

# RESEARCH ON URBAN RECYCLING SPACE LANDSCAPE REGENERATION INNOVATION BASED ON LANDSCAPE URBANISM

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**Abstract**—With the acceleration of urbanization and the transformation of traditional industries, the number of urban lost space has proliferated. Landscape urbanism re-examines the transformation strategy of urban lost space from three levels of urban, ecological and cultural, and reconstructs the urban lost space. The connotation is to clarify the relationship between the lost space and the surrounding land use. With landscape urbanism as the needle and ecology as the line, cities, ecology and culture are stitched together to deal with the lost space of cities dynamically and flexibly. Take the Chongqing Shapingba District Special Steel Factory as example, the lost space gradually improved and eventually became a new urban space integrating historical display, ecological viewing, and recreation.

**Keywords**—Urban lost space; Landscape urbanism; Landscape regeneration

## I. INTRODUCTION

Since the mid of 20th Century, with the development of urbanization and industrialization, as well as the transformation of enterprises, the number of enterprise transformation and policy migration has increased year by year in the process of urban development, and a large number of cities have lost their original functions and have not been fully utilized. This kind of space is called "lost space."

When these abandoned Spaces that have lost their productive functions are shelved for a long time and then turn into negative Spaces that hinder the development of cities, the diversity and historical thickness of cities are constantly reduced. In the past, space has made a great contribution to the promotion of regional economy. At the same time, it also carries the memory of the surrounding citizens and continues the regional historical and cultural genes. Therefore, effectively preserving and transforming urban lost space and making it full of new vitality is not only related to the preservation of historical context, but also a response to the call of the era when the ecology is sustainable.

## II. RESEARCH STATUS OF URBAN LOST SPACE IN DOMESTIC AND OVERSEAS UNDER THE GUIDANCE OF LANDSCAPE URBANISM

### A. Landscape Urbanism

The concept of Landscape Urbanism was proposed in 1997 by American architect Waldheim in *The Landscape Urbanism Reader*, which revises that landscape is to

reintegrate the existing inner order of the city in the process of contemporary urban development. Compared with architecture, landscape is more conducive to people's good experience of urban systems [1-2]. Landscape urbanism emphasizes the landscape components including public infrastructure and ecological infrastructure, and is a world view and methodology for dealing with human-land relations [3].

Today's interpretation of landscape urbanism is more comprehensive, mainly including the following aspects:

- Landscape dominates contemporary urban construction [4-6].
- Constructs landscape infrastructure based on ecological, economic and sustainability principles [7].
- ELandscape design should be added to the time dimension, targeted to propose dynamic and flexible design strategies [8].
- Landscape design should be added to the spatial dimension, emphasizing the multidimensional space of three-dimensional integration [9].
- Strengthen the construction of landscape infrastructure, with lower initial investment to obtain great economic and social benefits, which will drive the development of the district [10].

### B. Research Status of Lost Space in Cities and Towns at Home and Abroad

In the 20th century, the earliest concept of lost space in foreign countries was written by Jane Jacobs, "The Death and Life of American Big Cities", which provides a basic framework for assessing the vitality of cities from urban planning and urban design (1961) [11]. In the book "History of Urban Development - Origin, Evolution and Prospects", Lewis Mumford also defines the concept of "urban drama" to explore the characteristic value of the city and the potential rich spiritual culture connotation (1961) [12]. McHage's response to the problems arising from the expansion of industrial cities over the past century in the book "Design and Nature" (1969) [13]. The concept of lost space was clearly put forward by Roger Transsic in his book "Search for the Lost Space" from the concept of lost space, types, urban space design theory and other relatively systematic and clear theories and design guidelines (1986) [14].

In China, due to the late study of urban lost space, compared with the lack of systematic review in foreign countries, the research on urban lost space based on the theory of landscape urbanism has the following three points: the study of urban public lost space, study on lost space of towns and historic districts and the study of the lost space in the field

of art design. However, with the rapid urbanization process in recent years, the contradiction between people and land has deepened, and the activation and reuse of the urban lost space has become a focus topic.

