Design Strategy of Landscape Architecture Based On Coupling Method

CHENG YUNING, YUAN YANGYANG, CHENG SHI
Department of Landscape Architecture, School of Architecture
Southeast University
Sipailou 2#, Nanjing
China
cyn999@126.com
http://arch.seu.edu.cn

Abstract: Advocating “minimization” in landscape design is not to encourage to design simply and is not to emphasize the reduction of human intervention. Conversely, “minimization” recommends the intensive discipline of planning and design based on the coupling principle in an attempt to achieve the objectives of landscape resource optimization configuration through reasonable human intervention. Such practice is an effective approach to achieve scientification and minimization in contemporary landscape design. As a full-scale landscape design method, the coupling method not only involves methodology but also has a corresponding operability. The design strategy based on the coupling method takes mutual adaptability as its core and is involved in the whole process of landscape design, from project planning and design to construction.

Keywords: coupling method, full-scale, minimization, mutual adaptability, optimization, place, design strategy

1 Introduction
People typically use “local conditions” to describe the wisdom of perceptions and use of the environment. Different scientific concepts have different presentations. The corresponding design methods and strategies have their own characteristics. In terms of landscape architecture, the so-called “design” refers to the maximization of resource integration. With minimal human intervention to achieve the desired goal, the emphasis is on the design to maximize the use of environmental resources and “elements.” Correspondingly, advocating “minimization” in landscape design is not to encourage to design simply and is not to emphasize the reduction of human intervention. Instead, “minimization” lies in the intensive planning and design of system architecture based on reasonable human intervention on the landscape environment to achieve optimal resource allocation, which is at the core of the design to achieve minimization.

Landscape architecture involves arts, science, and technology. Therefore, landscape architecture has dual intertwined emotional and rational attributes. The “coupling method” is of important practical significance in contemporary landscape architecture design. Minimization can be achieved not only through design, but also through design concepts, methods, and construction. Through the effective control of all aspects that can be designed to achieve minimization, effects of “deflecting the question subtly” are apparent.

2 Coupling method and minimization design principles
The coupling method, as a full-scale planning and design method, has both theoretical significance and easy operability. The design strategy based on the coupling method takes mutual adaptability as its core and is involved in the whole process of landscape design, from project planning and design to construction. The coupling method emphasizes the reduction of human intervention while maximizing the use of landscape resources to achieve optimal visual effects. This method is also an effective approach to achieve scientification and minimization in contemporary landscape architecture.

2.1 Coupling Method
“Coupling” is a basic concept in physics that refers to the phenomenon whereby two or more systems or movement patterns influence one another and even unite through a variety of interactions. Coupling refers to the dynamic relationship built by the interdependence, coordination, and mutual promotion in the benign interaction of subsystems [1]. Thus, the concept “coupling” incorporates three
aspects: system, relationship, and dynamics. Modern landscape architecture goes beyond the planning and landscaping concept of “build.” Rather, based on the ontological features of the discipline, modern landscape architecture has embarked on a goal toward systematic planning and design. Various environmental elements are organized through an integrated and coordinated scientific method, with dynamic, diverse, and integrated effects. Modern landscape design is also characterized as multi-objective. Four fundamentals, namely, ecology, space, culture, and function, must be planned as a whole. These fundamentals are free from one other but highly polymerized, separate but interdependent, thus embodying a symbiotic relationship without affecting the existence of the respective original but exerting a joint influence on the landscape. Therefore, landscape design is not simply sum of the aforementioned fundamentals, but is rather an organic unity of the whole, with composite characteristics. Balancing and adjusting the four fundamentals to be symbiotic in the environment is a condition of excellent landscape design. Extending the basic idea of “coupling” to landscape design emphasizes the respect for and use of natural forces and integrating multiple design objectives with the inherent order of elements in space. The purpose of such an association is to use environmental resources to improve the overall quality of the environment. “Coupling,” as a basic strategy, is also a method of maximizing common characteristics in the design strategy. The basic principle lies in the restructuring and secondary processing of the original composition of elements in space to form a new order to meet multiple design objectives. The term “coupled” does not refer to a change in location attribute, but rather refers to bridging of the “heterologous” element and the “origin,” which is a process of generating a harmonious whole, which is the core of the coupling method. The coupling method covers from the body to form, function to technology, and design to construction. The mechanism covers the disciplines of the living environment, including landscape, planning, and architecture.

