

生态城市主义

Ecological Urbanism 尺度、流动与设计
Scale, Flow and Design

杨沛儒 著

Perry P. J. Yang 中国建筑工业出版社



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导言

城市可持续的迷思

本书写作的主要目的，在于介绍生态取向的城市设计理论发展。面对全球尺度的城市蔓延、温室效应，以及特别是中国乃至亚洲快速的城市变迁及日趋严峻的环境议题，城市设计与规划的既有观念正面临新一轮的考验，专业及学术界均高度期盼能系统性地引进有关生态城市、再生能源城市、低碳城市等新观念、设计方法及技术，从更深度的认识中，来思考当前迫切的城市生态问题及对策。然而，各种相关说法蜂拥而出，使得生态城市这个概念变得模糊难辨，许多我们习以为常或许多耳熟能详的名词，如可持续发展、生态城等，已经遭到滥用，混淆了我们对于问题的理解，并阻碍了我们提出有效方法与行动的能力，明显的例子包括：

(1) 可持续发展：这一代人不能用尽下一代人的资源，唯有通过经济、社会与环境三者的交互作用来达到真正的人类发展的可持续：一个被广泛使用却往往失于表面化的概念。

(2) 生态平衡：今天的急速经济发展与快速城市化，已经使得生态环境系统失衡。

(3) 自然保育：人口增长以及全球尺度城市化，使得原始自然几无立锥之地，面对发展无限扩张，可保育的自然不断缩小，自然保育只能无力地抵挡开发的压力。

(4) 零成长或成长极限：一种反成长的观念。

(5) 环保回收：强调节约与资源回收再利用来拯救环境。

(6) 生态规划：更多的绿地与湿地环境。

这些观点看似正确无误，专业上难以反驳。我们一方面乐于见到这些绿色观念的推展，但也惊觉，上述观念很容易变成一种成见以及思想的笼牢，使我们深陷其中而失去反省的能力。本书希望能从理论的高度，在“可持续的迷雾”中重新廓清、破除迷思，提出另一类思维方式：

(1) 可持续发展的论述已成为一种陈词滥调 (*cliche*)，让人无法找到反对的理由，面对实际问题难以操作，往往容易成为合理化政策的挡箭牌。

(2) 生态平衡论已经成为一种迷思 (*mythology*)，我们在各种城市承载力 (*carrying capacity*)、水文系统及生态多样性的研究中已经发现，想经由生态恢复来回归自然的行动太过天真，系统的平衡点无可回复，系统门槛值 (*system threshold*) 只存在于历史的晦暗时空轨迹里，而无可追寻。

(3) “纯粹的自然” (*nature*) 已不复存在，全球范围的城市化已产生巨型尺度

的城市区域空间结构 (global mega city-region), 城市蔓延与城乡复合体所形成的环境空间, 更接近地景生态学中的混杂地景 (hybrid landscape) 或是土地嵌合体 (land mosaics), 我们须以 “第二自然” (second nature) 的观念, 来重新理解并改变传统自然保育的对策。

(4) 生态城不等同于绿色城市, 生态城市规划并非单向度的绿地规划。生态规划要求更多绿地及水环境固然容易获得公众的认同, 真正的难题在于, 如何面对已建成环境的艰难现实条件。

(5) 传统的自然保育及环保的概念潜藏了自然与人类、自然与城市、环境与发展之间的二元对立论 (dualism)。我们必须承认, 极大部分的自然都已遭到人类扰动、人为的规划开发或管理。经济发展与自然保育须走出二元对立命题, 以新的框架及视野来理解新的现象。

