

亲自然的景观设计 对改善健康与福祉的作用

THE ROLE OF BIOPHILIC DESIGN IN LANDSCAPE ARCHITECTURE FOR HEALTH AND WELL-BEING



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摘要

截至2007年，全球50%以上的人口生活在城市。随着城市居民越来越多，全球城市化的水平不断提高，而城市中心的绿色空间与自然环境却不断减少。亲自然设计的目的是在我们建造与设计的环境中恢复自然刺激，以保护、维持、恢复、提高我们与自然界在生理、认知和心理上的联系。作为助益健康的一种途径，亲自然设计可以催化景观设计在改善城市环境中的公众健康方面发挥核心作用。

关键词

热爱自然的天性；景观设计；城市；健康；复杂系统

ABSTRACT

As of 2007, over 50% of the global population is now urban. With more global urbanites, has come increased urbanisation and displacement of green space and natural environments from our urban centres. Biophilic design aims to restore natural stimuli in our built and designed environments to protect, maintain, restore and enhance our physiological, cognitive and psychological connections with the natural world. As part of a wider salutogenic approach to health, biophilic design has the potential to catalyze landscape architecture into playing a central role in public health of urban environments.

KEY WORDS

Biophilia; Landscape Architecture; Urban; Health; Complex Systems

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1. 中国苏州拙政园。通过运用“观望”模式的借景原则，设置了朝向远方地标视角，使得空间比它实际上显得更加开阔，在这个小型的景观项目中创造出了冥想与放松的空间。在“水之存在”模式中，视线可及的受保护的座椅区（庇护模式），以及小桥与汀步（风险模式，在本文中未表述）都有助于使用者的亲自然体验。

1. The Humble Administrator's Garden in Suzhou, China. Applications of the Prospect pattern that utilize the *jeijin* or "borrowed view" principle, which orients views toward distant landmarks making spaces feel bigger than they actually are, can engender contemplation and relaxation in small retrofit landscape projects. The Presence of Water, visually accessible protected seating (Refuge) and the bridges (Risk, not demonstrated in this article) also contribute to a biophilic user experience.

截至2007年，全球50%以上的人口生活在城市。^[1]随着城市居民越来越多，全球城市化的水平不断提高，而城市中心的绿色空间与自然环境却不断减少。城市环境会导致精神疲劳与压力，与之相反，与环境和自然要素进行互动对维系我们的心理健康十分必要。因此，我们必须思考当今乃至今后几十年，城市环境因素将对公众健康产生的不利影响，而这正为亲自然设计提供了用武之地。

什么是亲自然设计？

亲自然设计的目的是在人造环境中融入自然刺激，以保护、维持、恢复上的、提高我们与自然界在生理、认知和心理上的联系。亲自然设计的理论体系尚不完善，但是在亲自然设计领域中成果卓著的研究在不断涌现。

亲自然设计是随着“热爱自然的天性”这一概念的普及发展而来。1984年，爱德华·O·威尔逊出版了《热爱自然的天性》一书，将“热爱自然的天性”定义为“人类与其他生物天生的情感联系”，威尔逊解释

到“天生”的意思是先天遗传，因此这是人性的一部分”，这正好与罗杰·乌尔里希具有里程碑意义的医学研究不谋而合，乌尔里希的研究发现观赏自然风景在病人康复过程中对健康具有影响。

近几十年来对亲自然设计课题的研究，可以归为以下三类：1）空间里的自然：在某一空间中直接的、物理的、短暂性的自然；2）类自然事物：有机的、非生物的、能够间接地唤起与自然的联系；3）自然的自然：自然中常见的空间布局。以上三大类别又可以衍生出14种亲自然设计的模式。自然界的格局被应用在建成环境中的亲自然设计中，而且由于大部分空间具有差异性（例如区域、气候、用途、生态系统），没有两个项目会采用相同的设计方案。相反，每个设计方案都旨在优先考虑项目业主的健康需求，同时保持方案具有一定的适应性，以满足社区与生态系统不断发展的需求。

亲自然设计的作用

与自然的互动可以减轻压力、减少烦

躁、缓解精神疲劳、降低血压、舒缓好斗情绪，还可以提高自尊心、改善情绪，以及通过“恢复”过程提高医院病人的康复率。恢复可以看作是另一项使人类受益的生态系统服务。在项目初期就引入亲自然设计，景观设计师可以以此为工具来使得公共健康政策目标与基础设施弹性、生态系统功能和文化美学协调一致。

