

设计生态的不同视角

PERSPECTIVES OF
DESIGNED ECOLOGIES

1 引言

近年来，随着中国整体城镇化率开始超过50%且国家层面开始大力推广生态文明战略，中国城市建设工作的重点以及设计在其中所发挥的作用都在发生着重大变化^[1]。“生态”（ecology）一词越来越多地出现在城市规划以及景观设计领域，成为实践的目标以及理论依据。从19世纪作为生物学的一个分支诞生，到20世纪成为一门体系完善的自然科学，生态学发展到今日已经具有以多学科为背景的认知框架，“生态”的外延也因此得以大大扩展，被应用到众多领域中，其相关

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摘要

设计生态是指在人居环境中，特别是生态破坏较严重的地方，设计积极主动介入生态系统功能优化、修复或重建的过程。与生态设计不同，设计生态是对复杂人居环境的创造性介入和改造。本文从相关概念的对比出发，将设计生态归纳为4个视角：再造自然风景、再造本土生境、加速自然修复，以及优化自然系统。以此为基础，本文尝试提出设计生态的三大内涵：1）生态的功能性，即设计需要创造一个可以自我维护的生态系统；2）过程的功效性，即需要使设计结果优于自然做功，甚至可以促进生态演进；3）结果的体验性，即设计需要叠加美学体验以使生态系统更符合人类社会的需求。作者指出，设计生态的有效推进有赖于设计实践与生态研究双方面的努力，包括对于地方生态系统、生态系统自我演替过程及生态系统承载力的研究，以及设计实践对于改善人居体验的探索。

关键词

设计生态；生态设计；生态系统；维度；景观服务；人居环境

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ABSTRACT

Designed ecology refers to a process of active and purposive design interventions that help enhance functional improvement, restoration, or reshaping of ecosystem in human settlements, especially in the areas suffering from severe ecological degradation. Different from ecological design, designed ecology is to creatively intervene and improve human beings’ complicated living environment. Starting from an examination of related concepts, this paper reviews designed ecology from four perspectives: creating natural environment; reintroducing native habitat; enhancing natural regeneration; and tending natural ecosystem. It further defines designed ecology at three levels: 1) ecological functionality, i.e. the design creates a self-maintaining ecosystem; 2) succession efficiency, i.e. the effect of the designed succession surpasses the results of natural regeneration or the design helps promote natural regeneration; and 3) landscape experience, i.e. the design offers aesthetic services to better respond to the needs of human society. The authors argue that an effective promotion of designed ecology relies on both the efforts of design practice and ecological study, including research on regional / local ecosystem, self-succession of ecosystem, and ecosystem capacity, as well as exploration of improving human living experience through design practice.

KEY WORDS

Designed Ecology; Ecological Design; Ecosystem; Dimension; Landscape Service; Human Living Environment

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概念也日益丰富^[2]。然而，在国内外的城乡规划与景观设计实践中，无论是在理论还是方法过程上，设计与生态之间的关系都尚未得到系统梳理。设计实践以及生态研究之间一直存在着巨大的鸿沟，二者的衔接亟待加强^{[3]-[5]}。本文藉由相关概念的对比，对其关系进行了梳理，进而界定了设计生态（designed ecology）的内涵与评价标准。

2 相关概念对比

与“设计生态”比较相近的几个概念包括“生态设计”（ecological design）、“生态修复”（ecological restoration）、“人工生态”（constructed ecology）等。这几个概念有相似之处，但又存在本质的不同（表1）。

“生态设计”是最早被提出，也最广为人知的概念，它是指任何与生态过程相协调，尽量使其对环境的影响达到最小的设计形式^[6]。生

1 Introduction

Over the past few years, under the background that China has been characterized with a high urbanization ratio over 50% and a top-down promotion of the Ecological Civilization, the focus of urban construction and the role of designers have seen a huge change^[1]. The term “ecology” (or “ecological”) has been increasingly mentioned in urban planning and landscape design as goals or theoretical standpoints of practice. Born as a branch of Biology in the 19th century and developed its independent disciplinary system over the 20th century as a nature science, Ecology now is recognized for its framework of multi-disciplinary knowledge. With a largely expanded and enriched implication, “Ecology” has emerged in various fields^[2]. However, the relationship between design and ecology has less been systematically examined in theories or methodologies of urban-rural planning and landscape design worldwide. It is undeniable that the gap between design practice and ecological research is huge, which urgently needs to be solved^{[3]-[5]}. By sorting out similar concepts, this paper considers the relationship between design practice and ecological study and then defines the essences and evaluation criteria of designed ecology.