(6) 我们从产业生态学认识到, 必须从末端污染排放控制, 进入到清洁生产, 以及从产业生态系统的观念着手。

(7) 生态城市规划着重于城市向度, 即在高密度城市环境中重建生态的整合系统。我们需走出传统自然保育论, 在城市环境脉络中成长自然及滋养生态。

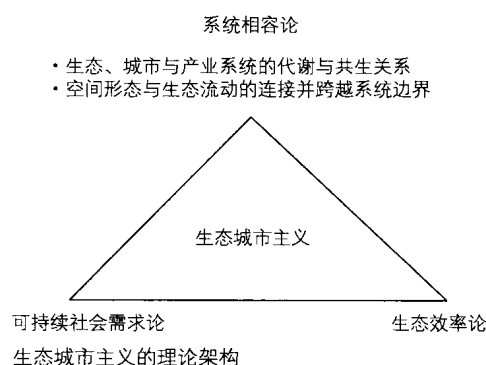
“第三生态”命题

上述新的生态城市论证, 可以帮助我们看清当前问题, 特别是中国乃至亚洲其他国家城市的快速城市化, 空间尺度巨大, 时间空间急剧压缩, 自然系统、城市发展、产业结构及社会重组的交错复杂的关系与情境。本书提出 “第三生态” 命题 (the third ecology proposition), 作为生态城市主义的理论架构, 并连接到生态城市设计的方法, 包含了:

(1) 可持续社会需求论 (social sufficiency) 用来因应可持续发展及成长极限等观念挑战, 这个世代的人必须从自我节制其社会需求与行为着手, 改变其对能源、水、产品及土地资源等的消费模式。面对下一阶段发展对于能源需求急速成长、自然资源快速枯竭、全球气候变迁等严峻形势, 已显示出仅仅从改变社会需求行为模式为基础的 “第一生态论”, 已不足以单独来解决这些问题。

(2) 生态效率论 (ecological efficiency) 高度仰赖精明的环境管理与创新科技观点来解决, 例如以清洁科技、清洁生产以及产业生态系统等来改善系统效率, 解决发展与环境的矛盾。可持续性的达成方法包含去物质化, 并最佳化的系统能量、物质流与输入、输出, 这种 “第二生态” 论背后隐含了科技乐观主义的思维。

(3) 生态系统相容论 (system compatibility) 为可持续观念开展出一空间的向度, 借由物质空间形式以及各种生



态流动如物质、能源、水以及有机体之间的键结，我们得以重建生态、城市与产业系统的代谢与共生关系，亦即“第三生态”的观念与方法，从城市空间模式与系统流动的相容，来拟订有效的规划与设计，以引导城市变迁发展、产业结构重组，并重建生态网络以及新的人与自然的关系。

生态城市主义的设计方法论

第三生态思维视城市为一种生态流动系统，其设计操作方法，以形式与流动的关系来键结城市、自然与产业系统并创造共生关系。传统城市设计与生态系统设计有一根本上的区别，传统设计侧重形态塑造，容易落入物质决定论；而生态系统的城市设计则面对自然过程中随机性的因素。传统城市设计处理“城市中的生态”，在城市环境中保护及增加绿地；而生态系统设计则“设计生态”，以生态流动重构城市系统。新生态学将催动城市的转化，重建生态系统相容性，键结城市空间形态及其背后的物质、能量、水、生物流动，以跨越城市、产业及自然系统的边界。生态城市主义的设计方法论，提供一种组织生态城市空间的原则，以量化评估空间形态、感觉品质、物质表层等的环境效应，分析城市系统各阶层之间的跨尺度系统复杂性及模式关系，并侧重时间的向度、系统门槛以及随机性的过程，以城市变迁管理来发展可持续的进程。

尺度、流动与设计：本书结构

在第三生态理论及其设计方法论的基础上，本书首先从理论及历史脉络着手，以五种设计维度，勾勒出理论的框架；其次从规划史的脉络来探讨生态城市主义的观点起源，并梳理与批评其理论的发展及典范移转。接着以尺度、流动及设计三个主轴作为主要思路，来引导写作的过程，并逐次展开本书框架：

（1）尺度：从生态区域、城市结构、地景单元到建筑空间等不同的尺度及其空间形态（**scale and spatial form**）。由于系统的复杂性与不可预测性，生态城市设计强调环境脉络，必然具有跨尺度的性质。

