

Climate Design: Theoretical Exploration and Practical Translation at the Intersection of Multiple Disciplines

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Since the beginning of the 21st century, extreme climate events have become increasingly frequent, posing a shared global challenge. The intensity and frequency of droughts, floods, heatwaves, and cold waves continue to rise, profoundly altering the natural foundations and social systems upon which human survival depends. Cities, as the most concentrated spatial manifestation of human activity, are not only drivers of climate change but also among its most directly affected spaces. The impacts of climate change extend beyond continuous shocks to ecosystem stability, amplifying risk exposure, inequalities, and disparities in adaptive capacity within urban environments.

In this context, how design can serve as an interface and take space as a medium to actively respond to climate challenges, building more resilient human settlements, has become a core focus of interdisciplinary inquiry spanning Landscape Architecture, Architecture, Urban and Regional Planning, and Urban Climatology. “Climate design” emerges within this framework, gradually revealing both theoretical significance and practical potential. It is not only a design philosophy addressing climate uncertainty and risk but also a spatial practice approach that integrates interdisciplinary knowledge to tackle complex systemic challenges.

Climate design emphasizes examining the interactions between humans and nature, space and climate, and design and systems, beginning from the fundamental units of environmental design. It seeks strategies that balance adaptation and mitigation while enabling innovative spatial forms. It is not a linear extension of any single discipline, but a convergence of dynamic climate science,

systemic ecological design, spatial organization methods from urban planning, and architectural and landscape thinking across scales, materials, forms, and functions. Its ultimate goal extends beyond formal climate responsiveness; it aims to enable urban and regional systems to transition from vulnerability to resilience, from passive risk absorption to proactive adaptation.

Currently, theoretical research and practical exploration of climate design are advancing along several directions. 1) From microclimate regulation to macro-scale patterning: studies focus on optimizing thermal environments in micro-units such as buildings, streets, and green spaces, while emphasizing the regulatory role of urban and regional-scale climate corridors, hydrological structures, and topographical patterns in climate processes. 2) From passive adaptation to active intervention: using scenario modeling, dynamic simulations, and parametric extrapolation, design interventions anticipate and guide climate system behaviors, enhancing spatial systems’ adaptability and resilience. 3) From natural restoration to nature-based systemic reshaping: research integrates ecosystem service functions and structural embedding, incorporating nature-based solutions into design strategies to enable co-evolution with climate dynamics. 4) From quantitative modeling to multi-sensory experience: while strengthening data analysis and model support, attention is given to perceptual and experiential dimensions, integrating perception, cognition, and behavior into climate-adaptive design evaluation frameworks. Collectively, climate design represents not only a reactive strategy but also a proactive capacity, offering new theoretical foundations and practical channels for

design-led climate governance by enhancing spatial thinking.

As an interdisciplinary nexus, the development of climate design depends not only on the maturation of its theoretical framework but also on mechanisms that facilitate cross-sector collaboration. Landscape Architecture, as a mediating discipline connecting natural and built environments, ecology and society, should play a pivotal role in this process. Advancing climate design requires the coupling of Landscape Architecture with Urban Climatology, building thermal environment research, Urban Ecology, and the coordinated engagement of design practice, policy governance, and community participation.

More importantly, the value of climate design should not be assessed solely by the “success” of individual projects, but by its capacity to address systemic challenges. This requires designers to possess multi-scale systemic understanding and integrative thinking, as well as stable knowledge co-creation and collaborative mechanisms among policymakers, community organizations, and research institutions, thereby establishing a design ecosystem oriented toward climate resilience.

Climate design not only responds to the urgent needs of our era but also offers landscape architecture a historic opportunity to expand cognitive boundaries and enhance practical impact. It encourages us to move beyond traditional design paradigms, confront climate change as a complex socio-ecological-technological system challenge, and redefine design’s responsibilities and values in shaping public environments and future spaces.

We aim to build an open interdisciplinary platform that fosters the integration of theoretical depth, methodological innovation, and reflective practice, collectively exploring the theoretical growth and localized evolution of climate design. Let us take climate design as a point of departure to reshape the knowledge map and action pathways of Landscape Architecture in an uncertain climate future, initiating a spatial transformation centered on resilience, adaptation, and co-existence.