Coupling emphasizes the departure from a place that corresponds to another place. Different environments, different levels, and different scales can be used to realize “coupling,” such that the corresponding technologies also differ. Coupling is designed to reflect a full-scale method. In medium and large-scale environments, the coupling method is characterized by “regionalism” compared with the more operational and systematic methods. In small-scale environments, the coupling method advocates the use of a dialogue with the environment. This method has similarities to “organic architecture,” which is aimed at identifying the elements of the overall harmony of a building as well as those between a building and the environment. However, “organic architecture” is unidirectional, whereas the coupling method reflects the dynamics of adaptive interaction and emphasizes ecology, spatial, functional, cultural, engineering, equipment, and other aspects of the system. A beautiful landscape is an outward manifestation of the environment, with inner harmony being the essential reason. Coupling is not only limited to formal harmony, but also to new elements that make the environment truly “seamless.”

“Coupling” is a dynamic process in which the design objective and place interact, ultimately leading to the design goal of harmonious coexistence. Thus, the compatibility between the design objective and place is the principle behind coupling. Despite the existence of diverse nature, different scales, and varying contents in terms of landscape design objects, the basic theory and principles remain the same, that is, compatibility, which runs through the design process of modern landscape.

Coupling is the fundamental law, whereas the pursuit of “mutual adaptation” is the specific operation instrument and process. “Mutual adaptation” can be understood as the adaptation and suitability between elements. In this work, “suitability” is considered a two-way street, considering that the design objective adjusts to the place actively, which indicates that the appropriate design project and technique should be selected based on circumstance. Another level is the appropriate transformation of the environment. Similar to the attitude toward architectural heritage, this concept does not refer to blind protection, but rather, the combination of protection and utilization based on a full assessment. Coupling, as a two-way process, focuses on appropriate human intervention based on the full utilization of resources and forces of nature in the place of interest.

2.2 Coupling and Decrement
“Adaptation to local conditions” is a common concept in both Chinese and foreign landscape design. This concept includes two fundamental levels: one refers to the maximization of the use of place, which indicates the use of existing resources as much as possible to achieve the maximum benefit to the place, and the other aspect is to minimize disturbance. During the process of landscape
construction, the designer should complete design goals with minimal disturbance to the place. Excessive design and construction must be avoided. Therefore, a design that “adapts to local conditions” can realize the intensive use of the place, while reflecting the sustainable design philosophy of landscape conservation. The so-called “decrement” refers to a design result that relies on the environment, including objective existence and variation trends, to minimize disturbance to the ecosystems of the existing area while utilizing the forces of nature. The literal meaning of “minimization design” is the opposite of “over design.” The latter generally exists in modern landscape design. The “bringing principle” breaks away from the original condition, whereas “formalism” and “massive construction” directly results in a waste of resources and the loss of place features and humanization. Another important aspect included in the maximization of the use of the place from the reduction design concept emphasizes a grasp of the regular pattern of the place, such as the utilization of natural forces and succession rules. Techniques must be used flexibly based on a series of analyses, including vertical issues of topography, landscape, slope, slope-exposure, and water environment issues such as catchment area, water-collecting amount, and water quality.

Most traditional designs emphasize the exertion of subjective initiative. Traditional design excessively relies on the designers’ sense, making the results inaccurate. Modern landscape design approves of artistry but is richer in rational spirit. The objectively existent place features will never be changed by differences in designer cognition. Thus, the evaluation result based on an objective place exhibits a tendency toward singleness. Based on their own judgment and design trends, different designers can select diverse features to strengthen, thus leading to a variety of results. Meanwhile, the same evaluation may lead to different design plans. The basis of relatively uniform evaluation not only enhances the scienticity of the design, but also strengthens the comparability among different schemes. The active interaction between landscape design goals and different place features gives rise to the design purpose of minimizing disturbance to the environment and change in resources, which is the significance of the promotion of coupling. Coupling mainly includes three aspects. First, the expression of place features is maximized, such that the elements of the place can be demonstrated in the project. This practice benefits the heritage of place features, including spatial and cultural characteristics. Accordingly, the basic avenues and strategies to realize personalization and specialization in design can be determined. Second, a reduction of design can be achieved by coupling. The minimization of disturbance will actualize demand for recombination, thus leading to real reduction design. Third, place cognition is more objective and accurate with the aid of scientific and technological means, which will guide the design from sensation to perception. Thus, coupling is an effective strategy for reduction design.