（2）流动：流动穿透一切空间形式、感觉经验及物质表层。各种生态流动（**ecological flows**），包含能源、物质与碳流动、水文流动、生物流动、地景流动、人流及信息流等，将横跨各种空间尺度，并催动各类空间形态的产生。形态与流动关系的分析，将使得我们更有能力精准预测各种空间规划设计的环境后果。

（3）设计：在生态城市主义的观点下，设计可以成为一种生态的介入（**design as an ecological intervention**），借由改变各种尺度的空间形态，来改变生态流动的方式，正是生态城市的主要设计方法。包括城市生态系统设计、生物栖地设计、地景生态设计、城市水环境设计、城市核心区生态设计等。

本书最后介绍生态系统城市设计（**ESD**）案例，结合理论及实践的设计，以论证生态城市主义的可操作性及经验反思。

Introduction

Questioning Sustainability

The book investigates an ecology-oriented approach and theory, and its articulation to urban design. Facing global-scale urban sprawl, global warming and particularly the radical urban growth and fiercely degrading environment in China and Asia, the existing knowledge and methodology in urban design and planning professional is again challenged by the new reality. We have been searching for new thinking, technology and operational approaches to the design of so-called ecocity, renewable city or low carbon city. There is an urgent need to understand profoundly the contemporary urban ecological issues before we can figure out an effective strategy. However, the discourses of sustainable development, eco-city and low carbon city today are flooded by all kinds of notions. Those terminologies have been abused and become confusing. Their interpretations are various, blurred, and sometimes controversial and problematic that might affect any good planning process to lead to action, e.g.:

(1) Sustainable development: the generational justice to be achieved by social, economic and environmental matrix: an overwhelming idea.

(2) Ecosystem balance: to restore the system back to its historical or original status before human disturbances occur.

(3) Natural conservation: to conserve what is left over in the situation that natural resources are decreasing drastically.

(4) Zero growth or limits to growth: a mind set of “stopping it” or “turning it back” .

(5) Environmental protection: to control the end of pipe pollution.

(6) Ecological planning: more green spaces and wetlands.

Most of the “feel good” concepts are not deniable. The counter-part propositions could be:

(1) Sustainable development has become a cliché that something we try hard but will never achieve. The matrix of social, economic and environmental sustainability is too broad to operate. It legitimizes policy makings from time to time.

(2) Ecosystem balance is a hypothesis, or mythology. System threshold can hardly be found. Ecological restoration will never bring us back to temporal point of its historical origin because of social and political constraint of restoration.

(3) The “pure” nature no longer exists. We have observed the contemporary nature as human made, human design, human planned and human influenced. We should deal with hybrid landscape of city, nature and infrastructure in the context of urban sprawl and global city and regional processes.

(4) Ecocity is not limited to greening city. Ecocity planning goes beyond one dimensional green space planning. It is more about how ecology can be taken as a key to regenerate the existing urban environment.

(5) The concept of limits to growth implies human activity as the threat of nature and vice versa. We should go beyond the dualism of human/nature, city/nature and development/environment to search for patterns of co-habitation of human and nature.

(6) We learn from industrial ecology that the end-of-pipe solution is to be replaced by cleaner production and the idea of industrial ecosystem.

(7) The propositions of ecological city planning needs to extend its urban dimension: the ability to design for ecological integrity in intensive urban environment. We should move away from “preserving the nature and left-over resources” to the new thinking of “nurturing nature in the context of urban environment” .