2 Designed Ecology and Other Similar Concepts

Similar concepts to designed ecology include ecological design, ecological restoration, constructed ecology, etc.

表1：生态设计、生态修复、人工生态以及设计生态的概念对比
Table 1: Comparison of concepts of ecological design, ecological restoration, constructed ecology, and designed ecology

概念 Concept	“生态”的含义 Implication of “ecology / ecological”	目的 Goal	设计与生态系统的关系 The relationship between design and ecosystem	场地特征 Site
生态设计 Ecological design	价值取向，对设计对象或过程性质的描述 As ecological ideas that describe design objects or processes in a qualitative way	避免设计中由于缺乏对生态的考量而对环境产生负面影响 To avoid negative impacts on environment brought by the lack of ecological considerations	被动适应 Design adapts to ecosystem in a passive way	不限 No limit
生态修复 Ecological restoration	生态系统功能 As an ecosystem functionality	修复被破坏的生态功能 To restore damaged ecological functionalities	被动修复 Design restores ecosystem as a passive remediation	生态退化的地方 Places that suffer from ecological degradation
人工生态 Constructed ecology	生态系统功能 As an ecosystem functionality	人为改变生态系统 To alter ecosystem through mankind interventions	无意识或是有意识的人工生态重构 Design reshapes ecosystem, intentionally or unintentionally	人工干预的环境 Constructed environment
设计生态 Designed ecology	生态系统功能 As an ecosystem functionality	积极创造条件并主动干预生态系统优化过程 To improve ecosystems through active and intentional interventions	积极修复和优化 Design restores and improves ecosystem in an active way	有必要设计介入的人居环境 Human settlements that require design interventions to improve living experience

态设计是对自然生态环境的被动适应，同时“尽量减少其对环境的破坏”也是一个模糊的概念，减少的对象及程度可能受主观决策影响较大。

随着城市化进程对生态的破坏不断加剧，“生态修复”的概念日益受到重视，相关研究至今已有近100年的历史。20世纪30年代，奥尔多·利奥波德试图通过设计手段恢复威斯康星大学植物园的牧场，并发现了火对于生态系统的关键意义，这是对生态修复的早期尝试^[7]。后来随着环境运动的兴起，在欧洲、北美等地区，人们开始有意识地将生态措施融入矿坑修复、水土保持和污水净化等环境治理过程中^[7]。20世纪70年代后，关于栖息地重建的实践在发达国家不断涌现。相对而言，中国的生态修复实践起步较晚，早期的出发点是提高林业生产的经济效益和森林覆盖率^[8]。直到20世纪80年代，随着生态恶化、环境污染问题的加剧，大量针对森林、草原、岛屿、废弃耕地等退化生态系统的恢复工程大量开展，生态修复理论也开始逐渐发展和丰富^[7]。生态修复的核心是对生态破坏地区的修复，国际生态修复协会对其的定义是“帮助退化、受损，以及遭受破坏的生态系统进行恢复的过程”^[9]，其更关注自然生态系统的功能重塑。

最近几年，越来越多的人认识到人类世生态系统与自然生态系统的差异^[10]，也意识到人类活动及工程建设对自然生态系统的影响。“人工生态”泛指借由人类工程建设进行的生态重构，其包含两个层面：一是有意识的生态重构（例如，湿地公园建设将直接为动植物创建自然栖息环境）；二是无意识的生态建构（例如，水利工程大坝可能会对区域的生态环境造成影响）。广义上讲，人工生态涵盖各种人工生态重构途径，包括设计、工程以及维护管理等^[3]。

“设计生态”与“人工生态”有相似之处，但更多是就人工生态的第一层含义而言，即在人居环境中，设计有意识进行的生态环境改善和地方生态系统重建；设计不是被动适应生态或被动介入修复，而是要主动介入生态系统的修复与管理^[11]。相较于自然生态，设计生态具有人工的属性，可以称作人工设计的生态系统^[12]。设计生态是构建型的，“通过景观设计的手段来模仿自然特性和借用其元素重新构建人

Similarities and differences among them are concluded in Table 1.

As the most well-known concept among them all, ecological design was first proposed to describe “any form of design that minimizes environmentally destructive impacts by integrating itself with living processes”^[6]. Besides, ecological design is a passive adaptation to natural ecological environment and its objective to “minimize environmentally destructive impacts” is vague because what kind of impact or how much to minimize is often subjectively defined.

