

DESIGNING WITH NATURE: BIOPHILIC STRATEGIES FOR SUSTAINABLE AND HUMAN-CENTERED URBAN HOSPITALITY



Zamira Juraeva

Master's Student

Altinbaş University, Department of Architecture

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Abstract: The article investigates biophilic design as an architectural method which unites humans with nature through built environments. The article uses foundational theories by Erich Fromm, Edward O. Wilson, and Stephen R. Kellert to explain biophilia's psychological, biological and spatial aspects and their practical applications in sustainable design. The article examines the 14 biophilic design patterns through an extensive evaluation of the PARKROYAL on Pickering hotel in Singapore which demonstrates how nature-based architecture improves environmental performance alongside user experience and urban resilience.

Keywords: Biophilic design, sustainable architecture, human-nature connection, arid climate, urban design, PARKROYAL COLLECTION Pickering, hotel.

Аннотация: В статье исследуется биофильный дизайн как архитектурный метод, соединяющий человека с природой через построенную среду. В работе рассматриваются основные теории Эриха Фромма, Эдварда О. Уилсона и Стивена Р. Келлerta, раскрывающие психологические, биологические и пространственные аспекты биофилии и их практическое применение в устойчивом дизайне. В статье проводится подробный анализ 14 шаблонов биофильного дизайна на примере отеля PARKROYAL on Pickering в Сингапуре, который демонстрирует, как архитектура, основанная на природе, улучшает экологическую эффективность, опыт пользователей и устойчивость городской среды.

Ключевые слова: Биофильный дизайн, устойчивая архитектура, связь человека с природой, засушливый климат, градостроительство, PARKROYAL COLLECTION Pickering, отель.

Annotatsiya: Maqolada insonlarni tabiiy muhit bilan uyg'unlashtiruvchi me'moriy usul sifatida biofilik dizayn o'rganiladi. Maqolada biofiliyaning psixologik, biologik va fazoviy jihatlarini va ularning barqaror dizayndagi amaliy qo'llanilishini tushuntirish uchun Erich Fromm, Edward O. Wilson va Stephen R. Kellertning asosiy nazariyalariga tayaniladi. Maqolada Singapurdagi PARKROYAL on Pickering mehmonxonasi misolida 14 ta biofilik dizayn naqshlari keng tahlil qilinadi. Bu me'moriy yondashuv inson tajribasi, shahar barqarorligi va atrof-muhit samaradorligini yaxshilashdagi rolini ko'rsatadi.

Kalit so'zlar: Biofilik dizayn, barqaror arxitektura, inson-tabiiyat aloqasi, qurg'oqchil iqlim, shaharsozlik, PARKROYAL COLLECTION Pickering, mehmonxona.

Introduction

Erich Fromm (1964) introduced the term biophilia to describe the psychological connection people have with life and growth. Edward O. Wilson developed this concept by adding evolutionary dimensions to its biological foundation. Stephen R. Kellert (2008) developed a design philosophy based on biophilia which promotes the integration of nature into built environments through essential features that affect health and cognition and emotion.

Kellert identifies three primary dimensions of biophilic design:

The three main dimensions of biophilic design include direct nature exposure through plants and water and light and air and animals.

The second dimension of indirect nature experience includes the application of natural materials together with colors and textures and imagery.

The third dimension of experience of space and place includes spatial arrangements which reflect natural processes such as openness complexity and variability.

Materials and methods

These dimensions provide a multi-sensory and holistic foundation for designing environments that nurture both individual well-being and ecological awareness. Within this framework, biophilic design becomes not just an aesthetic strategy but a transformative design philosophy—capable of addressing emotional needs, reinforcing cultural identity, and promoting environmental stewardship within the context of contemporary architecture (Table 1).

Table 1.1. Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life (2008)

Principles	Conceptual Explanation
Direct Experience of Nature	Involves the incorporation of natural elements—such as vegetation, water, natural light, air, and living systems—directly into architectural space to stimulate sensory and physiological engagement.
Indirect Experience of Nature	Refers to the use of materials, patterns, colors, images, and textures that symbolically or representationally evoke nature, without requiring direct contact with living ecosystems.
Experience of Space and Place	Entails designing spatial configurations that mirror natural processes and patterns—such as variation, openness, enclosure, and rhythm—to create psychologically comfortable and dynamic environments.
I.	Direct connection with nature - incorporating natural elements such as plants, water, natural light and fresh air into the architectural environment.
II.	Indirect relationship with nature - using natural materials, natural forms, textures, colours and images to create a sense of nature's presence.
III.	Spatial conditions - constructing layouts and spaces that mimic natural processes: open spaces, natural light, organic forms.

From a practical point of view, biophilic design includes a variety of methods, from vertical gardening and green roofs to optimizing daylight, implementing natural ventilation systems and integrating water features into urban infrastructure.

