



Study on the Construction of Residual Plaque Landscape Ecological Restoration Model in the Process of Rapid Urbanization

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ABSTRACT

The current rapid urbanization, industrialization, and expansion of urban construction patterns have resulted in a large number of residual plaques in the urban area, including both the original plaques that are extremely fragmented and the new plaques that are metabolized by urban production, especially natural habitat patches are more pronounced. Ecological restoration of residual plaques plays an important role in maintaining biodiversity, protecting native species, providing ecological services, revitalizing land resources, inheriting regional characteristics, shaping urban image, and improving the ecological environment. Therefore, research on the subject is necessary and urgent. The topic is based on the ecological survey of urban residual patches and the study of the characteristic attributes of current urbanization, defining the connotation, extension, type, characteristics, and influencing factors of urban residual patches, and analyzing the process of fragmentation of residual plaques in cities and their artificial interference relationship. From the macro, meso, and micro scales, from the top level of ecological planning, the whole process of life cycle management, and the moderately disturbed bottom layer of ecological engineering nodes, three levels are restored, theoretical integration guidance and technical restoration. Based on the three dimensions of the continuous symbiosis of nature, cost control of the economy, and public participation of the society, repair and activate the remaining plaques of the city to provide technical support for the construction and sustainable development of urban ecological civilization.

INTRODUCTION

Foreign Research Progress

Foreign studies on urban residual plaques have focused on the overall protection and sustainable use of natural plaques leftover from industrial wasteland and urbanization and industrialization from the 1970s to the end of the 20th century. Foreign studies on residual plaques are mainly manifested in several aspects: the ecological value of urban residual plaques, the fragmentation and artificial interference analysis of urban residual plaques, the investigation of species and the analysis of integrated ecological services, and the investigation of urban residual plaques, ecological evaluation, and management, sociology of urban residual plaques - public participation and other research, the main countries are Germany, France, Japan, Singapore, London, Australia; research perspectives include sociology, cultural landscape, habitat, community in terms of interference factors, the focus is on the study of natural plaque habitats, especially biodiversity, plant communities, and post-regeneration habitats. The focus of industrial waste plaques is on the reuse of industrial wasteland based on the needs of public space construction (Gemmell 1982).

Domestic Research Progress

Domestic research is first of all a high priority and a latecomer advantage at the national level, mainly in the 18th Party Congress in 2013, which clearly states that urban ecological civilization construction is the level of national strategy. In 2016, the urban double repair of the ministry of housing and urban-rural development, the proposal of ecological restoration and urban repair, the introduction of the National No. 1 document on the happy farms, family farms, and other related policies 2016 greatly promoted the study of urban residual plaques. Secondly, China's research on urban residual plaques mainly focuses on urban wildlife habitat survey and biodiversity conservation, protection and construction of local habitats, and basic theoretical research on sustainable and ecological design standards. Finally, in general, China's research on residual plaques started relatively late, and the systematic basic theories, norms, and standards are lacking. Especially from the perspective of ecological engineering, it has only gradually started in recent years but is mainly distributed in agriculture.

There have been some studies on the residual plaque at home and abroad, but there are still some shortcomings. Most

of the research is mainly based on analysis, research and suggestions. The research objects are mainly for the study of individual residual plaques, such as industrial wasteland, damaged natural environment, and biological environment. The research and application of the case are also partial individuals, and there is no systematic system of ecological restoration and the supporting ecological engineering (Xili & Dihua 2009). At present, China is facing a critical period of urbanization, urbanization is accelerating, the landscape matrix is severely fragmented and reduced, and rational planning and restoration of the ecological environment of urban residual plaques are of great practical significance for revitalizing urban land and activating urban vitality. Comprehensive systematic research on the ecological restoration of plaque landscape is essential (Goode 1990).

MATERIALS AND METHODS

In the process of urban renewal, the urban matrix that cannot quickly adapt to the development of the big environment is gradually increasing. Plaque is a block-like region with different properties or appearances from surrounding units. It is an inevitable product leftover from urban renewal and renewal, and it is also additional energy from urban production metabolism. According to the origin and type, plaques can be divided into interfering plaques, residual plaques, environmental resource plaques, and introduced plaques (Fig. 1). Under the strong impact of the rapid development of the city, the extremely broken original plaques and the landscape ecological restoration of the new plaques produced by the city can maintain the natural ecosystem, improve the urban ecological resources, strengthen the urban regional characteristics, and protect the ecology. The potential functionality of species and ecological services. Factors affecting the formation of residual plaques are multi-dimensional, multi-faceted, and complex. Remnant plaques in cities have enormous value. They urgently need people to understand their formation factors, specifically explore their potential effects, carry out the ecological restoration of fragmented residual plaques, restore their ecological functions, and improve the urban landscape ecosystem. To achieve the sustainable development of residual plaque landscape ecology in the process of urbanization (Hua 2015).

Behavioral Interference in the Process of Urbanization

The continuous advancement of urbanization, the rapid development of industrialization, and the contagious urban construction model have directly or indirectly led to the destruction and disappearance of the internal and external ecological landscapes of the city, and the construction of high-intensity, high-density, and disordered landscapes. The

ecological environment has brought many negative effects (Xiaohu 2010). Rapid urbanization occupies a large amount of land in the city, seriously disturbing the landscape habitats in the area, and the fragmentation of the landscape matrix is shrinking at the same time, which affects the generation of spotted plaques in a large area (Minghui 2005). The acceleration of urbanization has broken the balance of the urban ecological environment and interfered with the healthy and sustainable development of natural habitats. After the large-scale expansion of the city, the ecological environment is disturbed by various behaviors such as encroachment, division, destruction, transformation, etc., so the landscape matrix gradually degenerates, splits, and breaks.

Social Interference Under the Advancement of Science and Technology

The advancement of science and technology has changed the mode of production and life of human beings. Some functional sites have been eliminated in the trend of rapid construction of cities, and these functional sites have gradually turned into scattered unused land. Such as industrial wasteland, village sites, wetlands, parks, etc. Long-term technological development has seriously damaged the city's landscape ecosystem. Factors such as city size, urban nature, urban resources and geographic location (climate), and degree of economic development are all factors affecting residual plaques in cities. They act on the formation of residual plaques from different perspectives of the city, and any changes in one factor will affect the change and formation of residual plaques. The impact of advances in science and technology on residual plaques is a combination of multiple factors and multiple conditions.

Human and Natural Interference Under the Influence of Unexpected Events

Residual plaques are affected by emergencies including human interference and natural disturbances during long-

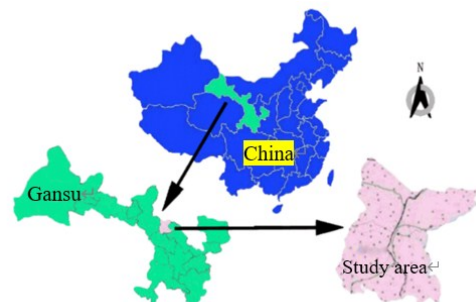


Fig.1: Types of plaques.

term evolution. The survival activities of human beings are accompanied by the destruction of natural habitats. The various interference activities of human beings are the main reason for the frequent fragmentation of urban patches (Renae 2004). Deliberate or unintentional interference behaviors such as uncontrolled mining

resources, over-exploitation and construction, and polluting urban environments have become important factors affecting residual plaques (Jun 2016). The population, density, intensity, type, time, and space characteristics of human disturbance also directly lead to an increase in the number of residual plaques. The human disturbance is more and more

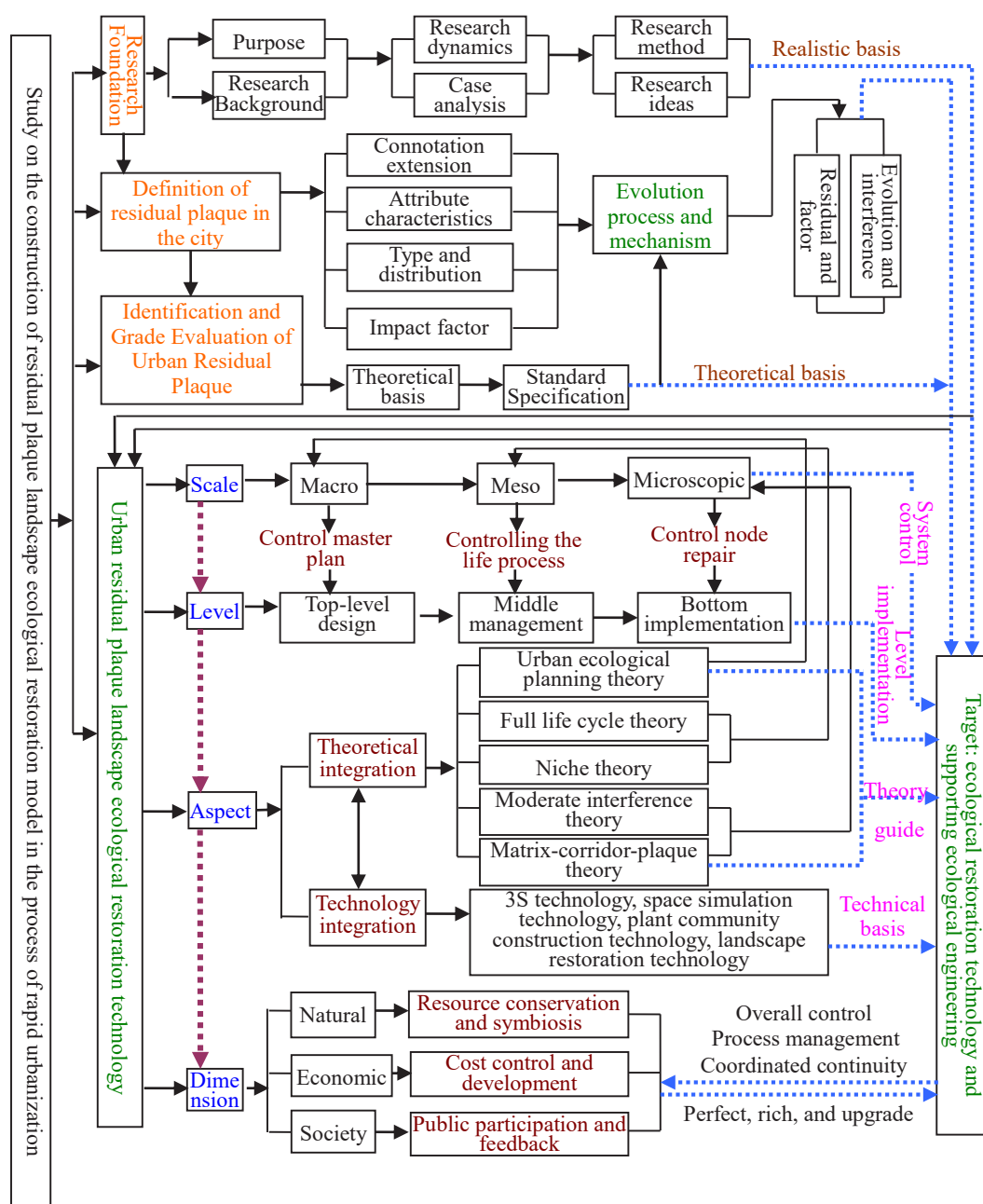


Fig.2: Residual plaque ecological restoration model.

intense in the process of human life structure and lifestyle change.

Natural disasters are irresistible disturbances caused by natural variability on the earth. Natural disturbances bring about many negative phenomena such as earthquakes, tsunamis, volcanic eruptions, landslides, mudslides, sandstorms, droughts, floods, fires, typhoons, insect pests, and so on. Natural habitats are affected by sudden disasters, breaking the balance of the original natural ecosystems, causing natural phenomena such as reduced biomes, harsh soil conditions, and air pollution, making the regional ecosystems unable to self-regulate for a period of time. , induce the formation of residual plaque. After the landscape substrate is seriously disturbed, the species will migrate to the remaining plaques, thereby changing the original species composition in the region, affecting the species changes in the remaining plaques, and succeeding into new residual plaques (Shiyomi et al. 2001).

Connotation Extension of Residual Plaques in the Process of Urbanization

Residual plaques are special plaques formed by economic, social, demographic, geographical space, and other aspects. They are plaques left by the flora and fauna in the background under the influence of large-scale disturbances. The connotation can be summarized as follows: (1) It is an incomplete partial or broken plaque after being strongly disturbed by human activities. (2) Small-area areas that have not been invaded and left behind during the development and construction of large-scale urban areas; (3) Natural landscape mosaics existing in artificially constructed areas after extensive disturbance of natural matrices; (4) For a long period of time, it has not been subjected to strong artificial disturbance, and it is reserved for planning and control land for future development or construction prohibition; (5) idle and legacy land with special natural resources and ecological value in the process of urbanization (Bin & Shengquan 2007). The characteristics of residual plaques in the process of urbanization are mainly fragmentation, residue, localization, strong interference, the humanity of development, subordinate weakness, and residual plaques reduce the connectivity of the city, showing an island shape as natural habitat (Zhu & Weiliang 2011).

Attribute Types of Residual Plaques in the Process of Urbanization

(1) Residential plaques mainly refer to urban residential plaques with the original indigenous settlements such as the village of the city as the main body. In the process of urbanization, the expropriation of rural cultivated land and residential land has increased, and some farmers

still live in the original rural settlements after losing the cultivated land. However, the development of the village lags behind the development of the city, which makes the original and continuous rural villages become external and powerful and become scattered and broken individuals embedded in the high-rise buildings of the city, forming a residential plaque that affects the overall style of the city.

(2) Natural plaques mainly refer to typical natural fragmentation ecological patches with natural resources as the main body. These plaques often retain high regional characteristics and have important restoration value. Global climate change, rapid population growth, industrialized economic production, over-exploitation of natural resources, and deforestation and excessive colonization caused by rapid urban development have severely damaged the original natural resource structure and the degradation of natural matrices. The reduction of biological species of natural matrices, the destruction of plant diversity, and the reduction of soil functionality have led to the formation and retention of residual plaques (Weiguo et al. 1998).