Aggravated ecological damages caused by urbanization processes have made the concept “ecological restoration” receive increasing attention, though it has been studied for nearly a century. In the 1930s, Aldo Leopold’s exploration to restore the pasture in the botanical garden of the University of Wisconsin through design methods and his discovery of the significance of fire to an ecosystem can be seen as one of the early cases of ecological restoration^[7]. Later, along with the rise of environmental movements, ecological measures integrated into environmental remediation processes, such as post-mining restoration, water and soil conservation, and waste water treatment, were recorded in Europe, North America, and other regions in the world^[7]. Practice of habitat restoration has been on the increase in developed countries since the 1970s when China’s early ecological restoration practice was started for a growth of economic benefits of forestry industry or a higher forest coverage^[8]. In the 1980s, to address serious environmental degradation and pollution problems, a large number of restoration projects were launched, targeting deteriorated forests, grasslands or islands, abandoned farmlands, and other declined or damaged ecosystems, together with a development of theoretical studies in ecological restoration^[7]. The essence of ecological restoration is to remediate ecological damages; according to the Society for Ecological Restoration, ecological restoration is “a process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed,”^[9] which focuses on re-introducing ecological functionalities back to a given natural ecosystem.

Over the past years, the difference between novel ecosystems and natural ecosystems^[10], as well as the impact of human activity and engineering construction on natural ecosystems, has been more and more recognized in this anthropogenic age. Constructed ecology refers to an ecological reconstruction with human engineering means, intentionally (for example, building a wetland park to directly provide natural habitats for animals and plants) or unintentionally (for

工化的生态新秩序，从而创造近乎自然条件及特征的人工环境”^[13]，即设计创造自然。本文将设计生态定义为“在人居环境中，特别是生态破坏较严重的地方，设计通过积极主动的介入对生态系统进行的功能优化、修复或重建过程”。

由生态设计向设计生态的转化，反映了在可持续的时代语境下，“生态”从代表一种价值取向（仅仅是对设计对象或过程的生态性质的描述）走向对生态功能的探索。设计已经逐渐成为应对环境变化的有力手段，从消极适应转变为积极创造条件，以实现更高的综合效益。

3 设计生态的不同视角

即便直到近年来才逐渐出现人工生态与设计生态的概念，人类积极介入生态系统优化、修复或重建过程的尝试从来都没有停止，且不同学科专业都有持续尝试。仅就景观专业而言，从“景观设计学”（Landscape Architecture）这个学科名称出现起，一直有不少设计作为积极介入和干预环境的过程存在，且已经在探索中形成了不同的设计思路。本文归纳出设计生态的4个不同视角：再造自然环境、再造本土生境、加速自然修复，以及优化自然系统；并在对比不同视角的基础上，探索当代设计生态应具有的核心内涵（表2）。

表2：设计生态的4种不同视角
Table 2: Four perspectives of designed ecologies

视角 Perspective	“生态”的含义 Implication of “ecology / ecological”	设计目标 Design objective	设计与自然演替的关系 The relationship between design with natural regeneration
再造自然环境 Creating natural environment	经验主义下的自然环境，内涵不明确 A natural environment that is often defined with empirical knowledge, without any explicit connotation	在人居环境中创建绿地 Creating green spaces in human settlements	不明确 Not explicit
再造本土生境 Reintroducing native habitat	本土生境 Native habitats	恢复或重新建立一个具有自我维持能力的健康生态系统 Restoring or reestablishing a self-maintaining, healthy ecosystem	不明确 Not explicit
加速自然修复 Enhancing natural regeneration	地方生境的自然演替过程 The process of natural succession of local habitats	通过积极手段实现比自然演替更高效的修复 Ensuring that the managed succession is better and faster than a natural regeneration	介入自然过程 Design intervenes natural regeneration
优化自然系统 Tending natural ecosystem	地方生境的承载力 Capacity of local habitats	通过设计创造出满足人类审美经验和文化可持续性的生态系统 Creating ecosystems to meet the needs of humans' aesthetic experience and cultural sustainability	在不超出自然承载力的基础上满足人类需求 Design integrates with human needs under a given environmental capacity

example, the construction of dams may bring an impact on regional ecosystems). Generally speaking, constructed ecology involves all kinds of man-made ecological reconstruction methods, including design, engineering, and maintenance and management approaches^[3].

Roughly, designed ecology can be seen as a sort of constructed ecology, where design is a purposive intervention to improve ecological environment and to restore local ecosystem in human settlements — in other words, design is not to adapt to or remediate ecosystems in a passive way, but to restore or manage ecosystems with proactive measures^[11]. Compared with natural ecology, designed ecology is characterized for its artificial attributes and can be considered as a human-designed ecosystem^[12]. Designed ecology is constructed through the means of landscape design to imitate natural ecosystems and to reorganize natural elements to create a new man-made ecosystem that functions like a natural one^[13] — that is, creating nature by design. This paper defines designed ecology as a process of active and purposive design interventions that help enhance functional improvement, restoration, or reshaping of ecosystem in human settlements, especially in the areas suffering from severe ecological degradation.