3 Strategies of Planning and Design Based on the Coupling Method

The core issue of coupling is the mutual adaptability between the design elements and the original environment. To achieve the optimization of places through human intervention in the design process, the design goal should be an organic whole that considers the environment. The coupling method creates a system that can improve itself and has a structure of self-discipline.

The design of landscape architecture is divided into three basic aspects: project planning; generation of the master plan; and location of the landscape nodes, monomer design, and so on. Different design scales contain different links. Coupling selects the appropriate project based on different environmental conditions and then introduces this project to the place. The second aspect corresponds to overall planning, which involves the generation of the master plan and the selection of an appropriate project based on different environmental conditions and then introduces this project to the place. The second aspect corresponds to overall planning, which involves the generation of the master plan and the selection of an appropriate environment based on different projects. The third aspect is to control a single project, including the size of the building, coverage, body mass, height, build strength, and other elements of control, in adherence to detailed regulations on the control of planning and design. Thus, the coupling method corresponds to three stages: “Planning — General Rules — Detailed Planning” in landscape planning and design, and it covers the entire landscape planning and design process progressively.

3.1 Project Coupled With Places

The establishment of a landscape project is a planning process, which is not exactly the same as the travel planning. This process requires a combination of the basic concept of landscape design that considers the market, and it needs to establish the content and position of the landscape projects based on field research. Planning requires a prospective. In the design of landscape projects, we
should start from the place and prejudge the reconstruction that may occur. In other words, planners need to find a causal link among things, thus providing support and basis for decision making. Correspondingly, landscape project planning does not require a simple or airborne concept. Rather, the basis for the project is sought from places, that is, based on the relevance of the coupling relationship between the research project and the environment. “Project Coupled with Places” refers to an appropriate project area located at the appropriate places. The establishment of a landscape environment projects has to consider host planning, government policy, and other related requirements while fully considering the factors of tourism, including tourism market demand, visitors, and target population. Moreover, the culture inherent in places is an important basis for the establishment of project content. A landscape project does not like “a tree without a root”, and also does not like “water without a source”. Projects based on places are more reasonable and sustainable. A project selected by the coupling method is classified based on function and location. Thereafter, combined with qualitative and quantitative analyses of traffic, natural resources, and other related aspects, we can determine the design partition. This process denotes the coupling between the project and a specific area. A project that is unrelated to a specific area is meaningless. Otherwise, we require the large-scale transformation of the environment project to adapt to the requirements of the environment and of the project.

Fig. 1 Framework of “Project Coupled With Places”

3.2 Design Elements Coupled With Places
The second procedure of the coupling method is the process of coupling design elements with places based on the research and analysis of the existing elements in the places. This process further deepens the design work after the establishment of the zoning and is the initial formation process of the master plan. The coupling between elements and places refers to the establishment of the corresponding relationship between specific projects and specific places, that is, the establishment of the specific position of projects. In the design, we need to sort out the coupling relationship between such elements as road line selection, building site, water environment creation, greening, and other major target elements and places. All these elements are associated with slope, aspect, and watershed conditions. Thus, place cognition is the first step in exploring the coupling relationship between design elements and places. Research on places should start from space, ecology, culture, and other levels, down to the most basic level of place factors, such as elevation, slope, and vegetation type. Through some methods such as geographic information system (GIS) analysis, we can achieve full field cognition and complete place evaluation, including such aspects as construction suitability and ecological sensitivity. Thus, according to the factors with specific requirements of siting different elements and factors, we can select the appropriate place factors. Finally, we can establish the counterpoint relations between places and projects based on local conditions.