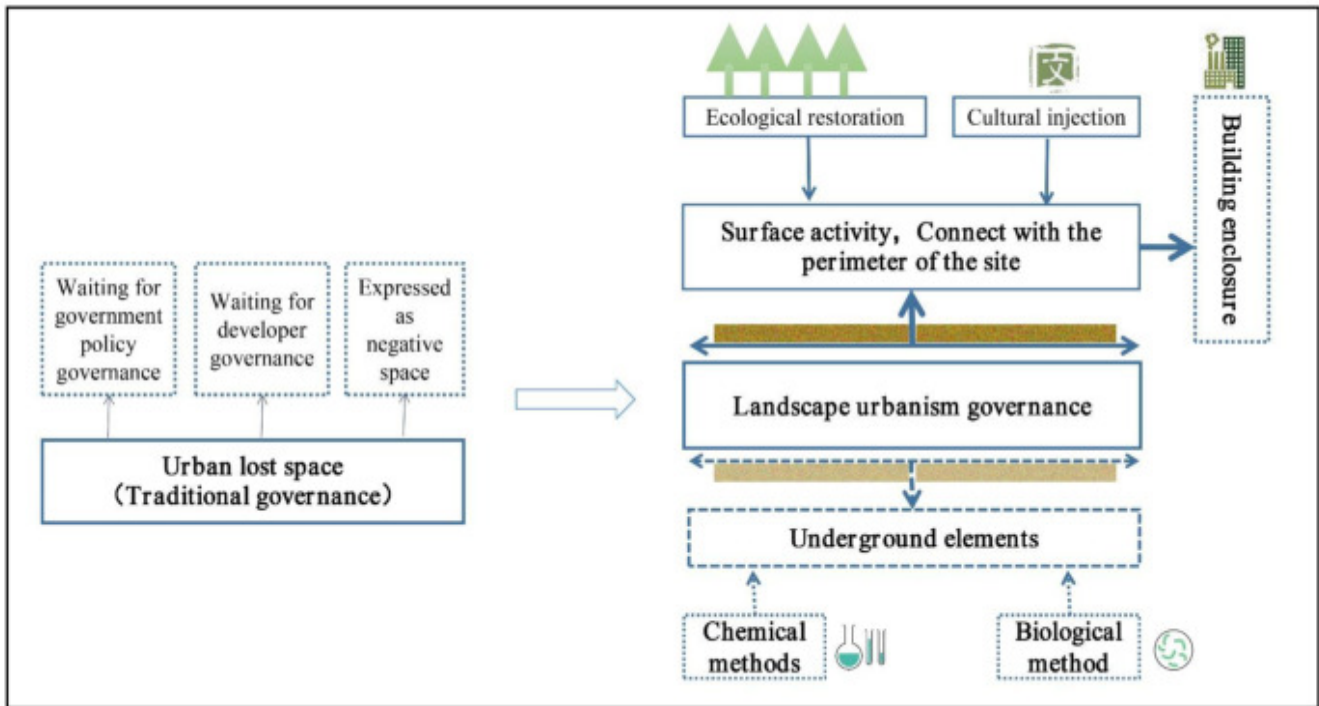


Fig.1. Change map of urban lost space reconstruction strategy

### III. THE ENLIGHTENMENT OF LANDSCAPE URBANISM TO THE TRANSFORMATION OF URBAN LOST SPACE

#### A. The influence of landscape urbanism on the urban lost space

Landscape urbanism emphasizes the leading role of landscape in contemporary urban construction, subverting the previous building-based transformation methods, comprehensively considering the characteristics of the lost space and the surrounding ecological nature, land use and humanities. The impact includes the following: First, extending the spatial dimension of urban lost space governance. In the perspective of landscape urbanism, it should be understood as a superficial activity rather than a simple “shelving”. The detailed description is shown in Fig.1. Multiple functions are implemented in layers: The combination of downward and sewage treatment, and upward can be combined with surrounding places to activate the vitality of the area and improve the organizational structure and function of the city. Secondly, the time element is incorporated into the composition of urban lost space management, The detailed description is shown in Fig.2, Urban construction is a dynamic process. The management of lost space should be planned in stages, and the various possibilities that arise in the future should be dealt with flexibly. Finally, the combination of urban lost space regeneration and space reuse of lost urban space, attention should be paid not only to the restoration of natural ecology,

but also to the value carried by lost space, so as to enhance the connection between lost space and city and people through various governance means. The detailed description is shown in Fig.3.