The transition from ecological design towards designed ecology mirrors a shift from highlighting the conceptual significance of ecology (that is often represented by qualitative descriptions of the ecological nature of design objects or processes) towards focusing on functional exploration in the era of sustainability. Design has been an efficient tool to respond to environmental changes by proactively creating ecosystems for higher overall benefits.

3 Perspectives of Designed Ecologies

Apart from the concepts of constructed ecology and designed ecology that were proposed over the recent years, human’s practice of proactively improving, restoring, or reshaping ecosystems has lasted for centuries by varied disciplines. In landscape profession, since the birth of Landscape Architecture, many design cases have been recorded as processes of active environmental interventions, where diverse design ideas and perspectives have emerged. To further deduce the essence of designed ecology in contemporary agenda, this paper examines and summarizes four perspectives of designed ecology (Table 2), including creating natural environment, reintroducing native habitat, enhancing natural regeneration, and tending natural ecosystem.

3.1 再造自然环境

再造自然环境泛指在环境受到破坏的地方，人类通过规划设计重新创造良好自然环境、将自然引入城市的过程。这里的“自然”以及“自然环境”带有很强的经验主义内涵，并非科学实证。

在现代生态学诞生（20世纪60年代）之前，这类实践的典型代表是19世纪美国现代景观设计的奠基人弗雷德里克·劳·奥姆斯特德。当时美国处于工业化后期，城市人口高度密集，城市环境恶劣，缺乏自然与休闲空间。奥姆斯特德从社会需求与缓解都市精神压力的高度认识景观和自然，提炼了英国田园景观和自然风景园“风景如画”的特征，并结合当地气候条件有意识地将自然引入城市。最为典型的实践作品是奥姆斯特德在曼哈顿核心地带设计的长3.2km、宽0.8km的纽约中央公园。设计采用自然式布置，保留了大量的原有地貌和植被。直至100多年后的今天，这里依然是供公众休闲、集会的重要开放空间。数十公顷的茂盛林木，也为城市中的各种野生动物提供了宝贵的栖息地^[14]。

可以说，再造自然环境现已成为景观设计及相关行业进行绿地和空间开发建设的最常用、最普及的目标与说辞，几乎所有在原本没有绿地的地方所进行的改造都可以称为“再造自然环境”。基于对自然环境概念以及期望的认知存在经验性、模糊性和主观性差异，我们无法将所有把原本空间变得更自然的设计都称为“再造自然环境”，在审视设计所具有的再造自然环境的绩效时也缺乏一致性的判断标准。

“再造自然环境”和前文所阐述的生态设计类似，二者都将自然视作一种概念、理念及价值观，而非功能；这就会导致如一些学者所批判的昂贵的生态设计、概念化的生态设计，以及不友好、反美学的生态设计^[15]。

3.2 再造本土生境

“生境”即由个体、种群或群落所占据的特定地点的环境条件的总和。“生境”包含对生态系统功能的考量^[16]。再造本土生境是指通过设计和修复措施重新建立一个具有自我维护能力的健康生态系统（包

3.1 Creating Natural Environment

Creating natural Environment is a process of introducing sound natural environment or natural ecosystems into urban areas suffering from ecological damages through planning or design approaches. “Nature / natural” and “natural ecosystem” here are often defined with empirical knowledge rather than scientific evidences.

In the 19th century — before the birth of modern Ecology in the 1960s — most cities of the United States had suffered from urban problems of the late industrialization, such as extremely high density of population, declined urban environment, shortage of natural and recreational space. Frederick Law Olmsted, the founder of modern landscape design of the United States, considered creating natural landscapes to meet social needs and relieve people’s mental stress by learning from the picturesque characteristics of British pastoral landscapes and natural landscape gardens and deliberately integrating nature with urban settings according to specific climate conditions. The most representative case is the Central Park in New York, where Olmsted introduced a 3.2 km long, 0.8 km wide natural oasis in central Manhattan with lots of existing landforms and plants retained. Today, the park is still a popular destination for public recreation and gatherings, where dozens of hectares of lush forests provide valuable habitats for wildlife in the city^[14].

In the fields related to landscape design, creating natural environment has been commonly regarded as a kind of planning and design objective and narrative in green space construction and spatial development. Generally, any form of practice that creates natural ecosystems of a place where there was no green space before can be seen as creating natural ecosystem. However, since the concept of natural environment, as well as the related expectations of improvement, is empirical, ambiguous, and subjective, not all designs that make places more natural are “creating natural environment.” Also, consistent evaluation criteria to examine the performance of a reshaped natural ecosystem are not in place. In both concepts of ecological design and creating natural environment, nature is discussed on an ethical level with less functional exploration. Part of such practices are criticized as expensive, conceptual, unfriendly, or anti-aesthetic ecology designs^[15].

