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Article

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Biophilic – a modern Trend in Design

Abstract:

The aim of the study is an influential trend in architecture and design called biophilia, which contributed to the formation of the style of a new type of biophilic design. The phenomenon called biophilia can be traced in the development of human civilization, from antiquity to the present day. However, it was only in the twentieth century that it became scientifically understood and formalized. Only in our days has biophilia become a conscious, purposeful and organized practical activity of man. It is in our days that "biophilic design" was born, which organically and logically fits into the so-called "green movement" and the world policy of sustainable development. The historiography of the topic presents authors who introduced the concepts of biophilia and biophilic design and the corresponding terms into scientific and practical circulation. Historical examples of early biophilic design are given. The reasons for the activation of biophilic design in the modern world and its development within the framework of the "green movement" are explained. The practice of biophilic design, its benefits for a person on a physical and emotional level are described. Using individual examples from contemporary residential and public interiors, urban environments and, on an even larger scale, entire cities, it is shown that this new specific type of design is a very relevant trend at the present time. As a result, it is concluded that, given the development of the modern urban environment and the deepening global climate, environmental and energy problems, biophilic design will become increasingly relevant in the future.

Key words: biophilic design; green movement; interior; interior design; trends; urban design.

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Introduction

Biophilia (from Greek bio-live, philos-love, literally love of live) according to Erich Fromm – psychoanalyst and social psychologist, is a personality trait oriented towards love of live creativity (biophilic character), is a tendency of the person focused on love of life and creation (biophilic nature). *"The passionate love of life and of all that is alive; it is the wish to further growth, whether in a person, a plant, an idea, or a social group"* [1, p. 365]. Biophilia is a tendency of the person focused on love of life and creation (biophilic nature). Biophilia is man's natural need to connect with nature. We humans, as its creation, have always sought and continue to seek this connection. It can be defined as a constant yearning for a closer bond. Biophilic design – this is a concept that is based on strengthening the connection of human habitation with nature. It is applied to buildings, their interiors, as well as on an urban scale, with numerous proven benefits. Although the term has been defined more recently, examples of biophilic design can be found as far back as antiquity, such as at the hanging gardens of Semiramis – one of the wonders of the ancient world. Actually they have not been discovered and it is assumed that they were built in the 7th or 6th century BC, or even earlier. They were located on the territory of Babylon (present-day Iraq). Their existence has not been proven but the legends because of which they are believed to have been built are several. According to one theory, they are the work of the semi-legendary queen Sammu-ramat (in Greek Semiramis, mother of the Assyrian king Adad-nirari III, who reigned from 810 to 783 BC) or of King Nebuchadnezzar II (reigned c. 605–c. 561 BC), who built them to comfort his Median wife Amytis because she missed the mountains and greenery of her homeland. According to another theory the hanging gardens may have been those built by Sennacherib (705/704–681 BC.) in Nineveh. The Hanging Gardens are described in detail by a number of classical authors. Although some sources disagree on who built them, in their descriptions all agree on the point, that the

gardens were located near the royal palace. They are described as a stone step-shaped, truncated pyramid, with vaulted terraces, whose area decreased in height. These terraces were layered with various materials, such as reeds, bitumen and lead, so that irrigation water did not seep through the terraces (Fig 1, 2). The gardens themselves were equipped with an exceptional irrigation system. Cedars, palms, pines and other large types of trees were grown on the first level. The second level was occupied by fruit trees and cypresses. Anemones, lilies, thousands of roses, exotic flowers and grasses flourished on the two highest platforms. Creeping vines and spreading plants covered the walls and columns, reaching the lower floors and uniting the individual levels into a perfect ensemble. Viewed from a distance, the gardens gave the impression that the trees and other vegetation were suspended in the air. This gives them the popular name "Hanging Gardens of Babylon"[2].