气候设计：多学科交汇下的理论探索与实践转化

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进入21世纪以来，极端气候事件频发，成为全球面临的共同挑战。干旱、洪涝、热浪、寒潮等极端天气过程的强度与频率持续上升，正深刻改变人类赖以生存的自然基础与社会系统的运行逻辑。城市作为人类活动最为集中的空间形态，不仅是气候变化的驱动因素之一，也承受着其最直接、最集中的影响。气候变化在对生态系统稳定性造成持续冲击的同时，更放大了城市空间中的风险暴露、不平等格局与适应能力差异。

在此背景下，如何以设计为界面、以空间为载体，主动应对气候挑战，构建更具韧性的人居系统，已成为景观设计学、建筑学、城乡规划学、城市气候学等跨学科研究的核心议题。“气候设计”正是在这一框架下逐渐显现其理论价值与实践潜力。它不仅是一种面向气候不确定性与风险的设计理念，更是一套融合多学科知识、旨在回应复杂系统性问题的空间实践路径。

气候设计倡导从环境设计的基本单元出发，重新审视人与自然、空间与气候、设计与系统之间的互动机制，寻求适应与减缓并重的策略重构与形式创新。它并非某一学科的线性延伸，而是气候科学的动态认知、生态设计的系统逻辑、城市规划的空间组织方法，以及建筑与景观在尺度、材料、形式与功能等层面思维方式的交汇与重塑。其核心目标不止于实现形式上的气候响应，而是通过设计介入，助力城市与区域系统实现从脆弱性向韧性、从风险承受向主动适应的转变。

当前，气候设计的理论研究与实践探索正朝以下方向深化拓展。1) 从微气候调节走向宏观格局重构：在关注建筑、街道、绿地等微观单元热环境优化的同时，聚焦城市与区域尺度上的气候通廊、水文结构与地貌格局对气候过程的调节机制。2) 从被动适应迈向主动调适：借助情景建模、动态模拟与参数推演等方式，推动设计对气候系统的前瞻性介入与引导，提高空间系统的适应能力与韧性。3) 从自然修复拓展至基于自

然的系统重塑：强调生态系统的服务功能与结构嵌入，将基于自然的解决方案纳入设计逻辑中，构建与气候共演化的空间策略。4) 从定量模拟到融合多感官体验：在强化数据分析与模型支撑的基础上，注重人对空间的知觉与体验，将感知、认知、行为等要素融入气候适应设计的评价框架。综上所述，气候设计不仅是一种应对策略，更是一种引导能力，它通过空间思维的深化与重构，为设计介入气候治理提供了全新的理论支点与实践通道。

气候设计作为跨学科交汇点，其发展不仅依赖于理论体系的完善，更需要跨界合作机制的支持。景观设计学作为连接自然与建成环境、生态与社会的中介学科，应当在这一过程中发挥关键枢纽作用。气候设计的深化发展离不开景观设计学与城市气候学、建筑热环境研究、城市生态学等的协同耦合，以及设计实践、政策治理与社区参与的共同推动。

更重要的是，气候设计的价值不应局限于单个项目的“成功”，而在于其应对系统性挑战的能力构建。这不仅要求设计者具备多尺度的系统认知与整合思维，也需要政策制定者、社区组织与科研机构形成稳定的知识共创与协同行动机制，从而构建以气候韧性为导向的设计生态网络。

气候设计不仅响应了时代的紧迫需求，更为景观设计学科提供了拓展认知边界、增强实践影响力的历史机遇。它促使我们跳出传统设计范式的限制，正视气候变化这一复杂的社会—生态—技术系统，重新界定设计在公共环境与未来空间构建中的责任与价值。

期待通过构建跨学科开放平台，推动理论深化、方法创新与实践反思的紧密融合，共同探索气候设计的理论突破与在地演化。以气候设计为起点，我们可以在高度不确定的气候未来中，重塑景观设计学的知识地图与行动路径，开启一场关于韧性、适应与共生的空间变革。