3.2 Reintroducing Native Habitat

Here, the term “habitat” is defined as the sum of environmental conditions of a specific place that is occupied by organisms, populations, or communities. The concept reflects functional considerations of ecosystems^[16]. Reintroducing

括自然、人工及半人工生态系统），使已恢复的生态系统能够继续为人类提供生态系统服务。在理想状态下，每一个地方都存在一个最适宜的生态系统，这种生态系统是最稳定的，是能发挥最大生态功能的，同时也是最美的。但是这种方法往往需要一个漫长的过程才能达到设计的理想状态，所花费的时间成本较高。

最早倡导通过设计再造本土生境的代表性人物之一是简斯·詹森，他的诸多作品（如哥伦布公园）即专门针对芝加哥区域的本土生态系统、草原景观等，力求通过设计重塑草原生境。他还通过草原俱乐部和乡土景观之友等组织努力保护现存的野生自然遗产^[17]。在詹森看来，景观的形成过程与生命历程密不可分，在他设计的公园和花园中，人们能够亲眼见证草地向林地演替的过程，其中一些景观的变化甚至超出了他最初的设想^[18]。

时至今日，草原景观的设计思想已经在美国中部区域得到相对广泛的应用，例如通用公司总部的设计正是对草原景观的再现。在每年三月草枯叶黄之际，通过模拟自然草原火灾，场地上的野草会被人工引火烧成灰烬；这些灰烬为次年新芽的萌发提供了肥力，到新的生长季节，无需再次播种和养护，野草的新芽就会从草灰中钻出来，吸取着上一代留下来的养分茁壮成长。

以再造本土生境为基础和目标的设计已在很多生态修复的案例中得到体现。自1985年以来，国际上已有一系列针对森林、湿地、草原、海岸等不同类型生态系统修复的专著陆续出版，使相关理论得到了长足的发展^[19]。中国学者对本土生境及本土生态系统的认知，特别是在如何有效利用对本土生态系统的研究来指导修复性规划设计方面，尚处于探索初期。

3.3 加速自然修复

在再造本土生境的基础上，部分设计师越来越关注自然演替的过程，且开始质疑为何要用设计结果来替代自然的生态系统。设计应该是一个辅助或者加速自然修复与自然演替的过程，而不是替代自然完成生境再造的工具。迈克尔·霍夫曾在《城市与自然过程：可持续发展的基础》^[20]一书中描述加拿大植物群落的演替：单纯依赖自然演替几百年才能修复的原生生态系统，如果在人造植物群落的建立过程中适

native habitats means to design and employ restoration methods to reestablish a self-maintaining, healthy ecosystem (natural, constructed, or semi-constructed), which could provide a number of ecosystem services for humans. In an ideal hypothesis, an optimal ecosystem would exist in every place, which would be in a highly steady state with a maximum ecological performance and provide best aesthetic values. But it would take a very long period of time to realize.

One of the early advocates of natural habitat reintroduction was Jens Jensen, whose works (such as the Columbus Park in Chicago) were dedicated to the native ecosystem and prairie landscape in Chicago, trying to reappear native prairie habitats with design. He also worked with Prairie Club, Friends of Our Native Landscape, and other organizations to protect remaining wild natural heritages^[17]. For Jensen, the formation of landscape is closely linked to life processes, and he demonstrated the concept with a number of parks and gardens allowing people to observe the exact natural regeneration process from a grassland towards a woodland, even part of the landscape changed beyond his original vision^[18].

The design concept of introducing prairie landscape has been widely used in central America till today. For example, the design of the General Mills Headquarters introduced a prairie landscape into the site and simulated wild fires in every March so that the weeds on the site would be burned into ashes, providing ideal fertilizers for the grasses growing in the coming year, without extra sowing or maintenance.

Many ecological restoration cases have explored to reintroduce or reshape native habitats with design approaches. Since 1985, a series of research on ecosystem restoration of forests, wetlands, grasslands, and coast ecosystems has been published, with remarkable achievements in theoretical development^[19]. Meanwhile, most Chinese scholars lack knowledge of native habitats and ecosystems, especially regarding how to apply such research findings to effectively guide restoration planning and design.

3.3 Enhancing Natural Regeneration

Beside of native habitat restoration, more and more designers focus on natural regeneration processes and begin to question why designed ecosystems can replace natural ones. Designs are expected as a process to help accelerate natural restoration and regeneration, rather than building a substitute of native habitats. Typically, in *Cities and Natural Process: A basis for Sustainability*^[20], Michael Hough noted that a natural regeneration of plant communities in Canada

当进行干预，通过在特定阶段栽种或移除树木，以提供更适宜的光照和水分，就能够大大加速生态系统的形成，在几十年内完成自然系统的演替。在场地自然演变过程的各个阶段，设计自然能够通过更为积极的手段实现比自然演替更高的效率。这表明设计生态的一大潜在内涵是设计自然演替的过程，而不是代替自然。

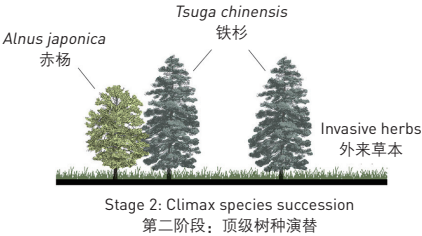
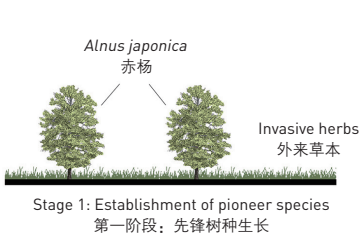
类似的思路已经在世界各地广泛运用，设计在促进自然演替过程中的做功，可以是“加法”，也可以是“减法”。例如，荷兰阿姆斯特丹堡斯公园按照网格混合种植临时性或速生性先锋树种和永久性顶级树种。早期，先锋树种为顶级树种的实生苗提供必要的阴影；15年后，先锋树种被砍去，为永久树种留足生长空间^[21]。与之类似的还有设计师彼得·蒂尔·特里迪西提出的“凹雕”理念，其源于一种雕刻技术，比喻通过移除“不想要的”——而不是引入“想要的”——来实现管理生态系统的目的（图1）。例如，人们通过移除可能抑制木本

would take centuries to restore native ecosystems; while, by establishing designed plant communities, if managed properly (such as by planting or removing trees according to given timelines and increasing light and irrigation), the formation and succession of natural ecosystems would accomplish within decades. Design works can facilitate all stages of a natural succession through proactive and effective approaches. It reveals that one of the essential roles of designed ecology is to design and manage the process of natural succession, instead of replacing it.

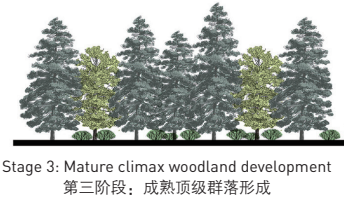
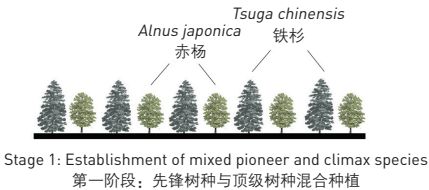
Such ideas of enhancing or facilitating natural regeneration have been applied into practice worldwide, part of which accomplish by introducing while the others by removing. For example, in the Bos Park in Amsterdam of the Netherlands, a mixture of temporary or fast-growing pioneer tree species and permanent climax tree species were planted randomly in grids. At the early stage, pioneer trees provided necessary shadows for seedlings of the climax tree species; 15 years later, pioneer species were removed to leave room for the growth of the climax ones^[21]. Similarly, the idea of “intaglio” by the designer Peter Del Tredici was adopted from an engraving technique, which metaphorically means to remove the “unwanted” — instead of introducing something “wanted” — from the existing ecosystem management (Fig. 1). For instance, locust trees (*Robinia pseudoacacia*) are protected by removing the vines competing with them. The Natur-Park Schoneberger Sudgelände in Berlin, Germany was built on a site of derelict

1. 荷兰阿姆斯特丹堡斯公园按照网格混合种植临时性或速生性先锋树种和永久性顶级树种。
1. In the Bos Park in Amsterdam of the Netherlands, a mixture of temporary or fast-growing pioneer tree species and permanent climax tree species was planted randomly in grids.