Fig. 2 Framework of “Design Elements Coupled With Places”

3.3 Regulation on design phase
As a full-scale landscape design method, the coupling method involves the initiation, selection, and relationship between projects and places in large-scale projects as well as specific problems on architecture and landscape in small-scale projects. Controlling the landscape environment as well as the scale and dimension of structures has always been a difficulty in the planning. The design vision focuses on a smaller scale after site selection based
on elements, which is necessary to control single buildings, building groups, and landscapes in such aspects as color, style, height of the buildings, intensity of construction, combination of building groups, building boundary, landscape view, greening rate, forest edge line, ratio of arboreal and shrub, and tree species planning. The term “seamless” denotes a harmonious inner relationship between landscape elements and the environment. Regulations based on the environment are able to correlate architecture and artificial landscape to the natural environment. Furthermore, the controlling coupling method, based on the analysis and evaluation of a place, can comprehensively analyze environment capacity. A design considering artificial reforming activities based on space capacity and ecological capacity without going beyond the environment capacity can maximize benefits.

4 Design optimization and comparison based on the coupling method

Similar to the modern architecture theory that divides design philosophy into Cartesian philosophy, which is inductive and rigorous, and Goethe’s philosophy, which is romantic and divergent, the design perspective of landscape architecture is a coexisting system of reason and perception, which can be likened to a large tree. Rational thinking is the trunk, whereas perceptual thinking is the branches and leaves. Without the support of reason, the design perspective will be chaotic. By contrast, without rich perception, design perspective will be rigid and dogmatic. Emphasis on reason or perception is not conducive to the healthy development of landscape architecture design. The dual attributes of modern the landscape architecture method requires a combination of reason and perception [2]. A variety of currently prevailing ideas and concepts emphasize design based on cognition of the environment. The significance of emphasizing the coupling method is the affirmation of the premise of scientific design, which shows the feature of reason. Landscape architecture design has always been the result of reason and perception, and emphasizing the process of reason does not exclude the meaning of perception. From a design perspective, the subjective initiative of the designer is very important. However, the existence of subjective initiative has its basis and condition, which, unlike painting and calligraphy, can be separated from the restrictions of the environment.

Thus, landscape architecture is unlike most other art forms. Landscape architecture fully utilizes the cognitions of the same place by different designers under a rational architecture and place value, which is in accordance with the basic features of landscape architecture art and techniques as well as with the rules of landscape architecture.

Almost all designs do not have only one solution. The cognition of place, different subjective goals, and design capability differences of designers will affect the design process and the generation of design and development. Different design plans have always been compared to determine the most appropriate design that can better fit the features of the place. However, project bidding cannot always escape the fate of draft and beauty contests because of the lack of place cognition. The so-called best projects are mostly determined by the person in charge, which makes project bidding meaningless. First, the objective condition of the place, which is independent of human will, should be recognized. The objective condition only provides the design fundamentals, but not all parts of the design because different plans have different perceptions of place. Selecting a plan based on the coupling method is a good approach to determine the one that is the most suitable for the place. The premise of plan evaluation is to emphasize the basic coupling level of the design. The coupling level is the correlation between the design plan and place, which can also be expressed as a numerical range to describe the degree of adaptation between design and place. Ontology is the source of everything. Ecology, space, culture, and function are four fundamentals that indicate multi-objective landscape architecture. Through careful analysis, quantitative technologies such as GIS and digital fold figure can be used to analyze data on a place to evaluate aims related to ecology, space, culture, and function quantitatively as well as to evaluate the coupling level between landscape architecture design and place. Comparisons of landscape architecture designs based on multiple aims and optimization methods are an effective approach for scientific selection.

Fig. 3 Landscape architecture design method based on place suitability [3]

5 Conclusion
In biological terms, protogenetic and exotic are two genes that can produce a kind of brand-new life, which is similar to the process of hybridization rather than simple grafting. The coupling method emphasizes that landscape architecture design must merge design goals into the original resources of a place. This method can also be interpreted as genetic recombination and stitching. The coupling method is an adaptive process of the design elements and place. The core and the precondition of the realization of coupling is the cognition of a place. Cognitive continues keeping evolving, from the traditional fold figure method to the current use of GIS and CAD platforms and the secondary development of software and remote sensing technology. These methods can realize a more comprehensive scientific evaluation of landscape environments. The coupling method must be based on the scientific cognition of a place, which is also the basic premise of realizing minimization design.

References: