

Analysis of Measures for Integrating Ecological Concepts into Landscape Design and Construction

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Abstract: In the context of globalization, ecological and environmental protection has received significant attention from countries worldwide, making the integration of ecological concepts into landscape design and construction a hot topic. In this paper, in view of adding the ecological concept with suggestion as to landscape design and construction to further promote the harmonious development between human activities and nature, how can we introduced ecological concepts into front-end advising works in landscape design and construction as well as back-end green development measures that lead to building a harmonic balance could by presented.

1. Introduction

Landscape, as one of the most important composition elements of urban ecosystem, has been changing a lot on its design and construction concepts thanks to the quick overview of rapid urbanization. In the past, the traditional landscape construction was through excessive pursuit of ornamental value ignoring ecological balance and going counter to sustainable development requirements. Incorporation of ecological elements yes, but it is not just another technical layer — the way back to design source Re-constructs discussion between humans and nature. Reasonable design of circulating water features, the combination of plant elements that play ecological effects on the site under the premise of respecting the original ecological foundation of the site can meet urban residents' living need while improving urban microclimate and regulating urban ecologic chain effectively. Today, one of the hottest topics in the transformation of the landscape industry is how to incorporate ecological concepts into design and construction for specific landscapes.

2. Principles to Be Followed When Integrating Ecological Concepts into Landscape Design and Construction

2.1 Principle of Adaptation to Local Conditions

The principle of slow adaptation to local conditions is the core element when ecological concepts are integrated into landscape design and construction. It mainly emphasizes the deep integration of landscape construction, site natural conditions and regional characteristics, so as to avoid the designs and constructions disconnected from reality. This principle requires the retention and utilization of original ecological elements in construction sites during landscape design phase. A case, to solve the topographic water collecting in landscape design work of north China dry place will be applied and seashore buckthorn plants which can resist cold should be better. Natural slope can be used to build rainwater drainage system, calamus is prefer for southern China landscape design. This principle demands an efficient handling of site resources during the landscape construction phase. Waste stone materials on the construction site, for instance, can be turned into landscape ornaments to minimize external purchase of materials and reduce carbon emissions. The construction schedule must also be aligned with regional climate rhythms, such as when to perform underground pipeline construction (typically during plum rain season in southern China but not during a time of surface soil erosion due to rainwater). Simply put, the idea of adaptation to local conditions makes landscape an essential support and extension of the natural ecosystem of a site — the physical crystallization of ecology.

2.2 Principle of Aesthetic and Practical Integration

In the landscape design and construction process, adhering to the principle of "aesthetic-practical integration" requires that while revealing the ecological value of the landscape, visual beauty should also be improved to prevent visual phenomenon from falling into a narrow concept of "ecology for ecology's sake." At the design level, this principle requires the balance and unity of ecological factors and humanistic needs. For example, when native plants are used to construct landscapes, the appropriate design of seasonal changes and scientific color combinations can create good visual effect. When it comes to deployment on public space, autumnal loners such as golden torch trees and ginkgo trees can be paired up to generate an atmosphere, thus fulfilling the demand of citizens in terms of their aesthetic expectations towards landscapes by tapping into the ecological potential native plants offer. There are specific scenarios in which functions are used that you have to be aware of when designing them. As community landscape examples, the ecological lawn and rest platform can be effectively integrated, with bamboo and wood materials serving as platforms and zoysia grass acting as lawns, offering residents high-quality activities while attaining a vi However / implement the dual spatial mission of being visitable and appreciable through natural space separation. At the construction level, this principle implies that craft details are in conjunction with ecological goals. For instance, he said in the construction of ecological embankments, ornamental value and stability should be considered together. Do not stick to stack blocks, keeping a gap to form conditions conducive for rooting aquatic plants and using the various textures of stones and plants mixing well together creating natural-style spaces; Permeable bricks can be laid according to the natural terrain, which improves water permeability and reduces the rigidity brought by hard paving; functional facilities occupy an essential position in urban landscapes. The foundation of the principle of aesthetic and practical integration just aims to help the public feel ecological concepts through landscape forms so that landscape beauty is pleasant senses of general publics (i.e. the social value of landscape) achieving ecological values (i.e. promoting a sustainable development approach).