Natural regeneration
(may take hundreds of years)
自然再生
(历时数百年)



Managed succession
(can be done in decades)
人工演替
(数十年内完成)



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1

的爬藤植物来保护刺槐 (*Robinia pseudoacacia*)。德国柏林苏姬德自然公园建立在废弃的铁路上,最初曾一度被自发生长的植物所占领。经过设计师对植物群落的微小干预,公园逐渐形成了由本地和外来植物共同构成的景观,并为当地物种提供了良好的生境^[22]。

运用设计加速自然修复的过程不仅要求设计师理解本土生境的含义,还有赖于其对地方生态系统自然演替过程的深层理解,这对设计实践及生态研究都提出了新的挑战。

3.4 优化自然系统

除却那些以生态学家为主导的、单纯地以改善受破坏自然环境为目的的生态修复,由景观设计师介入的设计生态一直以来都在考虑人的需求与使用。奥姆斯特德设计的中央公园是可供公众休憩的绝佳场所;詹森设计的哥伦布公园的核心区是一处露天剧场,听众可坐在河边平缓的台地上,欣赏夕阳西下的美景,以及夜色渐起时舞台上的表演。景观设计师试图使公众意识到大自然的优美和循环不息;而自然与人文的交叉也是景观设计学科中经久不息的话题。

将该方面思考提炼为理论的是琼·艾佛森·纳索尔。其“文化可持续性”理论^[23]以审美为着眼点,认为人本质上很难接受荒野之美。例如,对于城市中自由生长的植物,人们由于审美差异会做出完全不同的评价,既可能认为其杂乱不堪,也可能觉得富有野趣。审美也会受到人们所处环境的影响:人们会视一株长在城市空地上的植物为杂草,而长在乡村的就会被视为野花。尽管人类改造自然的能力越来越强,自然也似乎变得越发“顺从”,但实际上原始的自然环境对人类个体而言依旧充满凶险。人们对于自然的欣赏建立在文明的基础上。当试图通过设计改变自然系统的时候,我们并非要还原一个初始的自然状态,而是要实现“自然系统优化”,这种“优化”既是一种基于美学的判断和改变,也是为了适应人类的使用^[24]。

景观设计是以自然为对象的一种文化活动,除了构建生态系统,还必须满足人类审美与活动需求^[25]。设计是在自然资源与人类个体感受或审美经验之中寻找情感共鸣,从而找到一种模式来体现资源的价

值,其中它曾经被爬藤植物所覆盖。With minimum management on the plant communities of the park, a mixed landscape of native and exotic plants was formed, providing sound habitats for native species^[22]。

A design process to help accelerate natural regeneration and restoration requires designers having necessary knowledge about local habitats and, more importantly, about the natural succession process of native ecosystems, which are new challenges for both design practice and ecological studies.

3.4 Tending Natural Ecosystem

Other than the ecological restoration efforts that are led by ecologists with a single-purpose of remediating the ecology of damaged ecosystems, designed ecology cases led by landscape designers take human needs and uses into consideration. The Central Park designed by Olmsted is a great destination for public leisure; the Columbus Park designed by Jenson offers an amphitheater at its central area, where people can sit on the gentle slope along the riverfronts and enjoy the beauty of sunset and the performance on the stage with a moon-rising scenery. Landscape designers have been trying to arouse people's appreciation of the beauty and cycles of nature. The integration of nature and humanity is also a lasting topic in Landscape Architecture.

Joan Iverson Nassauer promoted the integration of nature and humanity into a theoretical thinking by proposing a concept of Cultural Sustainability^[23], who focuses on aesthetic values of landscapes and suggests that humans can hardly appreciate the beauty of wildness. For instance, people regard free-growing plants in cities aesthetically different: some avoid them as a mess and others prefer them as attractive sceneries. People's aesthetic values are also related to the environment where they live: plants growing in urban vacant spaces are often treated as weeds but seen as wild flowers if growing in countryside. Although human beings have shown their power to transform nature and made it seemingly “tamed,” original natural ecosystems in fact are still full of danger for individual humans. Humans' recognition of nature is based on a civilized understanding. When people try to alter natural ecosystems with design, it does not mean to restore back to the exact original landscape; instead, design is expected to improve the ecosystems, aesthetically and functionally, to meet humans' needs and desires^[24]。

Landscape design is a cultural intervention on nature, which is expected to not only reshape ecosystems but also meet human's aesthetic desires and activity demands^[25]。Design is about arousing humans' emotional resonance between

值。设计不是纯粹计算得出的，也不是任意的个人表达。同样，设计不仅仅是根据环境承载能力和权重映射方案得出，也不仅仅是个人对于自然资源的有效利用，而是在二者之中寻找平衡点^[26]。纳索尔倡导在自然系统承载力的范围内，通过设计适当加入大众喜闻乐见的事物，以优化与提升自然的美感，使美学和实用功能同时得到满足；并强调了颜色、花草、框限、动物等要素对于提升自然系统审美价值的意义。例如，芝加哥千禧公园内的野草景观即包含四季各异、色彩丰富的花卉，形成了良好的视觉效果。