Fig. 1. Assyrian relief from Nineveh (now housed at the British Museum) shows trees hanging in the air on terraces and plants suspendedon stone arches that resemble those from Sennecherib's waterways, supporting the idea of a hanging garden at Nineveh - https://www.biblicalarchaeology.org/daily/ancient-cultures/ancient-near-eastern-world/hanging-gardens-of-babylon-in-assyrian-nineveh/

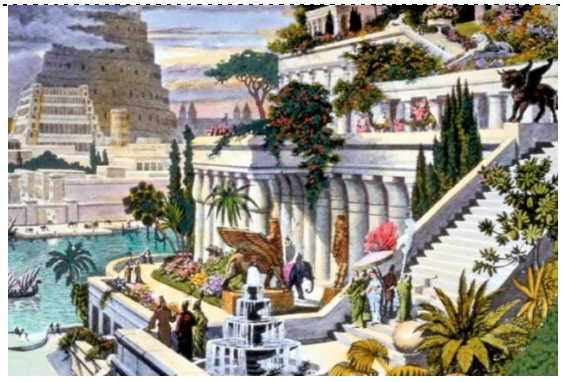


Fig. 2. Fanciful reconstruction, 19th century mistakenly attributed to Maarten van Heemskerck (1498-1574), apparently based on Berossus, c.250BC (mountain shaped, high walkways) and Philo, c.250BC, or c.150BC, or 1st century AD, or 6th century AD (forest ot columns, fountains) and Diodorus, c.50BC (starways) - http://www.plinia.net/wonders/gardens/hgpix1.html

Whether they existed or were merely a myth to romanticize the erstwhile empire, the Gardens of Semiramis testify to a way of seeking and achieving a close connection between nature and the built environment.

And if Erich Fromm in particular claims that *"Biophilia is the inherent human tendency to connect with nature, which even in the modern world continues to be crucial to the physical and mental health and well-being of people"*[3], then Stephen Kellert (Tweedy Ordway Professor Emeritus of Social Ecology and Senior Research Scholar at the Yale University School of Forestry and Enviromenttal Studies) explains: *"biophilia is the inherent human inclination to affiliate with nature that even in the modern continues to be critical to people's physical and mental health and wellbeing. The idea of biophilia originates in an understanding of human evolution, where for more than 99% of our species history we biologically developed in adaptive response to natural not artificial or human created forces. Most of what we regard as normal today is of relatively recent origin-raising food on a large-scale just in the last 12,000 years; the invention of the city, 6000 years old; the mass production of goods and services, beginning 400 years ago; and electronic technology, only since 19th century. The human body, mind, and senses evolved in a bio-centric not human engineered or invented world"* [4, p. 3] (Fig. 3).