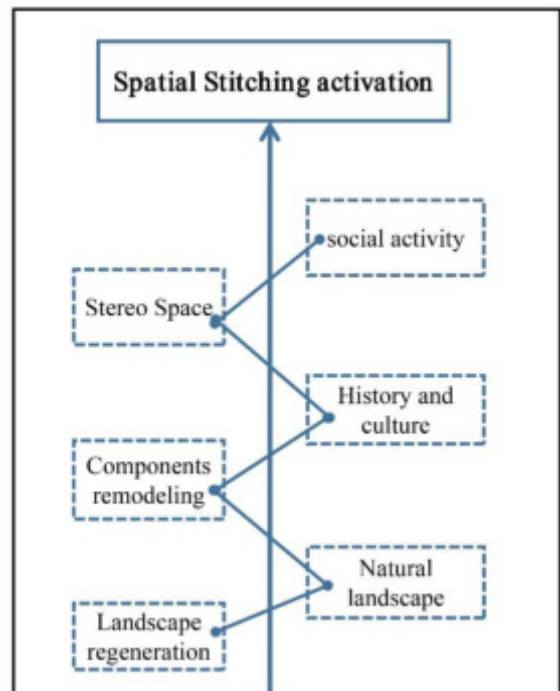


Fig.2. Elements of urban lost space reconstruction

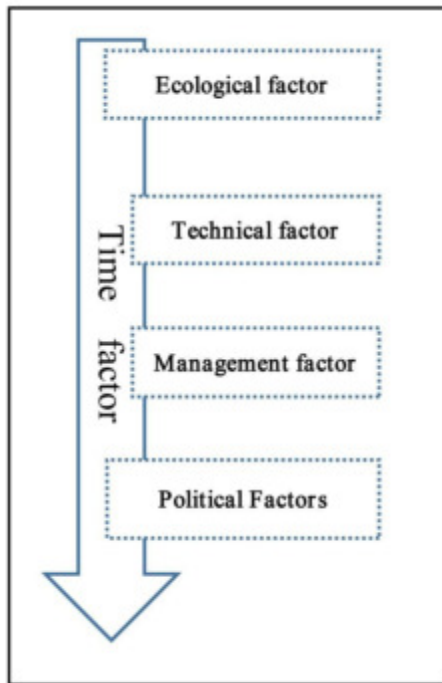


Fig.3. Composite means of urban lost space reconstruction

### B. The “Stitching” Strategy Guided by Landscape Urbanism

Landscape urbanism emphasizes that landscape is the carrier of all natural processes and human processes [15]. The author tries to construct a “stitched” urban lost space transformation strategy that is, taking the landscape as the dominance taking the ecological strategy as the entry point, adding the time dimension, and perfecting the landscape infrastructure. Establish a multi-dimensional space suitable for urban regenerative spatial landscape regeneration, and propose an open design strategy in stages, presenting an elastic and dynamic transformation process.

- Overall transformation strategy. The planning, management, and policies involved in the reconstruction of the lost space in the landscape-oriented city should take the ecology as the “line” and the landscape as the “needle” and “stitch” the

relationship between urban lost space and the type of surrounding environment.

- Ecological restoration strategy. Based on modern ecological restoration technology, the soil, plants and water bodies in the site are used as carriers to propose a targeted landscape regeneration strategy. Simple natural self-repair is difficult to solve the complex urban loss space problem. The power of ecology guides the ecological development of the lost space.
- Increasing the time dimension. Emphasizing the staged transformation strategy of urban lost space, the transformation of urban lost space is a long-term dynamic process, and the focus of its transformation is not limited to figurative design expressions and spatial forms, but by “stitching” actively guide the public to participate in the space, strengthen the open design strategy of interaction with the surrounding people.
- Expanding the spatial dimension. The transformation of urban lost space combines functionality with mass leisure, from simple flat transformation to three-dimensional multi-dimensional space. Under the guidance of the landscape, “stitching” the field history culture and mass leisure, thus integrating the lost space into a multi-layer system superimposed landscape field that combines leisure, entertainment and even transportation functions.
- Improve the landscape infrastructure. Improve the landscape leisure infrastructure of the lost space of the city, and “stitch” the existing road system, ecological corridor, green passage and river network around the field to form a sustainable landscape system, which is to activate space vitality.