4 结语

4.1 设计生态的主要内涵

基于上述不同的设计视角，本文认为“设计生态”作为“在人居环境中，特别是生态破坏较严重的地方，设计积极主动介入生态系统功能优化、修复或重建的过程”，应该具有三大内涵，其亦可作为评价一个设计实践是否为“设计生态”，以及评估实践绩效的标准：

- 1) 生态的功能性。设计需要创造一个可以自我维护的生态系统，而不仅仅是种植植被；设计要创造真正的生态，而不是停留在生态概念阶段，或创造伪生态。
- 2) 过程的功效性。无论是做减法还是加法，设计应该充分结合自然演替过程并使设计优于自然演替，甚或促进生态演进。未利用自然过程做功的生态修复，以及不能证明设计介入优于自然做功的生态修复，都是盲目的人工介入。
- 3) 结果的体验性。设计需要叠加美学体验并使生态系统更符合人类社会的需求。不涉及人居体验的生态修复无需设计师参与，只需依赖自然做功或者生态学家的介入；而营造良好的人居体验是景观设计师的专业范畴及景观设计学的学科根本。

natural environment — as a resource — and individuals’ feelings or aesthetic experience, to explore a method to unfold the value of the resource. Design is neither developed simply through quantitative calculations nor arbitrary personal judgements — in other words, design is developed on a combination of specific environmental capacity and weight mapping results with individuals’ effective use of natural resource^[26]. Nassauer argues that, in addition to meeting functional needs, under a given environmental capacity, it is encouraged to integrate culturally popular elements into designs to improve the aesthetic value of a landscape. She also stresses the role that landscape elements, such as lovely colors, blossom plants, borders, and animals, play in improving the aesthetic value of natural ecosystems. For instance, the Millennium Park in Chicago enjoys a meadow of a rich variety of wild flowers species, presenting a changing scenery all year round.

4 Conclusion

4.1 Essences of Designed Ecology

By reviewing the four design perspectives as above, this paper deduces that a designed ecology, as a process of active and purposive design interventions that help enhance functional improvement, restoration, or reshaping of ecosystem in human settlements, especially in the areas suffering from severe ecological degradation, should be quality in three aspects, which can also be used as a criterion to examine and evaluate the performance of relevant practices:

- 1) Ecological functionality. Rather than merely seeding grasses or planting trees, or even simply advocating ecological ideas, design is expected to create a functionally real and self-maintaining ecosystem.
- 2) Succession efficiency. By introducing the wanted or removing the unwanted, design is expected to combine with natural successions and facilitate or improve ecosystem regeneration. It is blind to intervene ecosystems in a constructed way if that does not help natural succession or ecological restoration.
- 3) Landscape experience. Design of ecosystems is expected to integrate people’s aesthetic experience with social needs. With less consideration on human living or experience needs, nature can ecologically regenerate itself, or sometimes with the aid of purely ecological interventions; designers’ role in ecological restoration is to improve the quality of human living environment, which is precisely the professional mission of landscape architects and disciplinary foundation of Landscape Architecture.

4.2 展望

设计生态涉及“设计”和“生态”两个方面以及多个学科知识，具有较强的交叉性和复杂性，其发展有赖于生态研究、设计实践，以及两者有效交叉融合的全面推进。生态研究方面需要强化对于地方生态系统、生态系统自我演替过程，以及生态系统承载力的系统认知，且应避免将这些研究与认知束之高阁；反之，需通过系统化、简单化的宣传使其便于设计师理解与应用。设计实践则需要进一步探索人居环境的内涵，并强化生态知识的学习，力求通过设计创造一个能够实现多种功能的“过程”，而非仅仅关注于“造型”。诚如朱莉·巴格曼所言：“当今景观设计的一大发展方向是使设计付诸于行动。”^[27]也唯有如此，生态学家和景观设计师才能更好地共同参与规划设计的整个过程，才能有效实现设计生态。**LAF**

4.2 Prospects

Designed ecology considers both aspects of “design” and “ecology” and is supported by interdisciplinary knowledge. It is highly integrated and complicated, and promoted by the development of ecological study, design practice, and the integration of the both. Specifically, ecological studies are expected to go further in local ecosystem, succession process of ecosystem, and ecosystem capacity to form a systematic and intelligible knowledge framework to encourage and facilitate authentic design applications. In the future, designers are expected to make more efforts in improving human living experience and strengthening ecological knowledge, in order to make their design a process providing multiple services, instead of only focusing on formal design. According to Julie Bargmann, “the big revelation for landscape designers now is that form is just a noun; it is also a verb.”^[27] Only in this way can ecologists and landscape designers work together and get engaged in planning and design processes to effectively form designed ecology. **LAF**

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