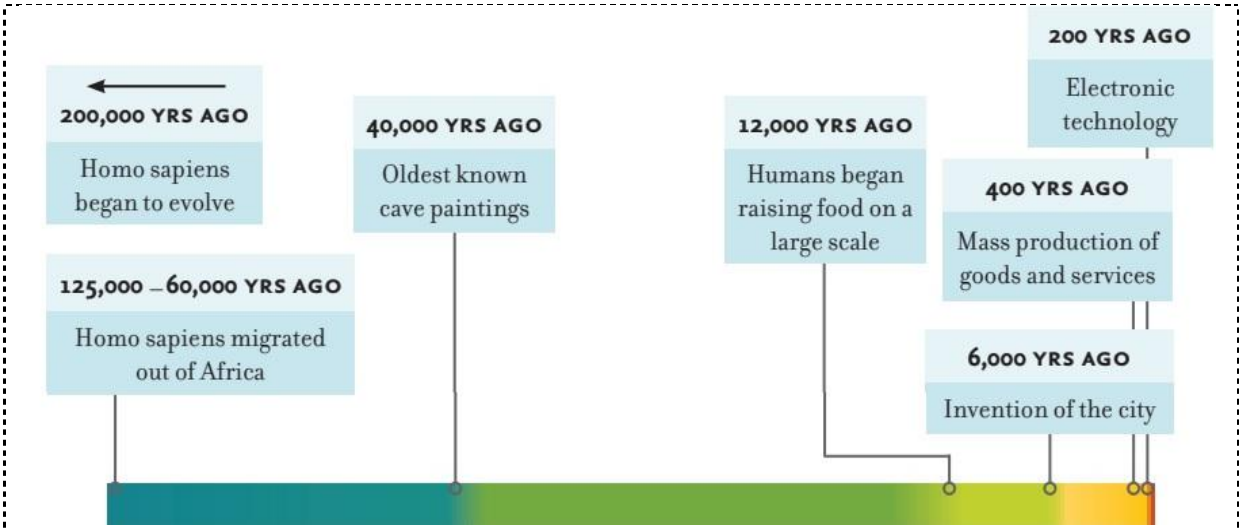


Fig. 3. Graphical representation where for more than 99% of our species history we biologically developed in adaptive response to natural not artificial or human created forces [4, p. 3]

The reasons behind the rise of the "biophilia" movement, the emergence of the concept and the spread of the so-called biophilic design today are undoubtedly global. They are connected with industrial revolutions, with urbanization processes, especially after the Second World War, with environmental problems and the energy crisis, with changes in climate and others.

In today's society the situation is complex. We observe "*population migration as a global phenomenon. One in seven people in the world being an internal or international migrant, the effects of migration are most felt at the local level". "The migration is a key driver of cities' growth In many parts of the world, migration is driving much of the increase in urbanization, making cities much more diverse places in which to live"*[5]. The overcrowding of cities entails more and more enclosed spaces. Our natural modern habitat is the urban environment where people spend 90% of their time. *"Raw material, energy and environmental issues have generated and continue to generate entirely new types and trends in design, such as: eco-design, re-design, energy-efficient and energy-saving design. They are also responsible for the increasing spread of the "green movement" as well as the emergence of the general trend of sustainable design. The "green movement" strives to reduce the waste of raw materials and resources, as well as to recycle garbage"* [6, p. 1]. Separation from the land and moving away from nature in general exacerbates the need for connection with it, gives impetus the search for biophilia, and sustainable development of cities in general. Biophilia is a current part of the so-called "green movement" and sustainable development policy in the world.

The challenge of biophilic design is to address these deficiencies of contemporary building and landscape practice by establishing a new framework for the satisfying experience of nature in the built environment. Biophilic design seeks to create good habitat for people as a biological organism in the modern built environment that advances people's health, fitness and wellbeing. The successful application of biophilic design necessitates consistenly adhering to certain basic principles. They include:

1.Biophilic design requires repeated and sustained engagement with nature.

2.Biophilic design focuses on human adaptations to the natural world that over evolutionary time have advanced people's health, fitness and wellbeing

3.Biophilic design encourages an emotional attachment to particular settings and places .

4.Biophilic design promotes positive interactions between people and nature that encourage an expanded sense of relationship and responsibility for the human and natural communities

5.Biophilic design encourages mutual reinforcing, interconnected, and integrated architectural solutions" [4, p. 6].

The practice of biophilic design involves the application of varying design strategies, what we refer to as experiences and attributes. The choice of which design applications to employ inevitably varies

depending on a project's circumstances and constraints including particular building and landscape uses, project size, varying economic, logistical and regulatory factors, as well as cultural and ecological conditions. As emphasized, the effective practice of biophilic design requires adhering to the previously noted principles. Most important, biophilic design should never occur in piecemeal or disconnected fashion, but rather in a manner whereby the diverse applications mutually reinforce and complement one another, resulting in an overall integrated ecological whole.

Three kinds of experience of nature represent the basic categories of our design framework. These include the direct experience of nature, the indirect experience of nature, and the experience of space and place.

The direct experience of nature refers to actual contact with environmental features in the built environment including natural light, air, plants, animals, water, fire, landscapes, and others that will be described.

The indirect experience of nature refers to contact with the representation or image of nature, the transformation of nature from its original condition, or exposure to particular patterns and processes characteristic of the natural world. These include images of nature, natural materials, natural colors, simulating natural light and air, naturalistic shapes and forms, evoking nature, information richness, age, change, and the patina of time, natural geometries, biomimicry.