(3) Industrial waste patch mainly refers to the abandoned plaques left after industrial activities such as quarrying, sand mining, metal mining, coal mining, smelting, and other productive factories, including heavy industry and light industry, Class factory land, warehouse land, external transportation, and public land. Due to the stagnation of some industrial production activities, the factory is abandoned, and the crude pollution of industrial production, the dumping of industrial waste, the storage of industrial facilities, and the ecological and environmental hazards are multifaceted and difficult to recover, thus forming a declining industrial waste patch of extreme degradation.

(4) Various cultural patches, such as cultural palaces with cultural activities as the main function, old cinemas, cultural exchange centers, etc. In the process of continuous openness and development of the city, the cultural life of human beings is also constantly improving. People are simply pursuing material life and pursuing a deeper spiritual life. The development of science and technology has led to the development of the social economy, and the human way of life is constantly improving and changing. People's outdoor activities mostly choose large shopping malls, characteristic towns, agricultural sightseeing parks, scenic tourist areas, and other fresh, exciting, individual, and attractive places. Therefore, all kinds of historical and cultural sites have declined, and they were isolated by new urban buildings to form fragmented cultural patches.

RESULTS AND DISCUSSIONS

Structural Design of “The model-3323”

The “3323” structure design is 3 scales, 3 levels, 2 aspects, 3 dimensions:

- (1) Three scales of restoration: It is the overall control from macroscopic planning to macroscopic management to microscopic design;
- (2) Three levels of restoration: It includes the overall restoration of the top level of the ecological planning, the process restoration of the whole life cycle management, and the restoration of the underlying ecological engineering nodes with moderate interference, which is the implementation guarantee;
- (3) Two aspects of repair: It refers to the theoretical integration guidance and technical integration repair guarantee; it is system integrity;
- (4) The repair of three dimensions: Including the three dimensions of continuous symbiosis based on nature, cost control of the economy, and public participation (feedback) of the society, it is relationship coordination.

The scale focuses on the overall local system control to promote positive repair; the level of attention to the top layer, the process, and the control of different niches of the bottom layer, to ensure the operability of repair (Zhang 2006); the level emphasizes the integrity and sustainability of the repair. From theoretical guidance to technical support, the repair is an open system that can be adjusted according to development; the dimension is highlighted by the symbiosis and constraints of restoration, and costs, resources, and humans mutually promote each other's constraints and are the guarantee of benign operation after repair (Fig. 2).

Theoretical Integration of Residual Plaque Ecological Restoration Model

Based on the “3233” structure, from the macro-master planning theory and other existing theories and the integration of related theories, the whole life cycle theory of the process management, the integration of niche and related theories, the microscopic moderate interference, the matrix-plaque Block-corridor, and related theoretical integration is the basis of research to analyze the urban green space landscape, and the resulting theory will guide the ecological restoration technology and control it as a whole. The urban ecosystem is the “matrix”, in which the broken and scattered point-like areas are “plaques”, the strip-shaped areas connecting various point-like plaques, protecting ecological diversity, and promoting landscape ecological restoration are “Corridor” (Gongqiao 2007).

Technical System Study of Residual Plaque Ecological Restoration Model

From the three sub-system dimensions of nature, economy, and society, from the top-level design, middle-level management, and the implementation of the underlying nodes, the research on ecological restoration technology ensures the coordinated development of various elements of the city and the implementation of ecological restoration at the level. The social subsystem allows the city's main body to actively participate and repair feedback to form a virtuous circle. The economic subsystem selects the technology from cost control and repair, and based on the repair of the natural subsystem, it optimizes the technology integration from the aspects of moderate interference.

CONCLUSION

- (1) Residual plaques are formed by natural or artificial disturbances of the surrounding land. The landscape background becomes a discontinuous plaque mosaic or block that is isolated from each other by an external force. Its turnover rate is faster and the stay time is shorter (Wilcover et al. 1986, Lovejoy 1986). From the identification, evaluation, and mechanism evolution to the restoration of residual plaques, urban ecosystems are constantly updated and constantly changing, and new problems will continue to arise.
- (2) The opening of the landscape ecological restoration technology system of residual plaques, the integration of new technologies and new materials, the renewal of old technologies and old materials, and the integration and upgrading of various technologies, have led to the sublimation of research theories and the ultimate realization of residual plaques. The ecological restoration technology system is of openness and sustainable development.
- (3) In the study of the construction of further residual plaque landscape ecological restoration model, it is necessary to carry out more in-depth theoretical research and technical system on the scale, level, aspect, and dimension design of different residual plaques. The practical exploration finally realizes the sustainable relationship between residual plaque and landscape ecological design.

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