2.3 Principle of Rational Combination

Rational combination means that all the elements must form a functioning ecological system through scientific composition, and the interconnection of various elements of landscape design and construction. Interplanting – When plants are mixed, symbiotic communities should be constructed in a semi-logical way by considering the ecological niches to which each plant is well adapted For instance, deep-rooted trees and shallow-rooted shrubs could be combined: deep-rooted trees take nutrients from the very deep soil layers by accessing water at depth ready for drought times so they do not compete with surface obtaining species like the shallow rooted shrub. In addition, attention should be paid to the relationship of mutual promotion and restraint among plants in plant combinations. For biological component combination, the balance of producers, consumers and decomposers should be taken into account ^[1]. Proposal of aquaculture elements: When designing water-scapes, suitable combinations of aquatic plants can be incorporated to act as producers supplying oxygen to the water body and fish together with consumers can be dispersal organisms to sustain erratic algal bloom. And also, the decomposer earthworms could be used for ecological circle. Essentially the law of rational mixture makes every element present in the layout a key factor of the complete system. In addition to strengthening the ecological functions of each individual element, it integrates these elements effectively and better maintains the ecological stability of the landscape.

3. Measures for Integrating Ecological Concepts into Landscape Design

3.1 Respect the Original Ecology of the Site and Implement Scientific Planning

The first step to infuse ecological ideas into landscape design is to respect the original ecology of site and implement scientific planning. The essence of this step lies in a complete fusion between artificial interventions and the ecology of nature, on the basis of the natural foundation behind it. In

the front-end design phase, staff should carry out systematic surveys such as drone aerial photography and biodiversity surveys to obtain information on actual hydrological directions, original vegetation distribution and terrain slopes. For instance, a protection range can be set to ancient trees outside the construction site. For seasonal streams, notes should be taken on their changes in water level, periods of high-water and low-water; these are required to reference for landscape design thereafter. In the specific planning, staff should abide by the "minimum intervention" principle, and restore the construction site as much as possible to retain the original ecological properties of its physical nature. In the case of naturally formed slopes, terraced flower beds are designed according to the form of the existing slope, and less earthwork is used while reasonably utilizing terrain to collect rainwater. The design of construction site should not completely clearance wild herbaceous plants, but scientific combing the best community form retention based on local research data; At this time, combined with native shrub scientific compilation merge to create high quality natural vegetated landscape.

3.2 Rationally Combine Plants and Construct Stable Plant Communities

Due to the significant uncertainty of plant communities and the lack of self-maintenance in traditional greening design, solid ecological concepts should be integrated into landscape design. Design should be based on native plants, choosing the original species adapted to local climate conditions and soil. For instance, trees such as *koelreuteria paniculata* could be chosen for the tree layer, and shrubs such as *lonicera maackii* for the shrub layer, while groundcovers should focus on *potentilla chinensis*. These plants will also grow strong resistance to stress after a period of growth, thus reducing artificial maintenance costs ^[2]. At the same time, the ratio of alien species should be controlled in a reasonable range, and the safety assessment and evaluation of ecologically relevant foreign ornamental species shall be carried out to avoid biological invasion. These principles tell you to create multi-layered solids or cubes of mixed species, creating communities in three dimensions consisting of trees, shrubs, herbs and vines. You can choose tall trees with shading function for the upper layer, semi shade tolerant shrubs with rich community layers for the intermediate layer, and ground cover plants covering surface for lower layer. Such a structural design can enhance the quality and/or occupancy (both in space and time) of high-energy light utilization. Plant combination design should account for the ecological relationship among plants to prevent competition between species. Rosemary and mint, for instance, are double planted around plants of the Rosaceae family in order to keep aphid reproduction and other pests at bay. On the one hand, differences in plant physiological periods need to be taken into account to increase continuity within so-called "four-season" landscapes.

3.3 Design Ecological Water Features and Achieve Water Resource Circulation and Utilization

It is a practical way of landscape design integrating ecological concept, that is to design ecological water features and realize the circulation and utilization of water resources. The core is to build a whole system and good synergy between natural purification, circulation and utilization, ecological symbiosis. For example, for ecological water features, the hardened mode will need to be modified, thus a near-natural layout strategy should be implemented ^[3]. Ecological embankments have been made with the help of pebbles and logs for breeding sites for organisms in water, such as dragonflies use, plant roots are engaged to prevent soil erosion. In the water features of a residential area, for example, the embankment can be designed as a gentle slope of 1:3 and will grow a lot of emergent plant such as *typha* along the shore, while submerged plants represented by *hydrilla verticillata* are arranged underwater. To construct a three-dimensional ecological belt to enhance the purification capacity of water body fundamentally. For a good water quality control, benthic organisms such as mussels can be artificially resettled and about 13 centimeters thick volcanic rock layers can be laid on the bottom of water body to provide carriers for microorganism attachment. On the other hand, plants such as *cyperus alternifolius* can be planted to use their root systems to absorb nutrients like nitrogen and phosphorus that would maintain a blue-green algae outbreak ^[4]. Also, in the design of water circulation systems collection, purification and reuse chains should be mutually connected. Rainwater garden and some other sponge facilities could be installed

surrounding the water features to collect road surface rainwater and roof rainwater along with filtering it using plants, soil and microorganisms in order to use those collected rain water as a supplementary source for replenishing the water features.

