical location, land area, existing buildings and structures, retained facilities and equipment, factory history, records, technical achievements and other industrial remains. During the investigation, the appearance and size of the building were recorded by means of Surveying and mapping, photographing, etc. On the basis of investigation, the evaluation system of industrial heritage is established, and the value of industrial heritage is evaluated by quantifying the system.

Table 6.

Evaluation factors of industrial heritage value

| Historical value | Cultural value | The value of science and technology | Artistic value | Economic value | Save state |
|------------------|-------------------|-------------------------------------|-------------------------------------|-----------------------|---------------------|
| It's a long time | Corporate culture | Industrial process | Architectural aesthetics | Structure utilization | Completeness |
| Special time | Social emotion | Industrial Technology | Aesthetics of industrial facilities | Space utilization | Authenticity degree |

Information Optimization of Landscape Regeneration Design of Third Tier Construction Industry Sites in China

In order to achieve the purpose of natural and ecological construction, landscape regeneration design on abandoned land is not only to restore the abandoned land to its original state, but also to change unfavorable factors into favorable factors

according to the local actual situation. It is suggested that designers should adopt ecological design in landscape design to minimize human intervention. Based on this, the principles of landscape ecological restoration and its application in abandoned land were investigated and optimized as Table 7:

Table 7.

Principles of landscape ecological restoration and its application in wasteland

| Principle | Specific application |
|-------------------------|--|
| Reconstruction | For example, some buildings left in the factory with enough space or special display effect can be converted into exhibition halls |
| Reform | The abandoned sewage pond will be transformed into a constructed wetland and a base for leisure and ecological education |
| Reconstruction Recovery | Reconstruction of habitats for birds, small mammals, reptiles and aquatic animals Restore the function of nature ecosystem and interact with artificial ecosystem |

Public open space is another new measure of open history in the transformation of industrial heritage. Industrial sites in the center of the city have lost their role as art and cultural centers. Regional culture and history show a shrinking situation¹⁸. The surrounding people cannot feel the humanistic care. The new "enclosure movement" of urban space is being staged everywhere. People have lost communication and cultural exchange Art platform, even cannot enjoy the due public resources and welfare. In this regard, the transformation for the purpose of public cultural

space breaks the traditional closed space pattern, and renews the similar historical space into a more open urban public space node, so as to activate the declining space in a real sense, and make the urban land belong to the public again¹⁹. Therefore, the transformation of public cultural space is a way to explore the regeneration of cultural industrial landscape under the background of industrial sites, and also an attempt to organically renew the old city area with historical and cultural characteristics. In this case, the impact of landscape regeneration design is further studied and improved as Table 8:

Table 8.

Impact content of Landscape Regeneration Design

| Landscape design mode | Environmental impact factors | Influencing factors of industrial heritage |
|----------------------------|---|---|
| Industrial Heritage Museum | Environmental factors have little influence | The industrial remains are of high historical, cultural, scientific and technological value and complete preservation |
| Public open space | Superior geography and economy, poor ecological | High artistic value of industrial remains |

According to the classification of the above table, combined with the background conditions of the "three line construction" industrial sites in a certain area analyzed in the previous chapter, the environmental factors and the industrial heritage value of the selected industrial sites are evaluated and analyzed^{20,21}. Through the analysis, the background and reasons of different sites, the advantages and disadvantages of the current elements are obtained, the main types and characteristics of them are summarized, and the appropriate landscape design is put forward Design mode, easy to clear the key transformation object, take appropriate landscape ecological restoration strategy, provide research direction and goal for the later research. Industrial wasteland is a landscape base formed by human disturbance. The destruction and degradation of regional ecological environment caused by long-term industrial production activities have far exceeded the natural system regulation and the adaptability of species.

Table 9.
Ecological characteristics of industrial wasteland

| Characteristic elements | Feature content |
|---------------------------|---|
| natural environment | The original natural environment elements are destroyed strongly, and the artificial environment replaces the nature. |
| ecological environment | Industrial wasteland, as a landscape with degraded structure and function, results in the decrease of functional connection, the obvious change and fragmentation of landmark landscape, and the discontinuity of ecological process in time and space. |
| Landscape features | The original surrounding environment of industrial wasteland is a complete ecosystem. Steel production activities must affect the regional ecological pattern, such as water runoff, waste dispersion and so on. |
| Natural landscape pattern | The rail transit facilities, road system, industrial facilities, equipment and other buildings and structures used for industrial production in the site have damaged the original ecological environment and landscape pattern, and the continuity of the landscape has been broken, showing a fragmented situation. |
| bio-diversity | Biodiversity is reduced, and it is difficult to communicate with surrounding species. |