The Third Ecology Proposition

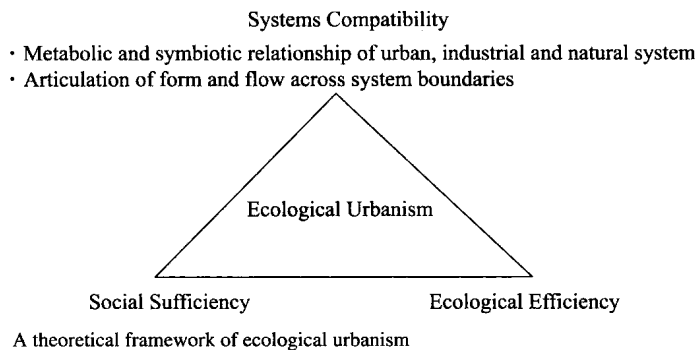
To engage these arguments would enrich our understanding of the contemporary conditions of urban and nature, particularly for the issues of China and Asia’ s rapid urban processes, mega urban spatial structure, compression of space and time, and the interweaving landscape and relationship among natural system, urban development, industrial structure and social network. The book proposes the third ecology proposition as a theoretical framework of ecological urbanism and its linkage to a methodology of urban ecology design.

(1) *Social Sufficiency* is an approach that responds to challenges of sustainable development and limits to growth. It is based on self limitation of social needs of the current generation by changing the consumption pattern of energy, water, product and land resources. The evidences of increasing demand in energy, speeding depletion of natural resources and global climate change show that “the first ecology” of social sufficiency and behavior change per se is an essential, however, not a sufficient approach to the urgent needs of problem solving.

(2) *Ecological efficiency* relies on innovative technology and management, e.g.

cleaner technology, cleaner production and industrial ecosystem as a reconciliation of development and environment. The enhancement of sustainability is achieved by dematerialization and the optimization of input-output ratio of flows through technological innovation and smarter way of managing the environment. "The second ecology" implies an optimism in technological innovation.

(3) *Ecosystems compatibility* addresses the spatial aspect of sustainability. There is a need to reconstruct the physical connection, compatibility and symbiotic relationship of urban, industrial and natural systems by linking their physical spatial form and ecological flows such as material, energy, water and species flows behind. It leads to "the third ecology" proposition that urban design is an ecological intervention that can guide urban transformation, industrial restructuring and ecological networking and a new human-nature relationship.



Design Methodology in Ecological Urbanism

The third ecology proposition provides a perspective that cities as a system contain ecological flows. Its approach to urban design articulates urban form and ecological flows to create symbiotic relationship of urban, industrial and natural systems. The distinction between *traditional urban design* and *ecological systems design* has been made. Traditional designs tend to be deterministic in form making, while ecosystem approaches to urban design deal with ecological processes that are stochastic. *Traditional urban design* treats "ecology in cities" as ways of preserving or adding ecological elements such as green spaces to urban environment. *Ecological systems design* advocates "ecology by design", an inherently ecology-structured urban system, and sees ecology as a driving force of urban transformation to reconstruct ecosystems compatibility by linking the urban forms and flows of material, energy, water and organism across the boundaries of urban, industrial and natural ecosystems. The design methodology of ecological urbanism provides a set of organizational principles of ecological urban spaces that are operated based on the measures of ecological performances of urban geometric form, perceptual quality and material surface. They are situated in cross-scale contexts

of hierarchical complex systems of cities, and should be considered in temporal dimension, system threshold and stochastic process to manage urban change and make sustainable progress.

Scale, Flow and Design: A Structure of the Book

Based on the third ecology proposition and its design methodology, the Ecological Urbanism book first introduces theory and context. A first chapter on Five Dimensions in Design delineate a framework of design methodology for the whole book, followed by a brief review of original concepts in a discourse context of planning history to argue for a emerging paradigm of ecological urbanism.

The three aspects *Scale*, *Flow and Design* were taken for driving the thinking and writing process and form a structure of the book:

(1) Scale: To investigate different scales and spatial forms from ecological city-region, urban structure, landscape unit to architectural space. Due to system complexity and unpredictability of ecosystem, ecological urban design emphasizes contexts and cross-scale relationships.