亲自然设计使得建成环境能够对健康发挥预见性的助益健康的作用，而非通常的反应性的病理学的作用^[2]。助益健康的理念认为“健康”涵盖多方面的因素，如心理、认知、社会和环境影响等因素，而不仅限于生物因素^[3]。

亲自然设计项目的考虑因素

许多关于亲自然设计的讨论一直是在室内设计的背景下展开的。那么，将亲自然设计融入景观设计又将如何？这需要考虑哪些问题？相较于室内设计，户外的、规模宏大的景观项目为亲自然设计带来了更大的机遇。原因有三：景观拥有真实的自然（与代表

性的自然相比)、知觉流畅性,以及复杂的适应系统。

热爱自然的天性在室内应用中存在的一个常见问题是:代表性的或者仿造的自然是否能够有效替代真实的、鲜活的自然。值得庆幸的是,户外景观中不存在室内环境的局限因素(光照、养护等)。人类使用大脑中的不同部位来处理自然元素与人造元素的信息,当人类与真实的自然互动或者体验到真实的自然时,所获得的健康效益更加显著。这种现象被称为“知觉流畅性”:人类有认知资源的需要,这就要求人类感知并处理特定刺激^[14]。与处于人造自然环境或者繁华的城市街道相比,感知并处理天然环境刺激对认知的需求较低,人类的注意力资源也能够随之获得补充。^[9]

最后,避免具有“象征”特色与暗喻主题的亲自然设计(因为它们对自然条件下的复杂的适应性环境毫无裨益),才最有可能长期保持对健康的积极影响^[7]。象征自然的设计是亲自然设计应用于室内时一种常见的默认策略,但由于景观设计拥有来自真实的自然和自然系统的众多资源,使场地与自然得以建立起持久的、健康的联系。特定的生态系统如何运转、生态系统的复杂性及其与大环境(即景观、社区、流域等)的关系、物种(包括动物与植物)行为的季节性、资源流动(水、养分、阳光),以上每一项都为一种适应性的设计策略提供了依据,各种策略也支撑着景观所带来的公共健康与福祉,而景观将为世代代所享用、向往和维护。

亲自然设计在景观设计中的实施模式

下文中介绍的模式选自《亲自然设计的14种模式》一书^[9],这为景观设计提供了重要机遇,因为这些模式具有广阔的应用前

景,并且可以应用于任何规模的项目上,有助于提升健康与福祉。

观望与庇护

观望——从一定距离外进行监视与规划的无障碍地观看,是景观项目中最容易实现的,能够在场地内看到远景,或者看到场地之外的焦点。把场地之外的焦点或风景融入设计是中国传统园林设计的重要原则,在汉语中这种方式被称为“借景”。借景创造出比现实情境空间更大、内容更丰富的错觉。中国苏州的拙政园包含了某些最精妙的借景设计,由于人们更乐意欣赏园中30m开外的景色^[9],这为设计者营造景色与设置视觉屏障都留出了足够的空间(图1)。最佳的观望景象有着类似于疏林草地环境的构成元素和空间特征(地形起伏、低矮的草地、灌丛、水体和人类活动或居住的迹象)。

庇护的空间特征先是给予头顶以保护,继续而保护身后^[10],从而给人以安全感。在城市景观环境的背景下,庇护意味着不受雨淋、不受日晒,或避开喧嚣的街道。这种模式旨在将视线限制在空间之内,同时能够从空间内向外观望周边环境^[11]。

观望与庇护对于健康的益处包括减少压力、缓解烦躁与易怒情绪、减轻疲劳和认知漏洞、提高舒适度、快速恢复。虽然观望与庇护属于两种不同的模式,但如果将两者结合会加强设计对健康的益处(图2)。

复杂性 with 秩序性

这种模式旨在依循空间层次和自然几何形式(它们具有连贯性但又十分复杂)将自然界中发现的对称和分形结合起来^[12]。这可以通过在具有代表性的艺术品、铺装材料等的表面,模拟自然的对称和分形得以实现。更全面地说,这可以通过模拟(或支持)自

然界中生态系统和植物群落的复杂且不断变化的结构与排布实现,这包括人流,促进社交活力的节点和网络。这种模式的应用有助于改善项目的空间构成,使得景观与贯穿其中的导向系统看起来更自然,方便游客辨识方向,能够创造低压力的体验,并利于恢复疲劳。

