



EDITORIAL

主编寄语

时间 2015年11月30日 地点 湖北省宜昌市 拍摄 俞孔坚

湖北省宜昌运河公园——从鱼塘到城市绿色海绵：场地原为一系列鱼塘，植被生长情况较差，仅有一棵树。鱼塘养殖业废弃后，土人设计团队开始对场地进行生态修复设计。其核心策略是保留鱼塘系统，并引入水生植物和水杉、池杉、乌桕等适宜于场地栖息地的植物物种，以构成一个新的、能自我繁衍和进化的人类世生态系统。仅仅三年时间，场地就已形成如图所示的景观，并已开始提供包括水质净化、雨洪调节和生态游憩等综合性生态系统服务。

Date November 30th, 2015 Location Yichang City, Hubei Province Photographer Kongjian Yu

Yichang Canal Park, Hubei — from fishpond to urban green sponge: the site was formerly fishponds with limited vegetative cover. After the aquaculture was abandoned, TURENSCAPE's team began the ecological restoration design. The strategy was to reserve the fishpond system while introducing various aqua plants and species that would be suitable for the onsite habitat. These included trees such as *Metasequoia glyptostroboides*, *Taxodium ascendens*, and *Sapium sebiferum*. After only three years, a self-maintaining novel ecosystem was in place. Now the park functions ecologically, purifying water, mitigating flooding, and providing spaces for public recreation.

人类世生态系统与生态修复

主编 俞孔坚

译 萨拉·雅各布斯

千百年的 人类活动深刻地改变了地球表面。尤其是20世纪的工业化和城镇化，给人类赖以生存的生态系统带来了巨大的冲击。而在近几十年来城镇化和工业化快速而无序发展的中国，这一变化尤为剧烈，我们已将中国的生态和环境带入绝境：雾霾、水污染、土壤污染、地下水位下降、湿地大面积消失、诸多珍稀物种濒临灭绝、生物多样性骤减……城乡生态修复将成为中国未来几十年最艰巨、最紧迫的任务。

为了完成这一任务，中国景观设计界——以及世界景观设计界——将面临一系列最基本的理论挑战：如何进行生态修复？如何评价生态修复的成果？修复的最终目标是什么？是将栖息地和生态系统修复到完全原始的状态，还是修复到自然系统某一阶段的状态？是要建立一个理想的顶级群落（Climax），还是建立一个与此地此地环境相适应的生物群落？是要配置和维护一个生态学家定义的、完全由乡土物种组成的生物结构，还是进行适当的人工干预，并开启自然的演化过程以形成新的生态系统和生物群落？“Novel Ecosystem”——新生态系统或人类世生态系统——的概念和理论为我们指明了一条出路。

Novel Ecosystem是指自然生态系统在人类干扰下，或人类管理的生态系统在停止管理的情况下形成的、栖息地环境和物种结构发生变化的生态系统，这些干扰包括气候条件和土地利用类型的改变，以及人类人力物质和信息干扰的撤除。这是介乎完全自然过程作用下的生态系统（Wild Ecosystem）和人类设计管理控制下的生态系统（Managed Ecosystem）之间的一类生态系统。其一端是自然生态系统被人为干扰和破坏之后形成的生态系统，诸如热带雨林砍伐之后形成的生态系统，江河大坝和防洪堤建成之后形成的新的河流水系生态系统，湖泊水体或土壤环境遭受污染或改变后形成的新的生物群落，因外来物种引入后带来的乡土物种的消失和栖息地条件的改变、气候改变带来的地域性生物群落的变化、城镇化和基础设施建设带来的景观破碎化而形成的新的生态系统……在另一端，是人工管理的生态系统失去管理之后形成的生态系统，例如，由于经济效益下降导致云南的人工橡胶林被遗弃和退化后所形成的群落演化、广大城市郊区的农田被撂荒后所形成的新的生态系统、鱼塘不再被利用而演化出的新的湿地生态系统，甚至大量中国农村的村庄和宅基地因无人管理所形成的新的生态系统。这些新的生态系统没有历史可以追溯，其非生物性和生物性组成部分是全新的，或部分新的。

在很多情况下，对这样的新生态系统我们往往无法评价其优劣，因为人类的评价往往是带有主观性和持有偏见的。例如，几十年前，在中国的云南大面积种植来自澳洲的桉树（*Eucalyptus globulus*）曾经不仅被作为荒山绿化的先进措施加以鼓励，而且还带来了可观的经济效益；而今天，这些桉树却已带来巨大的生态灾难，包括乡土物种消失、土壤条件恶化等。类似的例子包括我国东南沿海以防治海岸侵蚀为目的而引进的大米草（*Spartina anglica*），而今已经对当地生态系统造成了严重破坏；作为观赏花卉被引入的加拿大一枝黄花（*Solidago canadensis*），而今已泛滥于广大江南地区，它们侵占了大片乡间的田埂和被撂荒的土地。至于大江大河上的堤坝所引发的新的生态灾难就难以评估了。我们应该如何审视和应对这样的新生态系统？是花费巨资拔掉这些外来物种，还是任其繁衍，抑或引入新的天敌？最终该群落将会如何演化？对于诸如大坝这样的人为干扰，我们是要将大坝炸掉来恢复河流湖泊的生态系统，还是让水库淤塞，以形成新生态系统？——即使炸掉大坝，其后形成的新的生态系统也绝不会再复原到大坝建设之前的生态系统状态。