Using the design concept of “stitching”, on the one hand, the urban texture and ecological pattern of the lost space and the surrounding area are stitched, and the infrastructure is improved to activate the space vitality. On the other hand, the leisure and historical culture are stitched in the continuation of the lost space. While continuing the historical and cultural genes carried by the lost space, the public's sense of belonging to space should be enhanced, so as to enhance their enthusiasm for space reconstruction.

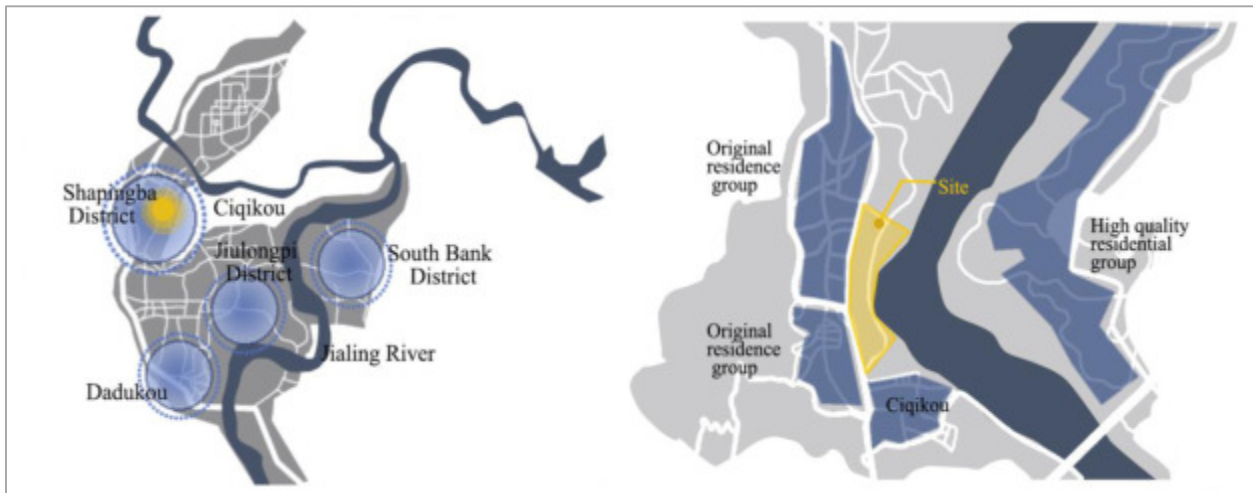


Fig.4.The surroundings of the site

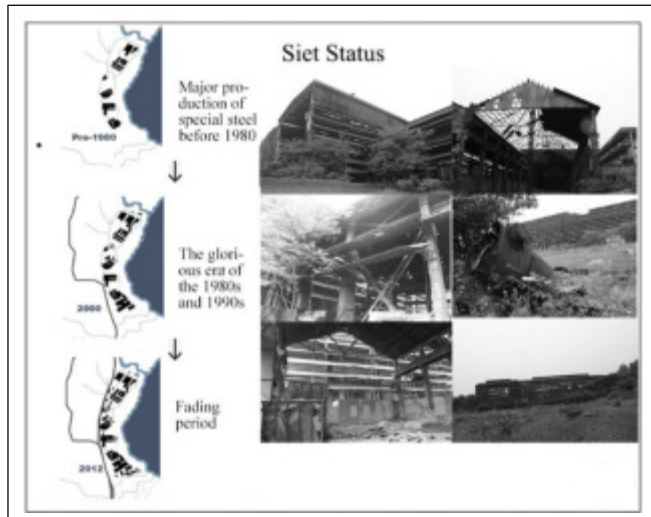


Fig.5.Site historical development and internal status

#### IV. CASE STUDY: LANDSCAPE RECONSTRUCTION PRACTICE OF CHONGQING SPECIAL STEEL PLANT

##### A. Background analysis

Chongqing Special Steel Factory, once known as “the mother of all industries in Southwest China” and “Shili Steel City”, The detailed description is shown in Fig.4, is located on the Jialing River in Shapingba District, Chongqing. It is the earliest steel enterprise in Southwest China. Its predecessor was Chongqing Electric Steel Plant. The state secret military enterprise has a glorious past and has carried memories of several generations. In the late 1990s, due to multiple reasons such as economic transformation, enterprise restructuring and internal contradictions of enterprises, it was declared bankrupt in 2005 and abandoned till now, which has become a negative space hindering regional economic development and affecting urban ecological appearance. The detailed description is shown in Fig.5. The base covers a wide area. The north is the Shuangbei Jialing River Bridge, the south is the famous historical and cultural block Ciqikou, the east is the Jialing River, and the height is about 10 meters, and the west is the old city zone. It is close to Shijingpo Station of Metro Line 3, which shows that the transportation around the site is convenient and the historical and cultural resources are abundant. The detailed description is shown in Fig.6. However, due to the long-term shelving of the site and the heavy industrial base, the heavy metal pollution of the soil is serious, the vegetation is difficult to survive, the factory is dilapidated, and the ecological environment is bad. The remaining road rails and surrounding road systems destroy the urban texture and affect the surrounding living environment. The detailed description is shown in Fig.7.

