Study on Application of Native Plants in Park Greening in Guilin

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Abstract: With the Guangxi Guilin being listed as an innovative demonstration zone for the national sustainable development agenda in 2018, the urban construction processes in Guilin continued to advance. In the construction of city image, garden planning and design has played an important role. Urban landscaping plays an important role in urban development and has a great influence on the image of the city. The selection of urban landscaping trees is mainly based on native plants, which directly determines the ornamental effect of landscaping. This paper aims to study the application of native tree species in Guilin in garden planning.

With the rapid development of social economy, the improvement of people's material living standards, and the rapid increase of urban population, the problems between the regional area of green space and the ecological environment are becoming more and more serious, and the protection of ecological environment and planning are extremely urgent. Guilin, Guangxi, as an innovative demonstration area for the sustainable development agenda, focuses on issues such as ecological restoration and environmental protection in karst rocky desertification areas. Locally adapted garden planning plays a vital role in urban ecological construction. Landscaping can effectively alleviate the accumulation of rainwater on the ground, accelerate the collection and diversion of rainwater, reduce the incidence of intrinsic mites, and at the same time adjust the microclimate in the region and improve the environment. It is indispensable to choose local plants suitable for local ecological environment to build garden green space. In addition, the criteria for selection of native gardening plants should be strictly and carefully selected, and the local native plant characteristics should be carefully understood selecting a wide range of distribution and adaptability. The local things with strong characteristics, good aesthetics and good resistance to stress create a garden green space with its own characteristics, adding unique urban style and improving the overall ecological benefits of the green space.

1 Native plant

In a narrow sense, a native plant refers to a plant that has been subjected to long-term natural selection and has survived the harsh natural environment, pests and diseases, and can still survive intact. This does not include alien species that are already highly adapted to harsh environments; Broadly speaking, native plants refer to the climatic conditions and ecological environment that have

been adapted to the relevant urban jurisdictions through artificial long-term care, cultivation and reproduction, and the excellent growth can represent the characteristics of local vegetation and have a good culture. Connotations, and trees that can influence people's lives. ^[1] It is well known that native tree species generally have the advantages of strong adaptability, good resistance, simple planting management, great economic benefits, ability to stabilize local ecosystems, good green effect, etc., because of their high cost performance, it has become The city "green pioneer".

2 Analysis of the regional nature of Guilin City

2.1 Guilin Geographical Environment and Climate Conditions

The plain area in Guilin City accounts for 65%, and the hills account for 5% of the mountain area. The average elevation of the ground is 150m. Yaoshan is the highest peak in the eastern part of the city with an elevation of 909.3m. The highest peak in the west is 581m above sea level. It has a beautiful natural environment and is a typical karst landform. The rivers in the city are densely distributed, with a certain gap and abundant natural water resources. The main rivers include Minjiang River, Xiangjiang River, Luoqing River, Minjiang River and Zijiang River. There are also 65 tributaries, and the rain collection area can reach more than 100km². Over the years, the city has reached an average total water volume of 40.381 billion m³. The Minjiang River in the middle and upper reaches of the Guijiang River begins in Mao'er Mountain, the highest peak in South China's Xing'an County, and flows through Lingchuan County, Guilin City, and Yangshuo County, with a total length of about 440km. The terrain of the Minjiang River is high in the

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north and low in the south. It is basically inclined to slope. The riverbed is mostly sandy pebble. The channel is twisted and twisted, and there are 62 beaches^[2]. Guilin is located in the southwestern part of the Lingnan Mountains. Its soil is dominated by red soil and belongs to the "red loam belt". The soil is diverse, the soil layer is deep, and the cultivation is excellent. Planting a variety of agricultural and forestry products such as vegetables, rice, forestry, and dryland crops. The forest coverage rate in the city area is 66.5%. Guilin is a typical mid-subtropical monsoon climate with mild and humid climate and superior conditions. The season changes are clear, the frost period is short, the rain is sufficient, the sunshine is sufficient, the winter is short and the summer is long, the heat is abundant and the rain is almost the same season. Guilin's annual average temperature is 16.5 °c ~ 20.5 °c, the lowest temperature in January is 15.6 °c, the highest temperature in August, the average monthly temperature is 23 °c. The average annual frost-free period, the average annual rainfall is 1395.1mm~2006.4mm, the annual average evaporation is 1490mm~1905mm, the annual average relative humidity is 73~79%, and the annual average sunshine hours is 1670 hours. The northerly winds are dominant throughout the year, with an average wind speed of 2.2-2.7 m/s.^[3]

2.2 Guilin native plants

Guilin is rich in plant species. There are 2329 species of higher plants in Guilin Yanshan Botanical Garden (including ferns, including many precious plant species such as ginkgo and silver fir. There are 1166 species of native origin, 1263 species of cultivars and introduced species, There are a total of 247 families and 969 genera. There are 11 species found in Guilin and its surrounding areas and named after the word "Guilin".^[4]

The original forest vegetation types are mainly subtropical evergreen broad-leaved forests, typically *Lauraceae*, *Theaceae*, *Fagaceae* *Magnoliaceae*, *Hamamelidaceae*, etc. It is composed of tree species, and *Quercus glauca*, *Platycarya strobilacea* Sieb. et Zucc., and *Pinus massoniana* Lamb are also important tree species in the forest.^[4] There are many clusters of bamboo on the banks of the Lancang River, as well as deciduous broad-leaved trees such as *Liquidambar formosana* and *Sapium sebiferum* (L.) Roxb. Bamboo forests and other colored leaf species form the main landscape along the Minjiang River.