The experience of space and place refers to spatial features characteristic of the natural environment that have advanced human health and wellbeing. The examples include prospect and refuge, organized complexity, integration of parts to wholes, transitional spaces, mobility and wayfinding, cultural and ecological attachment to place [4, p. 9–10].

The successful application of biophilic design should also result in a wide spectrum of physical, mental and behavioral benefits. Physical outcomes include enhanced physical fitness, lower blood pressure, increased comfort and satisfaction, fewer illness symptoms, and improved health. Mental benefits range from increased satisfaction and motivation, less stress and anxiety, to improved problem solving and creativity. Positive behavioral change includes better coping and mastery skills, enhanced attention and concentration, improved social interaction, and less hostility and aggression (Fig. 4, 5).

Having described everything about rediscovering the obvious, let's look at examples of biophilic interior design and directly experiencing nature.

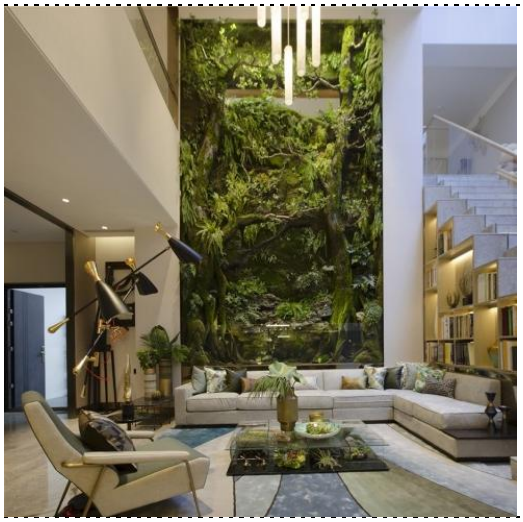


Fig. 4. "Green Living Room" by Charly W. Karl, (CC BY-ND 2.0) with terrariums in the coffee table and within the large green wall - https://www.greenroofs.com/2019/02/20/biophilia-turning-conventional-architecture-inside-out/



Fig. 5. Naranga Avenue House (by James Russell Architect) is entered through the extruded brick facade to a double-height patio with a crepe myrtle tree at its centre. Image: Toby Scott - https://architectureau.com/articles/naranga-avenue-house/

A widely used landscaping tool in biophilic design, not only in interiors are green walls. Today, the intersection of biophilic design and modern technology is smart green walls in interiors. They are a green wall/walls with smart management, which usually includes:

- Smart irrigation – monitoring humidity, temperature, sunshine, wind, precipitation, full automation, remote control;
- Smart lighting – monitoring light levels, full automation, remote control;
- Climate control – monitoring all environmental indicators;
- Monitoring – carried out continuously, at every stage. Full automation, remote monitoring and control on a screen or smartphone. Shows all historical data and statistics for the wall.

Benefits: "*10 times less carbon emissions in the living environment. 30% less water used, four times less maintenance time, saving labor costs"*[7].

Biophilic design in public interiors: Biophilic design is often deployed in office buildings, typicali in high-rise atriums. A very good example of directly experiencing nature in a public building is the mixed-use transit center in Kumamoto, Japan. The commercial complex includes retail, hotels, offices and residences. *"This project, as a key facility to development around the Kumamoto station core, is intended to be a symbol of recovery from the large-scale earthquake that hit Kumamoto in 2016, and to bring in new energy and vitality to the area. The centerpiece of the commercial facility is a "vertical landscape of water and greenery" that symbolizes the nature of Kumamoto*" [8]. Owner – Kyushu Railway Company, architect Nikken Sekkei Ltd., year 2021. The project won the 2022 Stephen Kellert Biophilic Design Awards (Fig. 6, 7).



Fig. 6. External view Kumamoto Station Building - https://www.biophiliccities.org/case-study-jr-kumamoto-station-building



Fig. 7. Interior of Kumamoto Station Building - https://www.biophiliccities.org/case-study-jr-kumamoto-station-building

In recent architectural practices, biophilic design has been implemented in many projects through the incorporation of green systems into buildings. Building greening systems typically refers to two-dimensional (2D) green roofs, walls, or facades. However, the wider range of three-dimensional (3D) green spaces developed on the top, in the sky, or inside of buildings are often overlooked in research (Fig. 8). These 3D green spaces, such as rooftop gardens, sky gardens, green balconies, indoor (sky) gardens, and atrium gardens, are collectively termed "green pockets". Compared to 2D green surfaces, these 3D green pockets have greater potential for performance and creativity in spatial arrangement because of their increased biomass, larger scale, and varied spatial forms and plant species [8].