4. Measures for Integrating Ecological Concepts into Landscape Construction

4.1 Use Environmentally Friendly Materials and Reduce Construction Pollution

In landscape construction, ecological practice is a kind of ecological concept implementation, one basic aspect of which is to cut down the pollution caused in the process of construction and which makes it necessary to use environmentally friendly materials. We all have to comply follow the principles of low consumption, recyclability and non-toxic material selection. Choose building materials created from local resources, as they have a reduced carbon footprint and overall emissions from transportation. The implementation of circular economy strategies should involve the active use of recyclables, for instance using construction materials broken into recycled aggregates to cast landscape ornaments in order to reduce the need for landfilling waste and natural sand and gravel mining. Mandatory ban on toxic substances and bamboo fiber boards as alternatives instead of plywood (traditional) to make export goods at factories. And for other construction links, we should use the green material instead. Choose with high porosity permeable materials, such as grass-planting bricks for Floor covering Ground simultaneously should leak rainwater rapidly seep into the soil to promote groundwater replenishment. Measures to control pollution from use of materials must also be supported. Establish a material entry inspection mechanism and test indicators (such as harmful substance content of recycled materials). Clean operation method should be used in special construction, such as wetly cut stone to reduce dust ^[5]. The resource consumption should be limit, by reusing the whole of construction by-products such as crushing wood by-products into plant mulch to reach ecological control on the entire material life cycle.

4.2 Apply Ecological Technologies and Reduce Ecological Impacts

Landscape construction is a technical method of operation which, if adopted correctly and within ecological concepts, should allow for the reduction of impacts in the natural ecosystem. In terms of soil protection, layer stripping and returning the original soil layer are the technologies that should be adopted. Topsoil and 20 cm of heart soil (about) Shovel the ground into layers separately, separate them to pile them up, cover them with non-woven fabrics for moisture and fertility preservation. Avoiding damage to the soil structure Before construction Soil layers were placed back down in their natural order and an appropriate quantity of biological amendments was spread, which could help to facilitate the recovery of organic matter content in soil during return. Aeration technology can be built by mechanical perforate to compacted soil, and activity of soil microorganisms is improved ^[6]. The principle of minimum intervention is to be complied with in plant protection technologies. When the tree is going to be kept, it must be tightly supported, using non-woven fabrics that allow air to enter with respect to its place and protective circles around the tree roots. Do not stack materials or constrained mechanical rolling in the circles. In water source protection, we should adopt source irrigation + circulation and utilization technology; Temporary rainwater collection ditches can be established on the construction site, and the treated rainwater can be used to irrigate seedling trees to reduce municipal water requirements. These ecological technologies can reduce the interference of construction on the site's ecosystem, and promote ecological protection and landscape construction simultaneously.

4.3 Strengthen Construction Ecological Management and Improve Resource Utilization Efficiency

And strengthen the ecological management in construction facilitate such activities as Recycling Utilization of Resources and thereby ensure the quality of their performance for landscape construction ensures that ecology concept is not only in theory but also needs an overall controls over resource consumption processes as well as their respective eco-positive impacts based on

thorough management structures. With our construction in the initial phase, employees have experience designing a efficient ecological management plan based on scientific definition of ecologically sensitive regions ^[7]. Establish clear resource consumption quota standards, such as calculating quantitative indicators of irrigation water according to the seedling planting area, and stone loss rate calculated according to the paving area. Specialized ecological inspection stations should be established at intervals to check back on the surface of vegetation protection round, and whether the temporary drainage system can drain smoothly. If any problems are found, they need to be fixed in a specific time. Also, old resources recycling system should be built. Construction waste needs to be crush and screened, coarse aggregate used for roadbed backfilling, organic fertilizers + sawdust mixed to nutrient soil ^[8]. To minimize the chance of weed growth, crushed downed branches can be used as mulch. At the same time, mechanical scheduling plans will be optimized and improved, new energy engineering equipment extinguishing fuel-powered gear for their replacement, construction operation occasions are centrally organized to lessen invalid power consumption and improve resource utilization quality.

5. Conclusion

Integration of ecology into landscape design and construction is an inevitable trend of the times, which is also in line with the development direction of modern urban. So, in practice, designers and constructors should pay close attention to the specifics of ecological concepts implementation, refine construction plans according to the unique climatic features along with cultural conditions and take responsible planning to level up urban ecosystems construction efforts.

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