The grass in Guilin is basically composed of dry grassland, field stalks and weed grassland in the low hills. Among them, the low hilly and dry grassland species are *Bothriochloa bladhii* (Retz.) S. T. Blake, *Apluda mutuca* L., etc.; the weedy grassland species are *Digitaria*, *Hemarthria*, *Paspalum*, *Setaria*, and *Eleusine indica* (L.) Gaertn.. It can be seen that there are many natural vegetation resources in Guilin, and the gardens are rich in landscaping plant resources. In the process of greening construction, rational planting can be carried out according to the basic principles of adapting to local conditions and adapting to trees, and the rich resources of local native plants can be brought into play.

3 Guilin green space plant landscape survey

3.1 Survey of urban green space plant species

According to incomplete statistical survey, there are 429 common garden plants in the urban green space of Guilin, belonging to 103 families and 223 genera. There are 198 species of trees, belonging to 54 families and 122 genera, 113 species of shrubs, belonging to 43 families and 78 genera; 25 species of vines, belonging to 11 families and 21 genera; 14 species of bamboo, belonging to 1 family and 9 genera; herbaceous plants 79 Species, belonging to 4 families and 8 genera. Among them, more than 20 families include *Rosaceae* and *Magnoliaceae*, all of which have 21 species; more than 10 species include *Papilionaceae*, *Oleaceae*, and *Euphorbiaceae*, *Lauraceae*, *Caryophyllaceae*, *Moraceae*, *Caesalpiniaceae*, *Cupressaceae*, and *Pinaceae*.

The plant species of Guilin urban green space are rich in species. The ratio of evergreen and deciduous species of arbor, irrigated and vine is 1.76:1. The ratio of evergreen tree species to deciduous tree species is 1.48:1. The most abundant species of trees are the main body of green plants and the basis for realizing the ecological and landscape functions of urban green space in Guilin. As a basic feature of tropical plant communities^[5], vine is only 25 species. The vines used in each green space are similar, and the types are slightly insufficient. Influenced by various factors of history and geography, the people of Guilin have a special love for bamboo. There are 14 kinds of bamboo plants, which reflects the rich bamboo culture of Guilin traditional gardens.

3.2 Investigation of plant species in park green space

The species of garden green plants in parks are mainly composed of trees and shrubs. The large amount of shrubs and shrubs, long life and high dosage are the main materials that constitute the green landscape of the park. The survey targets of Guilin Park Greenland are mainly the status quo of the green parks and plants of the entrances, buildings, squares, main scenic spots, water bodies and mountains of various parks.

Through the on-the-spot investigation, the statistical analysis of the main garden plants appearing in the park is carried out. See Table 1-3for details.

Table 1: statistical table of plant species in each park

Park name	ZiZhou park	Yushan park	Xishan park	Xiangshan park
arbor	90	78	55	32
shrub	56	56	36	35
Vine	13	12	7	8
Bamboo	6	6	4	5
Herb	37	36	32	15
total	202	185	134	95

Table 2: statistical table of plant species in each park

Park name	Fuboshan park	Nanxi shan park	Chuan shan park	Two rivers and four lakes park
arbor	42	39	46	68
shrub	30	25	35	33
Vine	6	8	4	7
Bamboo	4	3	3	6
Herb	35	31	19	42
total	117	96	107	156

Table 3: statistical table of plant species in each park

Park name	Die caishan park	Seven star park	Wang cheng Park	Garden botanical garden
arbor	61	85	23	113
shrub	32	42	17	86
Vine	13	16	8	18
Bamboo	3	7	1	8
Herb	36	36	13	49
total	145	186	63	272

According to the report, among the 12 parks surveyed, there are 6 species of vegetation with more than 150 species, accounting for 50% of the total number of parks; 3 species of vegetation with 100 to 150 species, accounting for 25% of the total number of parks; 3 of the ~100 species, accounting for 25% of the total number of parks. The Garden Botanical Garden and Pazhou Park have the largest number of garden plants, with more than 200 species; the smallest in Wangcheng Park, there are only 63 species. Among the 12 park green spaces surveyed, 395 species of garden plants are commonly used, belonging to 102 families and 102 genera. There are 195 species of arbor, belonging to 54 families and 122 genera; 108 species of shrubs, belonging to 43 families and 78 genera; 22 species of vines, belonging to 11 families and 21 genera; 11 species of bamboo, belonging to 1 family and 9 genera; herbaceous plants 59 Species, belonging to 29 families and 41 genera. The ratio of evergreen to deciduous species of Joe, Irrigation and Vine is 1.76:1, and the ratio of evergreen tree species to deciduous tree species is 1.48:1. There are also obvious seasonal changes under the premise of ensuring evergreen in all seasons.

