

Exploring the Influence of Landscape Architecture Design on the Reduction of Atmospheric Pollution

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Abstract: with the Rapid Development of the Economy, China's Urbanization Process Has Been Accelerating, and Energy Consumption Has Also Increased Rapidly. Many Cities Have Serious Air Pollution and Degraded Air Quality. Air Pollution Affects the Health of Urban Residents and the Development of Cities. in Order to Protect the Quality of the Ecological Environment, the Chinese Government Has Implemented Many Planning Initiatives, But the Air Quality of China's Cities is Still Not Optimistic. According to the Landscape Garden Plant to Reduce the Air Pollution, This Paper Analyzes the Landscape Layout Design from the Landscape Garden Layout to the Reduction of Atmospheric Physical Pollutants, the Reduction of Chemical Harmful Gas Pollutants, and the Reduction of Atmospheric Biological Pollutants.

1. Introduction

In Recent Years, with the Advancement of China's Industrialization Goals, Environmental Issues Have Increasingly Become the Focus of Public and Government Attention. in Some Areas, Public Concerns about the Environmental Hazards of Related Projects Have Caused Public Events with Great Impact, Such as from the Beginning of 2012 [1]. Urban Green Space Has a Very Significant Positive Effect in Purifying the Urban Atmospheric Environment and Maintaining the Benign State of Urban Ecosystems. in the Process of Normal Growth, Development and Reproduction, Urban Green Space Vegetation Has Absorbed a Considerable Part of Urban Pollutants through Various Physical and Chemical Approaches [2]. This Purification Function of Urban Green Space is Mainly Reflected in the Absorption of Toxic Pollutant Gases, Improvement of Microclimate, Dust Retention, Noise Reduction, Purification of Water Bodies, Balance of Atmospheric Ratio, Etc., and is Regarded as “the Lung of the City.”

According to the Latest Research, Traffic Emissions Have Become One of the Most Important Sources of Atmospheric Particulate Matter in Cities. and Traffic Pollution is Different from Other Types of Pollution. Contaminants Directly Spread from the Middle of the Road to Non-Motor Vehicle Lanes and Sidewalks, Which Have a Serious Impact on the Work and Travel of Pedestrians and Residents. the Green Belt Can Improve the Comfort of Non-Motor Vehicle Lanes or Sidewalks While Increasing the Distance between People and Roadways, Which is of Great Significance for Improving the Air Quality of Roads [3].

Road green belts can effectively reduce air pollutants through plant block and leaf adsorption, improve non-motor vehicle lanes and sidewalk air quality, and protect pedestrians' ecological safety. However, different road greening belts have different effects on improving air quality due to differences in their structure types and plant configurations. Based on the previous theoretical research results and some previous achievements, it is hoped that for the urban greenway isolation belt of Wuhan, from the perspective of plant selection and structural parameters of the green belt, how to construct a high-efficiency dust-reduction mode green belt can be used for urban roads. Provide reference for green space planning and road greenland landscape reconstruction and optimization [4].

2. Analysis on the Ways of Landscape Architecture Design to Reduce Air Pollution

The way to reduce atmospheric pollution by using garden layout design is shown in Figure 1.

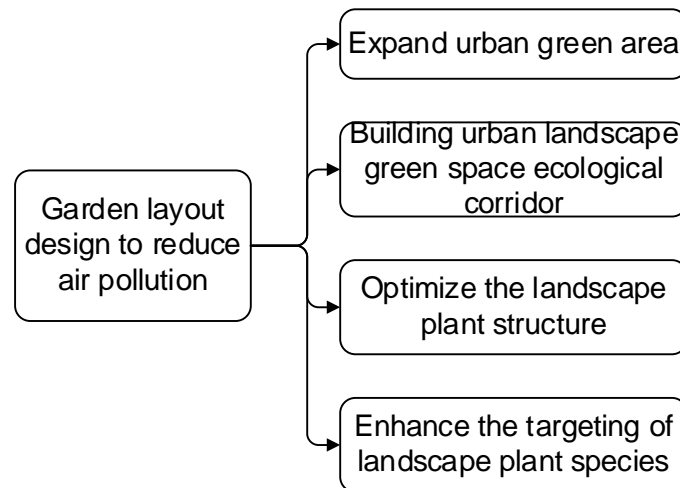


Fig.1 Garden Layout Design to Reduce Air Pollution.

2.1 Expand Urban Green Area

In the landscape garden layout, only when the urban green space is formed to a certain scale can the protection of atmospheric pollution be guaranteed. In the treatment of air pollution, landscape green space can effectively promote the circulation of rainwater and absorb the poisonous substances therein, greatly reducing the concentration of atmospheric pollution. The government should increase investment in the expansion of urban green space and provide support for the construction of landscape garden cities [5].