与自然系统的联系

这种模式的目的是让使用者了解一个地方的季节性,以及环境管理和自然过程的重要性。短暂性是其中的一个关键要素,短暂性可以通过风化过程、动物捕食、季节性迁移模式、水文循环、植被的季节性变化等得以体现。在景观设计实践中应用这种方法包括:使用露天的城市排水系统,对季节性种植和河床加以规范或保护,为野生动物和传粉昆虫提供栖息地,尊重景观与当地气候条件、生态系统、游客使用倾向,以及景观随时间而演变与适应的自然趋势之间独特而复杂的特征与关系。能够建立上述联系的亲自然景观,将有助于在游客观赏和体验中营造出感知变化,同时能够提高游客对于其他亲自然体验的健康反应。

水之存在

水具有激发人与场地积极情感联系的强大能力。现有的证据表明人们偏好带有水景的景观,尤其是当水景占据到整个景色的三分之二左右时^[12]。复杂的水流波动,如潺潺流水和瀑布,能够激发出更为强烈亲自然回应^[13],或者当游客能够接触到水或与水互动时也会产生这种效果。已有研究显示景观中的水景能够减少压力、增加宁静感、减缓心率、降低血压,甚至能够增强注意力和记忆力。水景作为景观的焦点和节点,还可以减轻嘈杂道路交通所产生的负面影响。

2. 美国俄勒冈州波特兰市的兰苏中式花园。在这个花园的设计中,应用了与自然系统的联系、水之存在、复杂性 with 秩序性的模式,并适当地运用了观望与庇护模式。从一处庇护空间望去,分形的装饰物框定了视野,并由物种丰富的植被进一步界定了景象,使用者在这里可以看见或被看见,或者独自在这个幽暗的空间中沉思。

2. Lan Su Chinese Garden in Portland, Oregon, USA, employs the patterns of Visual Connection with Nature System, Presence of Water, Complexity and Order and a healthy balance of Prospect and Refuge. Prospective views from one refuge space to another, framed with fractal ornamentation and further enhanced with bio-diverse vegetation, allow the visitor to see and be seen, or to retract into the shadows for contemplation.

在城市景观设计中应用亲自然模式的战略

为实现微修复体验而改造

由于高密度城市的中心区域空间十分有限,大尺度的亲自然设计有时并不可行^[14]。人们乐意通过步行或能够步行前往体验自然的距离往往不超过300m^[15]。由于城市中往往缺乏绿色空间,并且前往绿色空间的路径有限,城市环境缺乏自然体验有可能成为城市居民健康状况不佳的首要原因。

有趣的是,绿色空间并不一定是面积越大越好,因为绿色空间对心理和生理的积极影响并非与占地面积成正比。然而,生物多样性水平越高,人们越能从绿色空间中获益^[16]。这意味着在高密度的建成环境中,许多小尺度的亲自然景观对健康也有着重要的意义(图3)^[14]。

创建亲自然城市环境的一个关键策略就是对上班、上学、购物等活动的主要路径周围的小空间进行改造^[6]。提高这些小空间的生物多样性水平,可以使生态系统服务、绿色基础设施的适应性 with 人类的健康目标相互协调^[17]。

然而,这种改造通常面临着多方面的

限制。空间的限制意味着诸如可选择的植被较少、土质较差、空间配置人工化等限制因素,这些因素将对哪些模式能够成功应用及其效果如何带来显著影响。虽然这些因素限制了大型植被元素和观望视野的运用,但是景观设计师还是可以利用类自然事物或代表性的自然因素来改善空间的亲自然特质。

将弹性融入建成环境

气候变化、自然灾害和对能源的依赖都驱动着弹性政策与弹性设计,但由于建筑环境也在随之改变,这使得我们如何保持有效的亲自然景观体验以增强公众健康与福祉这一问题变得更为复杂。对于所设计的景观的功能而言,亲自然设计策略越整合,预计的健康效应就能更好地随着动态的城市景观而消长。

迎合户外环境的季节性变化是保持亲自然设计模式一直行之有效的方法之一。充分利用景观的季节性变化,能够使设计师开发出一一年四季均具有表现力的亲自然设计模式策略。从本质上讲,就是当一种亲自然设计元素由于季节周期而停止作用(例如物种进入休眠状态),另一个元素将被激活。