The garden plants of various park green spaces in Guilin are rich in composition, and there is no such phenomenon that the park green space is too poor. Guilin Garden Botanical Garden is a special park for local plant landscape display. The rich plant species composition is the basis of diverse landscapes. There are many ancient woods in the park, surrounded by mountains and rivers. The construction of the park is redeveloped on the basis of protecting the original vegetation. The local native trees are used as the keynote to highlight the highlights of colorful plants and rare plants.

According to the investigation, most of the trees in the park are tall native trees as the skeleton of the greenbelt plant landscape, and most of them are local native tree species. There are some introduced or domesticated species in the park, such as *Phoenix sylvestris* Roxb. and *Elaeocarpus sylvestris* (Lour.) Poir. The park focuses on the application of plant culture to create distinctive scenic spots, such as ginkgo garden,

osmanthus expo garden, cherry garden, rare botanical garden, banyan tree garden, magnolia garden, palm garden, tea garden and so on. Zizhou park is one of the most important projects in the stage of establishing ecological garden city in Guilin. The plant landscape can recreate the beauty of the ancient zizhazhou. The application of plant species attaches importance to the combination of evergreen and deciduous plants and the collocation of qiao irrigation, highlighting the seasonal changes of spring, summer, autumn and winter. All the keynote tree species in the park are native plants, with evergreen trees as the background, highlighting the highlights of bamboo plants and leaf plants. Zhou head with tall evergreen trees as the background, the formation of ecological good mixed forest. Thus, the west bank of zizhou is based on the natural community, with large vegetation group supplemented and isochromatic leaf species locally planted to build the ecological natural riverbank plant landscape dominated by evergreen trees.

4 Initiatives to build garden green spaces based on native plants

4.1 We should strengthen the strict management of seed and seedling production to effectively control the genetic composition of local plants and build the relevant production mechanism of local plants. At the same time, local plant seedlings traded on the market should be rigorously screened by professionals before they can be marketed for sale^[6].

4.2 Choose the plant type. To build a garden green space, you should choose the right type of native plant. First of all, it is necessary to select the tree species suitable for the local environment and natural conditions. Secondly, to have a higher ornamental value, it is considered to plant suitable types and quantities of native plants in the common areas of people's lives, and to select the native plants.

4.3 The use of scientific native plant breeding and cultivation methods. According to the different population protection issues in different regions, the collection of seed specimens should be carried out in the greening planning area as much as possible. All kinds of seeds should be collected and the location of the seedlings should be set within the scope of monitoring and control. Relevant technicians improve their professional level and understand the native plants. Specific problems The research on the whole plant growth and growth process was carried out in a specific analysis to accurately grasp the local plant conditions. We should take the garden construction as the purpose, to the garden tree classification, the habit, the reproduction, the cultivation management and the application and so on aspect carries on the system research.

5 Conclusion

With the invasive invasion of many alien species, in some areas, the utilization rate of native plants in

landscape construction has dropped drastically, resulting in the lack of local characteristics of landscaping in relevant areas, and the quality of greening is not as good as before, and the local ecosystem is seriously affected. damage. Therefore, in the construction of gardens, it is necessary to strengthen the cultivation and promotion of native plants in order to effectively construct a landscaping system that highlights ecological civilization. In the planning and design of gardens, we should strengthen the understanding of the protection and continuation of native plants, follow the principle of adapting to local conditions, rationally plan the garden design, and promote the improvement of the local humanities charm. The historical development of Guilin native plants itself is inseparable from the urban history and culture.

References

1. W.R.Liu. Discussion on the Correlation between Landscape Ecology and Urban Landscaping [J]. Southern Agricultural Machinery, 2019, 50 (05): 247.
2. S.Li. Application of native plants in landscaping [J]. New Agriculture, 2018 (13): 27-28.
3. Q.L.Yuan. Research on Evaluation of Guilin Ecotourism Resources Based on AHP[J].Journal of Chongqing Technology and Business University(Social Science Edition),2009,26(06):83-88.
4. B.Yang, W.Y.Li, Y.H.Zhang. Research on Urban Transportation Planning of Guilin City Based on Green Transportation Concept[J]. Highway and Motor Transport, 2008(05): 35-38.
5. Y.Z.Zhu. The Formation of Chinese Garden Plant Landscape Style[J]. Chinese Garden, 2003(09): 37-41+36.
6. G.B.Li, X.J.Huang. Construction and prospect of guilin eco-city [J]. China environmental management,2003(04):50-51.