2.2 Construction of Urban Landscape Green Space Ecological Corridor

Road greening is the main embodiment of urban greening and plays a huge role in optimizing the urban environment. In the air pollution control, the green space construction in the landscape garden layout not only plays the role of green space, but also plays a key role in the ecological corridor [6]. In the landscape garden layout design, the road and its green space are distributed in the form of strips in the city, which can introduce fresh air outside the city into the city, speed up the circulation of air and reduce the concentration of air pollution. Therefore, in the planning of urban landscape architecture, the direction of the road should be roughly the same as the dominant wind direction of the city; for the shelter forest planted on the periphery of the city, relatively short bushes should be planted along the road direction to ensure air circulation and at the same time in the city. The atmospheric pollutants are discharged [7].

2.3 Optimize the Landscape Plant Structure

According to relevant researches, among the plant communities planned and constructed by landscape architecture, the strongest adsorption effect on atmospheric pollutants is arbor, and then arbor, shrub, lawn and pure coniferous forest. Therefore, in the process of landscape layout and greening in the city, it is necessary to scientifically match the above-mentioned plants to form a staggered landscape level, and to maximize the effect of dust retention as much as possible. The overall structure of the plant is prevented from being dominated by lawns and trees, while the function of the shrubs is neglected [8]. The trees of the trees are relatively tall, which can effectively reduce the wind speed and block the atmospheric pollutants. The shrubs are relatively low in height compared with the trees, and can absorb the dust generated by the vehicles on the ground. The vines can block the heights. Dust. In addition, the landscape plants on the windward side should choose plants with a certain degree of transparency to increase the turbulence of the air and promote the settlement of the smog. In optimizing the landscape garden plant configuration structure, it is also necessary to pay attention to the role of the ecological corridor. The landscape plants are extended from the outer layer facing the outer layer to form an open surface which is favorable for wind drainage.

3. Landscape Garden Layout Design Reduces the Role of Air Pollution

When using landscape gardens to reduce atmospheric pollution, it relies mainly on the purification functions of plants themselves to intercept and remove atmospheric pollutants. Plant interception, adsorption and retention are involved in the interception, and the functions of plant absorption, degradation and transformation are required during the removal process. Based on the above analysis, the reduction of air pollution by landscape architecture design is mainly reflected in the following aspects:

(1) Landscape garden layout reduction of atmospheric physical pollutants

In urban construction and development, the main physical pollutant is dust. According to the relevant research results, the landscape greening plants in the city can absorb the dust, and can also effectively reduce the bacteria content in the atmosphere, thereby achieving the purpose of purifying the air. In addition, the dust-retaining performance of landscape gardens has always been an important support for urban forest design.

(2) The reduction of chemical harmful gas pollutants in landscape garden layout

The chemical harmful gases are mainly various toxic gases, including sulfur dioxide and carbon monoxide, as well as chemical gases such as photochemical smog. The reduction of such chemical gases by landscape plants is mainly reflected in the following three aspects, as shown in Figure 2.

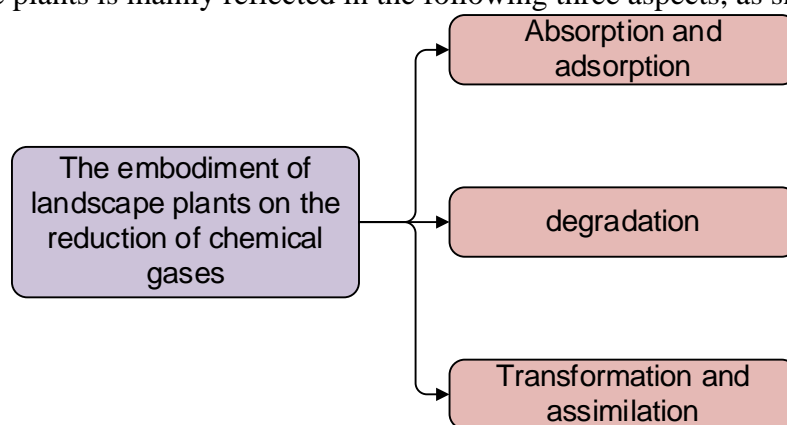


Fig.2 The Embodiment of Landscape Plants on the Reduction of Chemical Gases

Absorption and adsorption: The surface of plant branches in landscape gardens can absorb and adsorb many solid particles and gas molecules; leaf surface pores can absorb and store many harmful substances, especially the plants themselves have humidity, which is very absorbed by some soluble gases. Good.

Degradation: The plant itself mainly uses metabolism to achieve the degradation of pollutants, and the metabolites are retained by the bound form.

Transformation and assimilation: In the process of plant transformation, it is mainly a process of gradually converting some pollutants from one form to another according to the physiological process of plants. Under normal circumstances, plants cannot completely degrade organic pollutants into H₂O. Plant transformation is a physiological reaction process that protects itself from the effects of pollutants.

In the process of plant assimilation, it absorbs some pollutants containing plant nutrient elements, and at the same time assimilate to its own material composition, to promote the self-growth of plants. Plants use their own physiological processes to convert atmospheric pollutants until they are assimilated into their bodies.

4. Landscape Garden Plant Selection and Configuration Optimization Recommendations.

4.1 Plant Selection Design

In the process of plant application, plants with different levels of dust retention capacity can be selected according to the severity of pollution. For example, road landscape gardens in industrial

areas must choose plants with strong resistance and dust retention ability, and consider landscape functional plants; For the commercial area, you can choose plants with strong or dust-retaining ability, and focus on landscape functional plants.