对景观设计的启示

在过去的二三十年间,景观设计师将工作重点主要集中在材料的可持续性和气候变化问题上,对使用者体验疏于关注。随着自然和绿色空间能够促进人类健康的实证证据获得更广泛的认可,使用者体验重新成为设计考虑的前沿,并进一步扩展了其在健康与福祉方面的价值。这需要设计师、规划师、健康专业人员和其他专家之间进行更加广泛地合作。

在未来几十年中,就城市化与公众健康未来的趋势而言,亲自然设计必将成为景观及其他类别设计中必不可少的组成部分。这些因素相互融合,已经开始催化景观设计成为维系和提高城市环境中的公众健康的重要力量。简单地说,亲自然设计正是好的设计的延伸,而在设计实践中秉承上述标准已是景观设计师在专业上、伦理上和道德上不可回避的责任。**LAF**

注释

乔·克兰西与雷康铃合作编著了《亲自然设计的14种模式:提高建成环境的健康和福祉》一书(2014年),其电子版内容可以在Terrapin Bright Green公司的网站上免费下载:www.TerrapinBG.com/publications/。



THE ROLE OF BIOPHILIC DESIGN IN LANDSCAPE ARCHITECTURE FOR HEALTH AND WELL-BEING

As of 2007, over 50% of the global population is now urban^[1]. With more urbanites comes greater displacement of green space and natural environments from our urban centres. Urban environments can cause mental fatigue and stress and, conversely, interaction with natural environments and features is necessary for maintaining our mental health. We must consider that these factors in our urban environments will have a detrimental effect on public health now and in the decades to come. This is where biophilic design comes into play.

What is Biophilic Design?

Biophilic design aims to incorporate natural stimuli into our manmade environments to restore, maintain and enhance our physiological, cognitive and psychological connections with the natural world. It is a design ethic still in its infancy, with an impressive body of research that is growing at an increasing rate.

Biophilic design has evolved from the popularization of “Biophilia” with Edward O. Wilson’s 1984 publication *Biophilia*, which framed the term as “... the innately emotional affiliation of human beings to other living organisms”, and explained that “Innate means hereditary and hence part of ultimate human nature”. This coincided with Roger Ulrich’s cornerstone hospital study on health impacts of a view to nature in the patient recovery process.

Decades of research on biophilic design topics can be thought of in terms

of three categories: 1) Nature in the Space: the direct, physical, ephemeral presence of nature in a space; 2) Natural Analogues: organic, non-living and indirect evocations of nature; 3) Nature of the Space: spatial configurations common in nature. Under these three categories sit 14 patterns of biophilic design. Patterns from nature are used to frame applications of biophilic design to the built environment, and because most spaces have some variability (for example, area, climate, usage, ecosystem) no two projects will necessarily result in the same design solution. Instead, each solution aims to meet the health priorities of the project owner, while maintaining a level of adaptability for the evolving needs of the community and ecosystem.

Benefits of Biophilic Design

Interactions with nature can reduce stress, irritability, mental fatigue, blood pressure, and aggressiveness. They can also improve self-esteem and mood, as well as rates of recovery for hospital patients, through a process known as “restoration”. Restoration itself can be thought of as another ecosystem service from which humans benefit. When introduced early in the design process, landscape architects can use biophilic design as a tool for aligning public health policy goals with those for infrastructure resilience, ecosystem function and cultural aesthetics.

Biophilic design offers an opportunity for the built environment to act as part of

a proactive and salutogenic approach to health rather than the standard reactive and pathogenic approach to health^[2]. The salutogenic approach sees “health” as encompassing multidimensional factors such as psychological, cognitive, social and environmental influences, rather than just biological^[3].

Considerations for Biophilic Landscape Architecture Projects

Much of the discussion around biophilic design has been in the context of interior design. So how is biophilic design implemented in landscape architecture? What issues need to be considered? The outdoor, expansive quality of landscape projects provides greater opportunities for implementing biophilic design patterns than in interior design environments due to three factors: real (vs representational) nature; perceptual fluency, and complex adaptive systems.