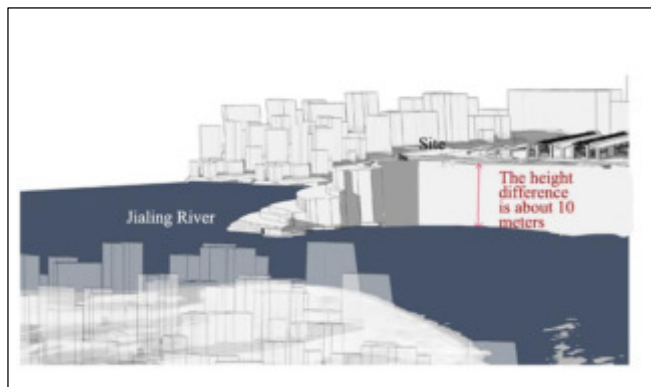


Fig.6.The difference in height between the river and the site



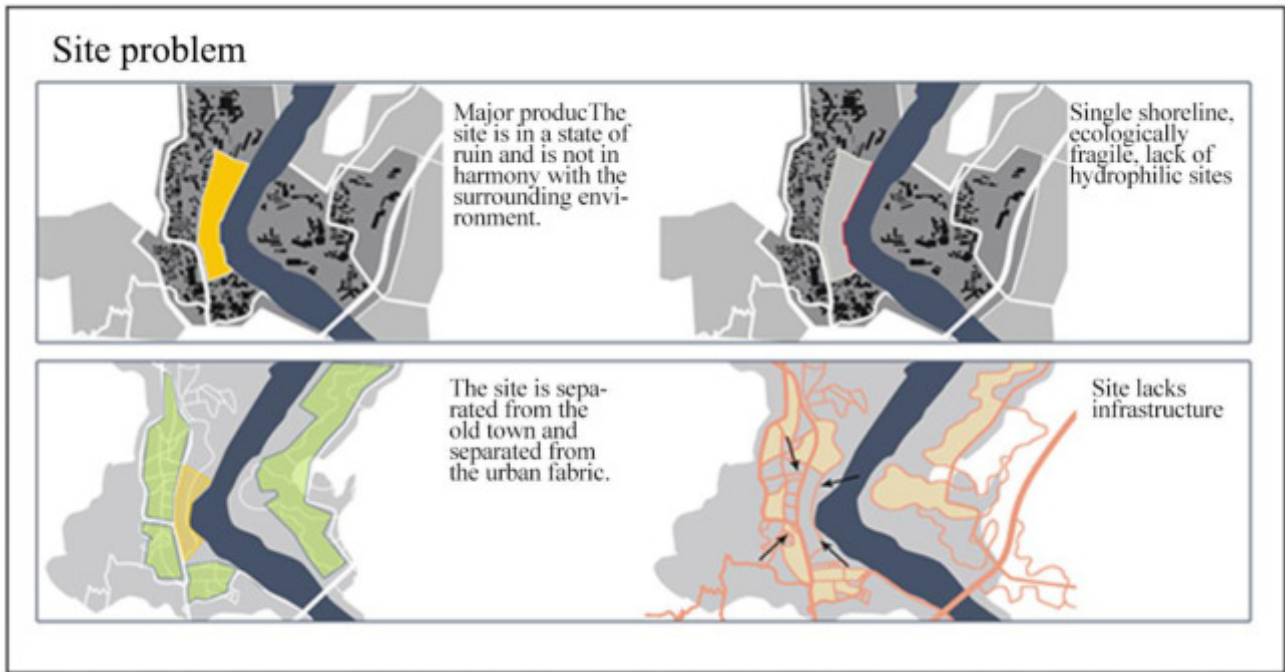


Fig.7. Summary of site problems

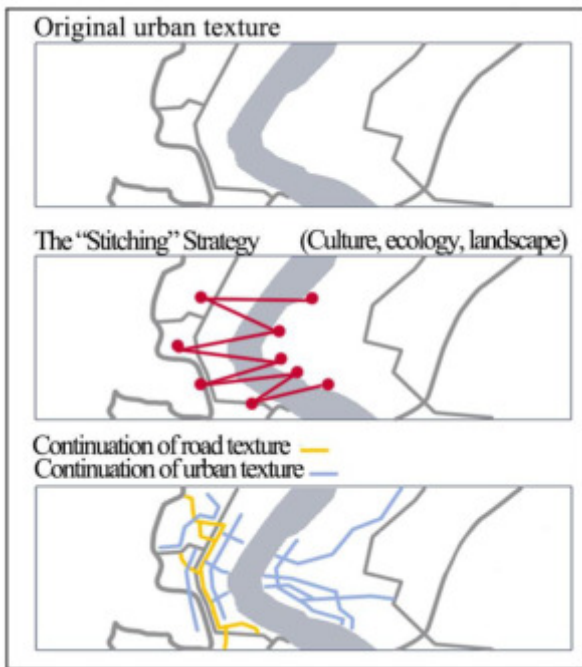


Fig.8. "Stitching" design strategy

**B. Planning concept**

Under the guidance of "stitching" of landscape urbanism, The detailed description is shown in Fig.8, it analyzes the advantages and disadvantages of special steel plants, protects and utilizes the existing old factories, and exerts their historical and cultural values and unique geographical advantages to create a cultural meeting room integrating industrial cultural tourism, maker center and theme business,

making people have a new understanding of the city, ecology and culture.

- "Stitching" the city. The landscape regeneration of the urban lost space is designed to coordinate the relationship with the surrounding environment and optimize the urban structure. Therefore, it should be incorporated into the entire urban system when planning large-scale urban lost space planning. Stitching the surrounding environment, weakening the boundaries and promoting mutual integration, thus guiding the natural environment inside the site and the urban social environment to penetrate each other.
- "Stitching" ecology. Connect the internal road system to the surrounding urban transportation network to activate the site's vitality. Use the riverside ramp to weaken the height difference of the site's riverside surface and interact with the water environment to promote the formation of a new shore ecological environment, thus "stitching" the ecological relationship between constructed wetlands and natural greening. Planting alkali-tolerant plants to absorb heavy metals, improves soil conditions, and increases the interface between ecology and activities.