Examples for biophilic design, direct nature experiences through green roofs in 2D and 3D green can be shown whit these buildings.

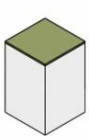
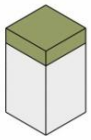
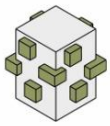
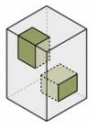
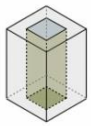
	2D Green Surfaces		3D Green Spaces (Green Pockets)			
Type diagram						
Terms	Extensive/ semi-extensive green roof	Green wall, green facade, living wall, or vertical greenery system	Roof garden, sky garden, or intensive green roof	Green balcony, or three-dimensional green facade	Indoor sky garden, elevated landscape, or green house rooftop	Indoor garden, or atrium garden,
Designed spaces in buildings	Outside	Inside or outside	Outside	Outside	Semi-inside	Inside
	Sky	Ground to sky	Sky	Elevated	Ground to sky	Ground to sky
Substrate depth	≤ 25 cm		> 25 cm			
Vegetation	Mosses, sedums, herbs, grasses, small and creeping shrubs, and climbing plants		Trees, small to large shrubs, ground cover plants (e.g. mosses, sedums, herbs, and grasses), and climbing plants			
Creative design	Low to medium potential		Large potential			
Technical complexity	Low to medium		High			
Maintenance	Low or periodically		Regularly and periodically			

Fig. 8. Comparison of 2D green surfaces and 3D green pockets in buildings – https://www.sciencedirect.com/science/article/pii/S2095263523000201?via%3Dihub

The School of Art, Design and Media at Nanyang Technological University Singapore today (Fig. 9) is regarded as an icon of sophisticated design and architecture, and has been featured in various international design publications. „The four-storey building, with its eye-catching sloped "grass roofs", was designed to blend in with NTU's gardens campus setting" [11]. The next example is also of a building with unique architecture. ACROS (Asian Crossroad Over the Sea) centre (Fig. 10) is situated in Fukuoka's financial district, adjacent both to Naka River and popular Tenjin Central Park, Japan. „This green roof consists of 100,000 m² of greenery stepped over fifteen terraces"[12].



Fig. 9. Nanyang Technological University (NTU) School of Art, Design and Media: https://www.easyuni.in/singapore/nanyang-technological-university-ntu-10274/



Fig. 10. The ACROS Fukuoka Prefectural International Hall https://makinglewes.org/2014/06/27/the-acros-fukuoka-prefectural-international-hall/

This impressive and inspiring park was designed by the renowned environmental architect Emilio Ambasz in 1995. The benefits of a green roof are: improving air quality, conserving energy, minimizing the urban heat island effect, efficient use of rainwater, helping to reduce water runoff . An example of three-dimensional landscaped facades is the "vertical forest" by Stefano Boeri Architetti.

The “vertical forest” consists of two towers that are respectively 80 and 112 metres high, housing a total of 800 trees (480 first and second stage trees, 300 smaller ones, 15,000 perennials and/or ground covering plants and 5,000 shrubs), providing an amount of vegetation equivalent to 30,000 square metres of woodland and undergrowth, concentrated on 3,000 square metres of urban surface.The project is also a device for limiting the sprawl of cities brought about through a quest for greenery (each tower is equivalent to about 50,000 square metres of single-family houses). Unlike “mineral” facades in glass or stone, the plant-based shield does not reflect or magnify the sun’s rays but filters them thereby creating a welcoming internal microclimate without harmful effects on the environment. At the same time, the green curtain “regulates” humidity, produces oxygen and absorbs CO2and microparticles, a combination of characteristics that have brought the project a number of important awards, including the International Highrise Award from the Deutschen Architekturmuseums in Frankfurt (2014) and the CTBUH Award for the best tall building in the world from the Council for Tall Buildings and Urban Habitat at Chicago’s IIT (2015) [13].