(2) Flow: Ecological flows penetrate through any kinds of spatial form, sensuous quality and material surface. All ecological flows including energy flow, material and carbon flow, water flow, landscape ecology flow, pedestrian flow and informational flow would run across different spatial scales and generate new urban form. The analysis of forms and flows is essential to our capability to predict environmental consequences of planning and design.

(3) Design: Design is regarded as an ecological intervention. Ecological systems design manipulates urban spatial configuration and manages modes of ecological flows. We introduce concepts and methods in urban ecosystem design, habitat design, water sensitive urban design, landscape ecological design and sustainable design in central city district.

To argue for an operational approach, the book concludes with design case studies of eco systems design (ESD) that provides experiences and reflections on how ecological urbanism could be applied to actual urban contexts.

第 1 章

生态城市主义：五种设计维度
Ecological urbanism: five dimensions in design

1.1 生态城市主义：面对当代自然与当代城市

Contemporary conditions of nature and city

生态城市主义是一个看似自相矛盾的命题，在城市环境剧烈恶化以及回归生态自然的渴望之间，引起无限的想象。有关建筑及城市空间如何面对自然环境，在文献上早已有类似于生态区域主义的观点（Talen, 2005）。这几年在中国甚至全球，生态城这个名词如雨后春笋般出现，著名者如中东阿布扎比的 Masdar City 及在中国各地浮现的生态城方案等，面对着不同的脉络。生态城俨然成为一个普遍应用的规划名词，虽然在观念上并非全然的创新，新的时势仍有待一种更系统性的观念与方法，来廓清各种迷思、回应当前挑战并启迪我们在设计上的实践。

建筑与规划理论界近年传递出一个很明确的讯息：当代的城市条件（contemporary urban conditions）及其驱动力产生了根本性的变化（Allen, 2009; Koolhaas, 1995; Harvey, 2000）。生态城市论的崛起，必须面对当代的自然（contemporary nature）与当代的城市（contemporary city）所处的独特历史空间条件，城市肌理及大地景观亟待生态策略来重新组织其系统网络。以哈佛大学理查德·福曼（Richard Forman）的说法，我们面对的是一种土地嵌合体（land mosaics），亦即混杂地景以及“第二自然”的情境。当代的自然业已失去其纯粹形式，已受人为的影响、经营、设计、规划及概念化，已被技术的力量所穿透，而成为一种人造的生态环境。与之相反的命题，则是当代的城市急需以生态学为基础来重建，即使在一个几乎完全人造的城市环境中，我们都可以观察到自然作用力的影响。任何的城市设计议题都必然涉及自然系统，所有的城市设计与建造的任务，都面临潜在的环境议题，且具有潜质来转化为某种形式的生态设计。

生态城市论认为，设计可以成为一种生态的介入（design as an ecological intervention），借由塑造各种尺度的空间形态，来改变生态流动的方式，这正是生态城市设计的主要思维。生态城市设计不仅仅是消极地保护自然，更应是积极地在现代城市空间结构中，以再生设计的手法，寻求机会嵌入有价值的生态空间元素。生态城市设计，需要整合能源流动、物质流动、水文流动、生物流动，甚至于人的流动及信息流动在设计过程中的作用。生态化的城市，以流动生成形式（flow generates form）。这个想法，可以对比于现代主义城市的功能生成形式（form follow function），或者资本主义城市房地产机制下，金融主导形式（form follow finance）的主流思想。

亚洲城市面对高密度及快速化的城市化与成长，发展与自然系统之间不断冲突。我们该如何来理解这样的空间及其变化？本文提出包含其形式、物质、流动、尺度及时间五种设计维度，来介入这个当代的城市条件。更准确地说，这五种设计维度，包含了空间形式的感觉经验、城市纹理及地景结构的物质表层、生态流动及其环境效应、跨尺度复杂性，以及时间变迁管理及可持续进程等空间组织原则。作为概念以及设计的操作性工具，在大尺度城市环境中以规划设计来引导城市变革。