- "Stitching" culture. Retaining the special factory structure, railway, and human culture of Chongqing Special Steel Plant, and suturing it with leisure, sports, entertainment, education and other activities and surrounding historical and cultural districts. It provides the public with a deep exchange space to experience ecology and culture.

C. Transformation strategy

To create a model for urban lost space landscape regeneration and transformation by "stitching" urban, ecological and cultural phases, using the theory of landscape urbanism, the whole site will be "stitched" by multiple lines, and the public will participate in a wide-scale open transformation strategy. The detailed description is shown in Fig.9.



Fig.9.Site plan design

- Overall strategy. The transformation of urban lost space is a complex space that can provide an interface for diverse urban activities, "stitching" the lost space and the boundary of the city. The detailed description is shown in Fig.10.
- Ecological strategy. By creating a road system to weaken the terrain elevation difference, and strengthening the connection with the existing waterfront ecology with a lower investment, creating a "artificial wetland". Using modern science and technology to mix artificial ecology to effectively improve the natural conditions of soil in the site, optimize the ecological environment, and activate the site vitality.
- Time dimension. Formulate phased planning goals. The first stage: Sort out the site and plan the road system and operation interface to meet the basic design requirements; The second stage: Select and retain the existing buildings, infrastructure and plants of the site, divide the main functional areas, and build a road network; The third stage, plant green plants based on soil pollution, transform water bodies and build artificial waterfront wetlands, and join cultural facilities building; the fourth stage, create a special area combined with different functions , "stitch" culture, ecology and leisure.