The drive to turn cities into green cities dates back to the late 19th century and Howard's garden city theory. “Roof gardens have been propagated since Le Corbusier” [6, p. 5]. However, the widest deployment of biophilic design today is in urban design, expanded to designing so-called biophilic cities.

Growing a biophilic city in a garden Singapore have won the 2019 Stephen Kellert Biophilic Design Award [14]. Singapore is perhaps the first "biophilic city" in the world. The city-state has an impressive network of trails and pathways that connect parks and green spaces to one another. These park connectors allow people to walk, bike, and jog between various green spaces without leaving vegetated areas. “In 1986, only 36% of Singapore was green space, compared to almost 47% known today” [15]. Singapore has also made considerable efforts to integrate nature into its vertical spaces. A number of high-rise apartments, office buildings, and hotels have installed green roofs and indoor hanging gardens to help reduce the effects of urban heat island wherein a metropolitan area is warmer than its surroundings because of escalated human activity. The city administration invests considerable effort in educational and awareness campaigns, encouraging active and conscious behavior among the population. And so, despite its rapid growth, Singapore has not become a jungle of concrete, instead it’s an outstanding example to the rest of the world of how urban life and nature combine.

The examples so far show that biophilic design is a contemporary trend in architecture, interior design and urban planning. Because of its benefits, it will be an increasingly relevant trend in the future. Thus, using individual examples from modern residential and public interiors, urban environments and, on an even larger scale, entire cities, it is shown that this new specific type of design is a very relevant trend at the present time. As a result, it is concluded that, given the development of the modern urban environment and the deepening global climate, environmental and energy problems, biophilic design will become increasingly relevant in the future.

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Sourses

I. Orientation to the Biophilic Design Toolkit, Section 1. What is Biophilic Design? URL: https://storage.googleapis.com/education-living-future-org/ILFI-Biophilic-Design-Toolkit-Version1-May-2022/index.html#/lessons/xfYOVlRjSCFUHVJQ_2EKgrq_9T00BvgB

II. Newsletter Biophilic Design Roundup. URL: https://www.linkedin.com/company/biophilic-design/posts/?feedView=all

Article Summary ***Design. Art. Industry*, 2024, Issue 11**

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Biophilic – a modern Trend in Design [Biofiliya – sovremennyi napravlenie v dizaine]

Аннотация:

Целью исследования является влиятельное направление в архитектуре и дизайне, называемое биофилией, которое способствовала формированию стилистики нового вида биофильного дизайна. Явление, называемое биофилией, прослеживается в развитии человеческой цивилизации, от античности до наших дней. Однако только в двадцатом веке оно стало научно понятым и формализованным. Только в наши дни биофилия стала осознанной, целенаправленной и организованной практической деятельностью человека. Именно в наши дни зародился «биофильный дизайн», который органично и логично вписывается в так называемое «зеленое движение» и мировую политику устойчивого развития. В историографии темы представлены авторы, которые ввели в научный и практический оборот понятия биофилии и биофильного дизайна и соответствующие им термины. Приведены исторические примеры раннего биофильного дизайна. Объяснены причины активизации биофильного дизайна в современном мире и его развития в рамках «зеленого движения». Описана практика биофильного дизайна, его польза для человека на физическом и эмоциональном уровне. На отдельных примерах из современных жилых и общественных интерьеров, городской среды и в еще большем масштабе – целых городов, показано, что этот новый специфический тип дизайна является весьма актуальной тенденцией в настоящее время. В результате сделан вывод о том, что, учитывая развитие современной

городской среды и углубляющиеся глобальные климатические, экологические и энергетические проблемы, биофильный дизайн будет становиться все более актуальным в будущем.

Ключевые слова: биофильный дизайн; зеленое движение; интерьер; дизайн интерьера; тенденции; городской дизайн.

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