A common question for indoor applications of biophilia is whether representational or fake nature is an effective alternative to real, living nature. Such limitations of the indoor environment (daylight, maintenance, etc.) fade away with the outdoor landscape, and thankfully. Humans process natural element and manmade ones in different parts of our brain, and the beneficial health effects are more significant when interacting with or experiencing real nature. This phenomenon is known as perceptual fluency; the demand

on cognitive resources required for perceiving and processing a specific stimulus^{[4][5]}. With lower demands placed on cognitive functions for perceptually processing natural environmental stimuli, attentional resources are given the opportunity to be replenished faster than when experiencing fake nature or a busy urban street.^[6]

Finally, biophilic landscapes that are most likely to maintain a positive health impact over the long term are ones that avoid “tokenistic” features and metaphoric theming that offer little contribution to the naturally complex adaptive environment^[7]. Tokenistic nature-inspired design is a common default for biophilic design strategies in interior applications, but as landscape architecture has a vast palette of real nature and natural systems to draw from, there exists a unique opportunity for creating lasting and healthful connections to place. How a particular ecosystem functions, its complexities and relationships with the greater whole (i.e., landscape, community, watershed, etc.), and the seasonality of species behaviour (of both flora and fauna) and resource flows (water, nutrients, sunlight), each inform an adaptive design strategy that also supports public health and well-being in a landscape that aspires to be used, admired and cared after for generations.

Implementing Patterns in Landscape Architecture

The following patterns draw from

14 Patterns of Biophilic Design^[8] as key opportunities for landscape architecture, as they have broad applications and can be applied to any size project to help improve health and well-being.

Prospect and Refuge

Prospect, as an unimpeded view over a distance for surveillance and planning, is easiest to achieve in landscape projects that allow for long distance views within the site or external views to focal points in the landscape. This form of prospect, with the focal point / view being external to the site is a key principle of traditional Chinese garden design. Known as *jièjǐng* (借景), or the “borrowed view”, it creates the illusion that the space is bigger and more information-rich than it actually is. The Humble Administrator’s Garden in Suzhou, China contains some of the finest examples of *jièjǐng* (Fig. 1). Views greater than 30 meters are preferred^[9] so as to provide ample ground for surveying, for both opportunity or hazard. In best-case scenarios, prospective views include content and spatial characteristics that are representative of a savannah-like environment including undulating topography, low growing grass, copses of trees, water and evidence of human activity or habitation.

Refuge can be spatially characterized by protection overhead, followed by protection to one’s back^[10], allowing for a feeling of safety. In the context of the urban landscape environment, this could mean protection from the rain or sun, or retreat from the busy street. This pattern seeks to limit visual access into the space

while supporting a degree of prospective views outward from within the space towards the surrounding context^[11].

The health benefits of prospect and refuge can range from reduced stress, boredom, irritation, fatigue and perceived vulnerability, to improved comfort and expedited restoration. While they are two separate patterns, their health benefits are enhanced when combined (Fig. 2).

Complexity and Order

This pattern aims to incorporate symmetries and fractals found in nature that adhere to spatial hierarchies and natural geometries, which are coherent yet sufficiently complex^[12]. At the surface, this can be achieved by replicating natural symmetries and fractals in representational artwork, paving materials, etc. More comprehensively this can be achieved by mimicking (or supporting) the complex and evolving structures and arrangements of ecosystems and planting communities found in nature, including pedestrian flows, and the nodes and networks of social virility. The implementation of this pattern helps establish the spatial configuration of a designed scene, making the landscape and wayfinding throughout it seem natural and hence, easily processed by visitors, allowing for a low-stress experience and opportunity for mental restoration to take place.

Connection with Natural Systems

This pattern aims to make users aware of the seasonality of a place, the

importance of environmental stewardship and natural processes. Temporality is a key component, such as expressed through weathering processes, animal predation, seasonal migration patterns, hydrological cycles and seasonal patterns of vegetation. Methods of implementing this in landscape architectural practice include the use of exposed urban drainage systems, the specification or protection of seasonal plantings and streambeds, and the provision of wildlife and pollinator habitat; embracing the unique and complex characteristics and relationships a landscape and its local climate, ecosystem and visitor usage trends, as well as the natural tendency for a landscape to evolve and adapt over time. A biophilic landscape capable of establishing these types of connections will help create a perceptual shift among visitors in what they are seeing and experiencing, which may also enhance their health responses to other biophilic experiences.