Table 10.
Industrial landscape regeneration planning method

| Planning and development strategy | Strategy content |
|--|--|
| Economic development strategy | We should actively adjust the industrial structure of industrial wasteland and surrounding areas, develop new industries with regional advantages and prospects and in line with the leading direction of economic development, adjust the spatial layout of regional industries, and improve the level and efficiency of urban land use. |
| Environmental improvement strategy | We should seize the historical opportunity of the relocation and reconstruction of the plant, and carry out regional environmental improvement through the adjustment of industrial land, including the treatment of the soil and groundwater environment polluted by the industrial production of the Communist Party of China, and gradually control and reduce the regional pollution sources, so as to reproduce the pleasant landscape environment. |
| Social development strategy | Through the construction of industrial wasteland, promote the social progress of regional scope. Industrial arrangement should be conducive to improving the level of social employment, by increasing the training of re employed personnel, paying attention to solving their life security problems, maintaining social stability and promoting the improvement of social population quality. |
| Cultural protection and development strategy | Traditional industrial culture should be actively investigated and protected to expand the connotation of historical and cultural names; at the same time, the landscape and characteristic advantages of industrial resources should be brought into play to improve the quality of regional culture. |

The design of industrial landscape regeneration ultimately implements the design of human beings.
The design should not only meet the needs of culture, art and ecology, but also meet the various

needs of human beings, providing people with enclosed and semi enclosed space for rest and activities. The creation of these spaces can be industrial materials, plants and water. During the visit to Chongqing Industrial Heritage Park, we found that there are a large number of industrial heritage landscape structures and sketches, but there is no corresponding enclosed space to meet the needs of people's rest. In the site design, we should consider many aspects, add color to the urban art, and at the same time, increase the shape design of the space, so as to create a better environment Echo the idea of people-oriented design. The landscape design of industrial sites should be considered from the overall aspect. The use of industrial remains should be integrated. There should be a connection between industrial cultural landscape and landscape to show the complete industrial history and art of the site. The contemporary urban landscape design should start from the whole and integrate industrial elements, so that the nodes of industrial landscape have a certain connection and share common interests to express certain industrial spirit and form a complete urban industrial landscape. Express a theme through major industrial elements. After the landscape design of industrial sites, it has become the established landscape, which cannot get the evaluation after use, and few users' feedback can be obtained. There is a lack of satisfaction survey on the regeneration of industrial landscape of industrial sites. We should set up a return visit mechanism for the landscape design of industrial sites, and investigate the landscape use needs and their own behavior habits. The industrial sites park also lacks website, microblog and telephone. The

establishment of design return visit mechanism can test the advantages and disadvantages of industrial site landscape design, and provide a theoretical reference and suggestions for the following industrial site landscape design.

The Realization of Landscape Regeneration Planning of the Third Tier Construction Industry Sites in China

The "three line construction" industrial site is a complete and independent system, including residents' living space, leisure space, work space and entertainment space. It is connected with the surrounding environment and can exist independently from the surrounding environment to a certain extent. In the face of complex small social system and ecological environment system, in the orderly landscape ecological restoration process, the transformation should avoid rigid treatment and develop in the direction of diversification and flexibility. According to the current situation, three principles of landscape ecological restoration are put forward: protective restoration, promoting restoration and renewal reconstruction. The foundation should strive to upgrade and optimize the industrial structure on the land, change the industrial structure mode that used to be dominated by industrial production, promote the diversified development of regional industrial structure, and take this opportunity to improve regional vitality and activate regional development power. In the process of land renewal of urban industrial wasteland, the utilization patterns of the three major industries under the theory of structural optimization mainly include the following aspects. (Table 11)

Table 11.
Renewal and utilization mode of industrial waste land in third tier cities under the framework of industrial organization optimization

| Industrial structure optimization framework | | Land renewal and utilization model |
|--|---|---|
| Optimization of the internal structure of the secondary industry | | The model of continuous alternative industry |
| Structure optimization among three industries | The service sector; the tertiary industry | Urban industrial model Cultural industry model Real estate development mode |

There are many site resources in the landscape of industrial sites. In order to reduce the demand for urban energy resources, designers can deeply understand the site and excavate the artificial and natural resources in the site, so as to achieve local materials; and maximize the use of waste materials in the site, re design for landscape sketches, art installations, etc. This will not only reduce the consumption of new resources, but also give new life to waste materials. In the design, renewable energy can also be used to replace non renewable energy, such as solar energy, water energy, wind energy, biogas, etc. Urban art sculptures in Toronto, Canada can collect rainwater and domestic wastewater in the city, and use ultraviolet purification technology to purify rainwater and sewage, so as to make water resources recycling. Moreover, the circulating water will alleviate the urban heat and energy consumption, reduce the energy consumption and bring more value for urban development.