Terrapin Bright Green's (2014) publication *14 Patterns of Biophilic Design* further categorizes sensory and spatial connections to nature, including thermal comfort, airflow, soundscapes, and even olfactory stimulation. These design elements not only enhance visual appeal but also improve environmental quality and human experience in urban settings.

PARKROYAL on Pickering, completed in 2013 and designed by the award-winning firm WOHA Architects, stands as a seminal example of biophilic urban hospitality architecture. Strategically situated between Singapore's Chinatown and the Central Business District, the project advances the notion of a "hotel-in-a-garden" by embedding ecological systems directly into its architectural language. Covering more than 200% of its site area with greenery, the hotel acts not only as a place of rest but also as a living ecosystem, addressing both environmental and psychological needs in the dense urban fabric.

Biophilic Design Patterns: From Theory to Spatial Experience

The building operationalizes key biophilic design patterns as defined by Stephen Kellert, Judith Heerwagen, and others, transforming theoretical principles into experiential and performative architecture. These include:

i Visual Connection with Nature

The building provides continuous exposure to natural environments through its multi-level sky gardens and vertical green walls and planted terraces. The elements provide visual relief and cognitive restoration which represents a primary objective in human-centered design.

ii Biomimetic Forms and Pattern

The architecture features fluid, curvilinear forms that evoke natural landforms. The biomorphic expressions create a softening effect on the urban skyline while they trigger positive affective responses by connecting users to familiar natural patterns.

iii Thermal and Airflow Variability

The building façade features multiple layers of vegetation and roof extensions which create various microclimates that promote both natural ventilation and passive cooling systems. The thermal diversity pattern replicates natural environments to create comfortable spaces for occupants while decreasing energy requirements and improving touch-based interactions.

iv Material Connection with Nature

Organic materials such as wood stone and soil-based planting systems create a stronger sensory connection between people and their environment. These materials develop a natural beauty throughout time which enhances both their authenticity and depth.

Dynamic and Seasonal Qualities

The tropical monsoon climate of Singapore does not stop the architectural integration of plant life which responds to sunlight and humidity and growth cycles. The building absorbs these delicate changes which reflect natural variations while developing emotional bonds.

Sustainable strategies and environmental performance:

PARKROYAL on Pickering incorporates numerous green building technologies, such as:

- Rainwater harvesting for irrigation;
- Photovoltaic panels to power landscape lighting;
- Automated irrigation and plant maintenance systems;
- Sky gardens that act as thermal buffers and reduce cooling loads.

The building has received the BCA Green Mark Platinum rating - Singapore's highest green building certification - acknowledging its commitment to sustainability and biophilic innovation.

Urban integration and significance:

The PARKROYAL on Pickering hotel stands as a green sanctuary in the midst of the busy Central Business District and Chinatown area. The building exemplifies how nature can be harmoniously integrated into vertical urban spaces, redefining the relationship between architecture and the environment.

Methodological insight and adaptability:

For cities with hot or tropical climates, the project provides a highly adaptable model for integrating biophilic principles. In regions with hot and dry climates during the summer months, the following strategies can be adapted:

- using drought-tolerant plant species,
- integrating perforated structures for passive cooling,
- employing local, low-maintenance materials.

Ultimately, PARKROYAL on Pickering represents an innovative and poetic fusion of hospitality, ecology, and urbanism, offering a replicable framework for future climate-responsive design.



Figure 1. PARKROYAL COLLECTION Pickering is a landmark biophilic hotel in Singapore

Conclusion

Biophilic design represents a forward-thinking approach to architecture that seeks to restore the intrinsic human connection with nature. The framework combines psychological theory with evolutionary biology to provide a complete system for improving well-being and environmental sustainability and architectural experience enhancement. The case study of PARKROYAL on Pickering in Singapore demonstrates that biophilic design extends beyond decorative greening practices because it requires full integration of natural systems and sensory stimuli into built environments. PARKROYAL on Pickering serves as a leading example of biophilic architectural design because it operates within Singapore's dense urban core. The hotel presents itself as a "hotel-in-a-garden" through its sky gardens and green walls and cascading terraces which establish deep natural connections. The building achieves better environmental impact and human experience through its biophilic design elements which include visual nature connections and biomorphic forms and natural ventilation and thermal and airflow variability. The implementation of green building technologies including rainwater harvesting and photovoltaic panels supports the ecological sustainability of the building. PARKROYAL on Pickering demonstrates how biophilic design principles can be integrated into hot and dry climates through drought-resistant plant selection and perforated structures for cooling and local low-maintenance material choices.

Biophilic design functions as both a sustainable architectural tool and a philosophical approach which establishes a new connection between urban areas and natural environmental patterns. The extensive advantages of biophilic design demonstrate its ability to transform future human-centered climate-responsive design.

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