Based on the above plant selection method, based on the field investigation and professional knowledge accumulation of existing road landscape garden plants in Wuhan, considering the plant's dust retention capacity, adaptability and landscape effect, the following plants can be used as road landscape gardens in Wuhan. Plant selection suggestions:

Arbor: Citron, Magnolia, Euphorbia, Fuyu, Eucalyptus, Ginkgo, Purple Leaf, Japanese Cherry, etc.

Shrubs: Rhododendron, safflower, deciduous, French holly, Lagerstroemia, Bauhinia, Hibiscus, Cypress, Pyracantha, Phnom Penh, Euonymus japonicus, Pleurotus ostreatus, P. sylvestris, P. sylvestris Leaf coral, etc.

Fujimoto: Yunnan Huangxin, creeper, etc.

Ground cover: Ophiopogon japonicus, auspicious grass, Manila, white clover, safflower sorrel, etc.

In the process of plant application, it is necessary to select according to the degree of pollution and the main function of the plant; especially the selection of trees should be more cautious. The plant height of the trees should not exceed the height of the buildings on both sides of the street. The crown width should not exceed 7m, and the plant spacing should be greater than 0.4H. (H is the height of the building on both sides of the street).

4.2 Matching Method

For roads and landscapes with a width of more than 3m, all roads and landscapes are generally in the form of low and high, near the side of the motorway, with herbs such as Ophiopogon japonicus and white clover or low shrubs (such as France). Holly, sea paulownia, safflower eucalyptus, red leaf heather, cypress, golden lobster, etc., and low shrubs can be designed in the shape of a curved or triangular shape, close to the non-motorized vehicle side with high point shrubs Or hedges (wood carp, purple leaf osmanthus, sweet-scented osmanthus, crape myrtle, etc.); in addition, depending on the actual situation, appropriate large shrubs and small trees (horizontal roads perpendicular to the dominant wind direction) or sparsely large trees can be planted in the middle of landscape gardens. (The road with the angle of the dominant wind direction), and the spacing of the trees should be greater than 0.4H (H is the height of the buildings on both sides of the street), and the crown width should preferably not exceed 7m.

For the location where the width of the road landscape is less than 3m, the configuration pattern of hedges + small shrubs or barbed wire + vines + flower shrubs should be selected, and the side of the motorway should be supplemented with herbs such as Ophiopogon japonicus. Hedges or flower shrubs close to the side of the motorway can be designed as triangles, diamonds, etc., or curved, not only to enhance the landscape effect, but also to improve the particulate matter reduction effect.

4.3 Scientific Management of Urban Landscape Garden Layout

In order to realize the landscape garden design of the city and adapt it to the air pollution control, adhere to the concept of sustainable development, and play its own role in pollution prevention and green landscape, it is necessary to standardize the urban landscape greening and system. In order to transform the urban greening layout goals into detailed tasks, and implement them into various social projects, build corresponding intermediary mechanisms and regulatory systems, and pay attention to rewards and punishments and ecological compensation mechanisms.

In the urban greening work, technology is an indispensable part, and its management is mainly reflected in the following aspects: Reasonable pruning of flowers and trees; Reasonable watering, different plants need different water in different areas, especially the lawn, which requires Watering under actual water demand; Pest control, this aspect will have an impact on the overall ornamental and utilization years of green plants. Among them, the ecological system of soil is very complicated, and it contains various pathogenic bacteria, which will adversely affect the survival of plants. It is necessary to pay special attention to the secretion of plant roots in the process of urban greening,

and kill the pests and diseases. Eliminate its unfavorable factors in plant growth.

For some areas where the concept of sustainable greening and sustainable construction is relatively backward, environmental protection work should be publicized through various forms such as newspapers and bulletin boards, and personnel of all levels should be organized to participate in environmental protection technology training and technical consultation work to strengthen greening work. Increase the law enforcement of gardens, and let the urban people participate more actively in the construction of gardens. Use the form of propaganda and education to protect the ecological environment, and get the people's understanding and support for eco-environmental work.

5. Conclusion

Landscape garden layout design can effectively mitigate the harm caused by air pollution. Although it can not solve the air pollution problem fundamentally, it is also a very reliable way. Based on the layout design and ecological knowledge of landscape garden plant structure allocation, through the nature of the garden plants themselves, such as dust retention and absorption of toxic substances, the sustainable development effect of landscape gardens is effectively exerted, and the air pollution rate is reduced. In addition, garden research workers and related practitioners should further explore the application of garden plants in air pollution control and find more effective ways and techniques to control air pollution according to garden plants. Relevant government departments should formulate more stringent environmental governance standards, improve the adjustment speed of economic structure, reduce the emission of atmospheric pollutants, and scientifically use landscape gardens to prevent and control air pollution. Air pollution is an organic circulation system. It is necessary to continuously study new types of pollution control programs and technologies to fundamentally curb the occurrence and spread of pollution.

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