我们对于人类世生态系统的研究刚刚开始，但有一点是可以明确的：对待人类干扰下破坏的自然生态系统，我们既不能指望恢复到原始的自然生态系统状态，也不应该通过高投入使生态系统维持在历史上出现过的某一状态；生态修复的过程应该是通过生态设计，在撤除人类破坏行为的同时，开启一种新的、具有综合生态系统服务功效的新生态系统演化。

FROM RESTORATION TO NOVEL ECOSYSTEMS

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TRANSLATED BY Sara JACOBS

Human activity has been changing the surface of the earth for several thousand years. In the 20th century, however, the rate of change was accelerated, propelled by industrialization and urbanization. This change has affected the global ecosystem on which human life relies. Over the past decades China’s rapid and often chaotic process of urbanization and industrialization has left us in ecological and environmental despair. Our country is threatened by smog and haze, water pollution, soil contamination, groundwater recession, wetland disappearance, species endangerment, and declines in biodiversity. Ecosystem restoration in urban and rural environments has become China’s most difficult and urgent task.

Faced with this task, landscape architecture has been confronted by some of the most basic theoretical questions of restoration: what is the objective of ecological restoration? How is ecological restoration evaluated? What phases of ecological communities will restoration build — should we recover habitats and ecosystems back to their “original” situations, or to certain status of their natural evolution? What ecological theories are being deployed — should we establish an ideal climax, or an adaptive community appropriate to the specific site? Should we design and maintain a local community that completely consists of “native” species which are defined by ecologists, or a new ecosystem / community that can healthily evolve based on the preexisting status? And how much human intervention is needed? The concept of a novel ecosystem — a new ecosystem that has been formed or largely altered in structure and function by human agency — provides the theoretical grounding for addressing such questions.

Novel ecosystems are natural ecosystems which have been disturbed by or once managed by humans, and as a result, have new ecosystems. These ecosystems emerge from changing climates, changing land uses, or sudden human abandonment, and may result in a permanent habitat change and species invasion. Whereas wild ecosystems function through the actions of nature, and managed ecosystems are designed and controlled by humans, novel ecosystems exist as neither the former nor latter. These ecosystems are often formed after disrupted by human interventions, such as tropical rainforests, rivers and lakes, and industrial sites whose hydrology and ecology have been permanently altered by deforestation, construction of river dykes and flood bank, or soil contamination. Other examples of novel ecosystems would be seen in the transformation of regional biological communities due to climate change and species invasion, or new ecosystems brought about by landscape fragmentation during urbanization. At the other end are ecosystems that were once managed by humans, and have been transformed through abandonment. Examples of these types of ecosystems include rubber forests in Yunnan, the loss of

farmland to suburbanization, and the growth of wetlands in former fishponds. The abiotic and biotic components of these new ecosystems are neither entirely found nor created. This is new to us.

As humans, we carry our own subjectivities and prejudices, making it difficult to evaluate or to judge the vitality of these ecosystems. A few decades ago the *Eucalyptus globules* was introduced from Australia to Yunnan Province in Southwest China. Their importation was encouraged as part of an afforestation initiative in barren mountainous areas. The trees also brought a considerable economic benefit. Today, eucalyptus has proven to be an enormous environmental disaster, causing local species to disappear and resulting in deteriorated soil conditions. This type of story is common: *Spartina anglica* was introduced to China’s southeast coast to combat erosion, instead replacing native plant communities; *Solidago canadensis* was introduced as an ornamental flower and now has become widespread in farmland south of the Yangtze River. The ecological catastrophe caused by huge dykes and dams is impossible to calculate. As designers, how should we evaluate and respond to these new ecosystems? To only eradicate invasive species is difficult and expensive, while introducing new species is unpredictable. In the case of dams, the local landscape has become so altered that to restore the original river ecosystems by demolishing the dams will be an almost impossible task — even so, the new landscape would never recover the ecosystem that existed previously. Cultivating a novel ecosystem that is based on the existing ecological environment and can robustly evolve suggests a solution.

Our understanding of novel ecosystems is underdeveloped. However we are clear of one thing: when approaching natural ecosystems that have been damaged by humans, we should not expect to restore them to a specific historical moment. Ecological restoration should be a design that, while limiting the disruptive behaviors of humans, also allows for ecosystems to evolve with new functions.