Presence of Water

Water has a powerful capacity to engender a positive emotional connection to a place. Current evidence indicates preferences are for views to landscapes with water features, particularly ones that occupy approximately two thirds of the scene^[12]. Greater biophilic responses are also generated by complex fluctuations in water flow, such as achieved by babbling brooks and waterfalls^[13], and when visitors have the option to touch or interact with the water. Water features in the landscape

have shown to reduce stress, increase feelings of tranquility, lower heart rate and blood pressure, and even improve concentration and memory. As focal points and destinations in the landscape, they can also serve to mitigate the negative effects of noisy street traffic.

Strategies for Implementing Biophilic Patterns in Urban Landscape Architecture

Retrofit for Micro-restorative Experiences

As space within high density urban centres is scarce, large scale biophilic design endeavours are not always possible^[14]. The distances people are willing or able to travel by foot to experience nature is often less than 300 meters^[15]. With urban green space in short supply, and access to it limited still, urban environments devoid of natural experiences are at risk of becoming a primary factor in the poor health of its own citizens.

Interestingly, when it comes to green space, bigger is not always better, as psycho-physiological benefits of green space are not proportional to land area. Instead, the benefits from green space can increase with higher levels of biodiversity^[16]. This means that many small biophilic landscapes can have a meaningful health impact within high density built environments (Fig. 3)^[14].

Thus, a key strategy for creating biophilic urban environments is the retrofitting of small spaces along key routes, such as to work, school,



3. 美国纽约市的佩雷公园是一个亲自然城市景观的优秀案例。它创造了一个逃离喧嚣的街道（庇护模式），并且从这里可以观望街景（观望模式），阳光透过树冠洒在这个空间（创造出不断变化的漫射光线模式，在本文中未表述），以及一个位于公园后部的巨大的跌水（水之存在模式），这些要素共同在高密度的城市环境中构成了一个微修复空间。
3. Paley Park, in New York City, USA, is an excellent example of biophilic urban landscape with an escape from the busy street (Refuge), a view out over the street (Prospect), dappled light from the tree canopy (Dynamic and Diffuse Light, not demonstrated in this article), and a powerful waterfall at the back of the park (Presence of Water), utilized together as part of a micro-restorative space in a high-density environment.

shopping^[6]. Increasing levels of biodiversity within these small spaces could harmonize human health goals with those of ecosystem services and green infrastructure adaptation^[17].

However, retrofitting does come with constraints. Restrictions on space translate to fewer vegetation options, poor soil quality and contrived spatial configurations, for example, that can significantly influence which patterns can be successfully implemented and to what efficacy. While these factors can rule out meaningful elements of vegetation and prospective views, landscape architects can also utilise natural analogues, or representational nature, to improve the biophilic quality of a space.

Incorporate Resilience into the Built Environment

Climate change, natural disasters, and energy dependency have each been drivers of resiliency policy and design, but as the built environment evolves in response, it adds a layer of complexity to the discussion of how we are to maintain an effective biophilic landscape experience for enhanced public health and well-being. The more integral biophilic strategies are to the functionality of designed landscapes the more likely the intended health responses are to withstand the ebb and flow of a dynamic urban landscape.

Embracing seasonal variation of outdoor environments is one method of ensuring biophilic design patterns maintain efficacy. Capitalizing on the variability of landscape allows designers

to develop strategies that maintain the efficacy of biophilic design patterns throughout the year and beyond. Essentially, when one element of a biophilic design response deactivates due to seasonal cycles (for example, species goes dormant), another response becomes activated.

Implications for Landscape Architecture

The last 20 to 30 years have seen landscape architects focus primarily on sustainability of materials and climate change issues, with diffuse attention toward the user experience. With wider recognition of the evidence supporting the health benefits of nature and green space, the user experience has again risen to the forefront of design considerations, but with an expansion of values to include health and wellness. This requires greater collaborations among designers, planners, health professionals and other experts.

With the predicted trends for urbanization and public health in the decades to come, it seems natural that biophilic design be a requisite of landscape architecture, and of design in general. These converging factors have begun to catalyse landscape architecture as a central player in maintaining and enhancing public health in urban environments. Simply put, biophilic design is purely an extension of good design, and the professional, ethical and moral responsibility to uphold such standards in design practice has been placed upon landscape architects. **LAF**

NOTE

Joe Clancy and Catie Ryan are co-authors of "14 Patterns of Biophilic Design: Improving Health and Well-being in the Built Environment" (2014), which can be downloaded at no cost from Terrapin Bright Green's website: www.TerrapinBG.com/publications/.

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