- Spatial dimension. While restoring the landscape ecology inside the base, pay attention to the advantages of the river beside, use the cantilevered landscape platform and the tortuous trails that weaken the height difference to strengthen the interaction with the waterfront ecological landscape, and extend the ground landscape to the underground to form more dimensional and versatile three-dimensional space.

Landscape infrastructure. According to different functional areas, the modern landscape facilities are combined with the landscape construction of the site reservation, "stitching" the new and old infrastructure, and perfecting the landscape facilities system of the entire site with point and surface.

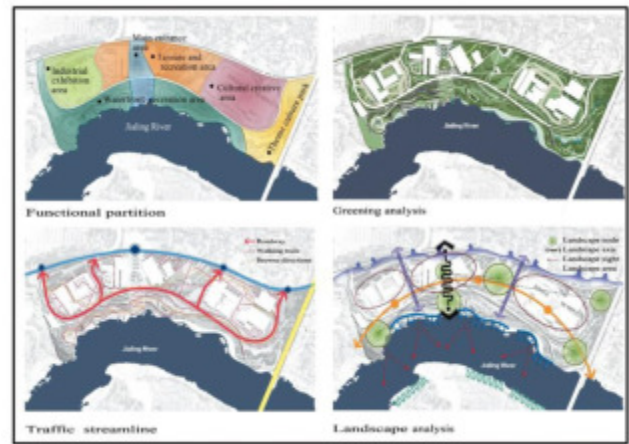


Fig.10. Design scheme analysis

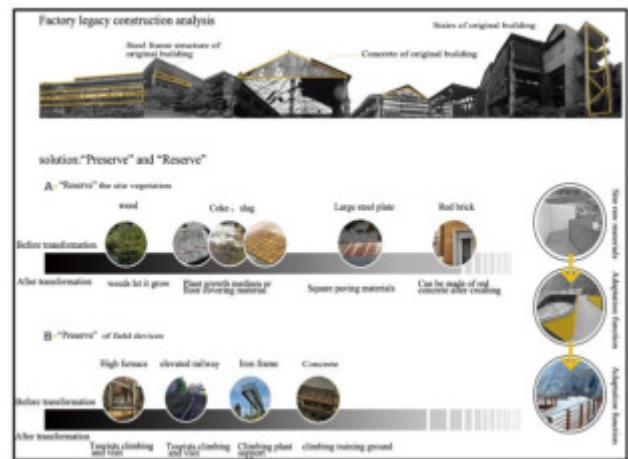


Fig.11. "Preserve" and "reserve" of site construction



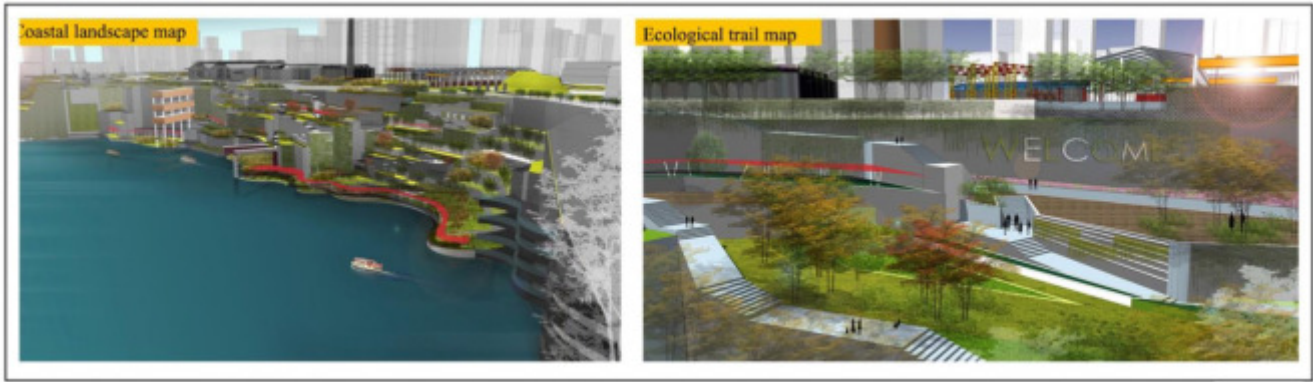


Fig.12.Three-dimensional space reconstruction

D. Transformation features

The abandoned Chongqing Special Steel Plant belongs to the typical urban lost space, and forms the following four characteristics in the process of landscape regeneration design.