The ecosystem has strong self recovery ability and reverse succession mechanism. After natural disasters and man-made disasters, it can generally recover through the system succession function. The climate is suitable and the water resources are rich in this area, which is very suitable for the growth of plants. The industrial sites of "three line construction" are mostly located in the dense mountain forest on the edge of the city, with rich plant species and vigorous growth. After decades of slow self recovery, some plots in the site have dense natural vegetation. For this kind of plot, first of all, on the premise of eliminating the harmful environmental factors of the site, respect the site, strengthen and protect the original geomorphic characteristics, make full use of natural vegetation, and guide the good development of the ecosystem.

When carrying out landscape ecological restoration of industrial sites, it is necessary to have a deep understanding of various natural and artificial elements inside the site, make unified

planning, fully consider the maximum utilization rate of resources, and at the same time try to reduce the artificial intervention on the site, so as to reduce the secondary damage to the environment. At the same time, biological and engineering restoration methods are adopted to strengthen and promote the self-healing process of this kind of ecological environment, so as to facilitate the restoration of the site ecosystem. This method is less used, generally only for part of the environment which is difficult to recover by itself. This kind of environment is mostly affected by chemical agents or metals, and needs to replace or treat the soil matrix of biological growth. The damaged topography, landform and soil are restored by engineering restoration methods, including surface soil replacement, stacking, leveling, loosening, etc. Chemical recovery methods are commonly used to improve soil, including acidification (adding organic matter), alkalization (adding alkali lime), leaching (removing metal ions from soil), conducting (adsorbing metal ions), etc. Landscape Regeneration Design of industrial wasteland is to integrate, redistribute and reorganize the existing buildings, indoor and outdoor space, landscape environment and other resources of industrial wasteland. At the same time, through the means of design, it can reasonably protect, transform and reuse the industrial heritage resources. The principles are as follows:

Due to the long-term production, industrial wasteland has brought some damage to the surface and plants, with the characteristics of landscape fragmentation and disordered landscape elements. We should first objectively analyze and evaluate the landscape characteristics of the site, and make reasonable protection and reuse of the representative landscape elements on the previous site. In the design of landscape regeneration of abandoned land, designers should recognize the objective existence of industrial facilities such as towers, chimneys and blast furnaces, absorb and

accept the elements of industrial landscape, and make the old industrial landscape shine again through reasonable design and transformation. The landscape elements on the industrial wasteland are mainly divided into two parts, one is the existing miscellaneous industrial heritage buildings, the other is the relics that have disappeared but left traces on the surface. The use of ecological design techniques is to keep these landscape elements in a reasonable and orderly way on the site, and then through artistic techniques for secondary creation, change their original appearance and structure, create a new landscape element with practical use, through a series of methods to repair and pay equal attention to the industrial culture on the ground.

CONCLUSIONS

Industrial site landscape is the embodiment of the sustainable development of the city, a new means to solve the problem of healthy and orderly development of the city, and an effective way to continue the vitality of the city. It has gone far beyond the simple field of landscape design, and more belongs to the sustainable development of cities and the world. It is a complex academic field and a complex and hard work, which needs more attention from scholars in related fields. The landscape design of industrial sites in China is still in its infancy. Due to the lack of understanding of the landscape value of industrial sites and practical experience, there are many deficiencies in the reconstruction and reuse of industrial sites. Therefore, on the basis of foreign experience, combined with China's reality, in order to create a sustainable city and landscape, and continue the historical context of the city, we need to carry out more in-depth and extensive research on the landscape design of industrial sites.

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2. Research project of Chongqing Technology and Business University "Research on the Regeneration of Chongqing Traditional Culture in Environmental Design" (NO: 2055018) .

REFERENCE

1. Aiello G ,Hopps F , Santisi D , et al. The Employment of Unmanned Aerial Vehicles for Analyzing and Mitigating Disaster Risks in Industrial Sites[J]. IEEE Transactions on Engineering Management, 2020, 12(99):1-12.
2. SantinM , Chinese D , Saro O , et al. Carbon and Water Footprint of Energy Saving Options for the Air Conditioning of Electric Cabins at Industrial Sites[J]. Energies, 2019, 12(19):3627-3632.
3. NenkovN ,Domitrov N . Research on the Effectiveness of Modelling of Autonomous Flight System for Monitoring Agricultural and Industrial Sites[J]. MATEC Web of Conferences, 2019, 297(3):6-14.
4. Fabian Bühler, Benjamin Zühlsdorf, Nguyen T V , et al. A comparative assessment of electrification strategies for industrial sites: Case of milk powder production[J]. Applied Energy, 2019, 250(10):1383-1401.
5. Yang X , Zhou X , Kan T , et al. Characterization of size resolved atmospheric particles in the vicinity of iron and steelmaking industries in China[J]. The Science of the Total Environment, 2019, 694(1):1-11.
6. A R A , Gérard Delahay b, A H T . Selective catalytic reduction of NO by NH₃ on cerium modified faujasite zeolite prepared from aluminum scraps and industrial metasilicate[J]. Journal of Rare Earths, 2020, 38(3):250-256.
7. Mcpherson M C , Smith G L , Eyley J E , et al. Reversible coordinative binding and separation of sulfur dioxide in a robust metal-organic framework with open copper sites[J]. Nature Materials, 2019, 18(12):1358-1365.
8. Elshamy M M ,Heikal Y M , Bonanomi G . Phytoremediation efficiency of Portulacaoleracea L naturally growing in some industrial sites, Dakahlia District, Egypt[J]. Chemosphere, 2019, 225(6):678-687.
9. Cazares Y , Vergara P M , Garcia-Romero A . Regeneration of Quercus spp. along interactive forest boundaries in a fragmented peri-urban landscape of Mexico City[J]. Environmental Conservation, 2020, 47(1):39-45.
10. YilotlCázares, Vergara P M , Arturo García-Romero. Regeneration of Quercus spp. along interactive forest boundaries in a fragmented peri-urban landscape of Mexico City[J]. Environmental Conservation, 2019, 47(1):1-7.
11. Ex S A , Ziegler J P , Tinkham W T , et al. Long-Term Impacts of Fuel Treatment Placement with Respect to Forest Cover Type on Potential Fire Behavior across a Mountainous Landscape[J]. Forests, 2019, 10(5):438-442.
12. AltamiranoA , Miranda A , Meli P , et al. Spatial

- congruence among indicators of recovery completeness in a Mediterranean forest landscape: Implications for planning large-scale restoration[J]. *Ecological Indicators*, 2019, 102(7):752-759.
13. Koltunov A , Ramirez C M , Ustin S L , et al. eDaRT: The Ecosystem Disturbance and Recovery Tracker system for monitoring landscape disturbances and their cumulative effects[J]. *Remote Sensing of Environment*, 2019, 238(5):111482.
14. Gehrke A R , Neverett E , Luo Y J , et al. Acoel genome reveals the regulatory landscape of whole-body regeneration[J]. *Science*, 2019, 363(6432):1191-1191.
15. Romijn E , Coppus R , Sy V D , et al. Land Restoration in Latin America and the Caribbean: An Overview of Recent, Ongoing and Planned Restoration Initiatives and Their Potential for Climate Change Mitigation[J]. *Forests*, 2019, 10(6):510-515.
16. Oskars Kriāns , Matisons R , Māra Kitenberga , et al. Wind Resistance of Eastern Baltic Silver Birch (*Betula pendula* Roth.) Suggests Its Suitability for Periodically Waterlogged Sites[J]. *Forests*, 2021, 12(1):21-25.
17. Markgraf R , Frédérik Doyon , Kneeshaw D . Forest Landscape Heterogeneity Increases Shrub Diversity at the Expense of Tree Seedling Diversity in Temperate Mixedwood Forests[J]. *Forests*, 2020, 11(2):160-168.
18. Dimitris , Mourtzis , Konstantinos , et al. Mapping Vulnerabilities in the Industrial Internet of Things Landscape - ScienceDirect[J]. *Procedia CIRP on SciVerse ScienceDirect*, 2019, 84(2):265-270.
19. Ardanza A , Moreno A , Segura A , et al. Sustainable and flexible industrial human machine interfaces to support adaptable applications in the Industry 4.0 paradigm[J]. *International Journal of Production Research*, 2019, 57(11):4045-4059.
20. Simon-Stger L , Varga C . PE-contaminated industrial waste ground tire rubber: How to transform a handicapped resource to a valuable one[J]. *Waste Management*, 2021, 119(10):111-121.
21. Geros C L . Designing Momentums: Site, Practice, Media as Landscape[J]. *Architectural Design*, 2020, 90(1):14-21.