- Retaining the unique steel frame, chimney and railroad tracks inside the base, using modern landscape reconstruction techniques to create an iconic landscape structure, not only highlighting the characteristics of the base, but also giving the base a sense of history and bringing the domain sense to the surrounding public. The detailed description is shown in Fig.11.
- Using the landscape leisure trail to weaken the height difference of the river area, create a multi-dimensional three-dimensional space pattern, provide a variety of waterfront landscapes for the surrounding public, and provide viewing space for the surrounding people by hanging over the observation platform and the elevated fitness trail. , sightseeing, dining, walking space. The detailed description is shown in Fig.12.
- Emphasize the ecological restoration of Chongqing Special Steel Plant, construct artificial waterfront

landscape, plant such as calamus, longkui, zhongtian poplar, etc., which absorb harmful substances of heavy metals such as mercury, nickel and cadmium, are planted in the waterfront area and inside the site with the function of plant absorption, so as to improve the riverbank ecology and provide living space for birds. The detailed description is shown in Fig.13.

- Improve soil pollution and saline-alkali conditions through modern methods of mixing soil, soil salt discharge, and chemical techniques, and gradually restore the ecological system and realize landscape regeneration.

V. CONCLUSION

Nowadays, the process of urbanization is accelerating and the reform and restructuring of enterprises. The urban lost space is increasing year by year. Improper reconstruction will affect the use of space and even cause secondary damage to the land. Based on the landscape urbanism, this paper studies the reconstruction methods of urban lost space landscape regeneration from the perspective of "stitching", in order to provide new ideas and possibilities for the transformation of urban lost space.

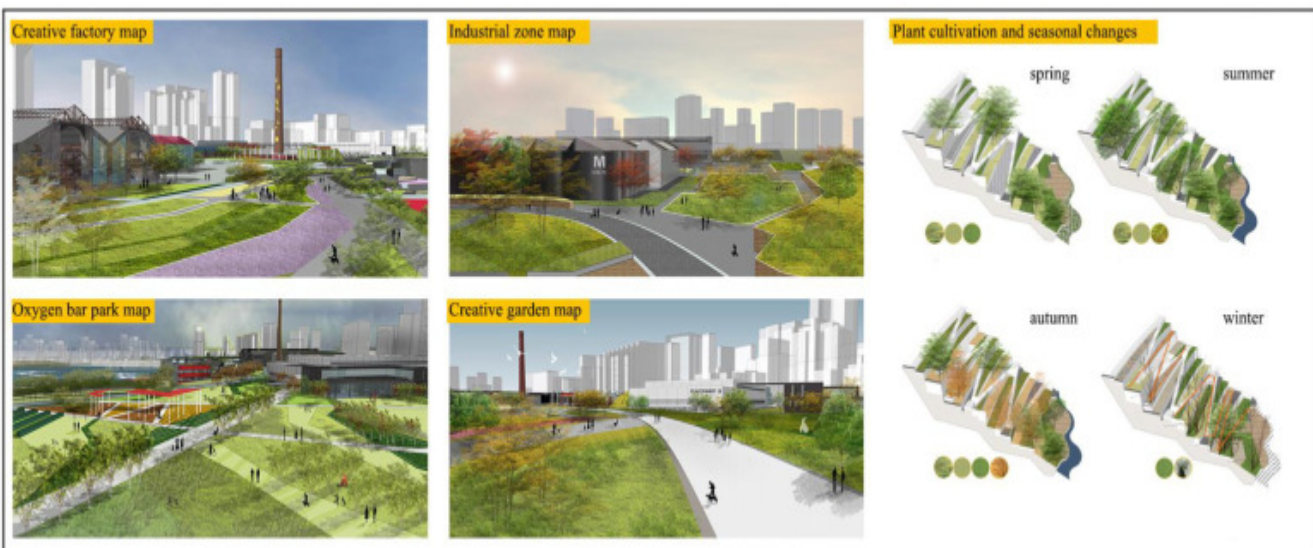


Fig.13.Ecological landscape regeneration

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