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Biophilic Architecture

Ishani Bathri[1], Angad Kasliwal[2]
[1]*Fourth Year Student, Department of Architecture, SDPS Women's College, Indore, India*
[2]*Professor, Department of Architecture, SDPS Women's College, Indore, India*

***Abstract*: The recent research shows that there is a high-quality impact of nature and buildings having natural built environment on human wellbeing and health in different physical, physiological and social spaces. The need for the eco-friendly structure configuration turned out from the view that the need for human comfort is destroying the supporting arrangement of our lives. Through this research, I need to show the ongoing methodologies that lower the energy utilization of structures. The paper underlines the idea of biophilia and its rule. The overview of its green components and design credit and foundation way to deal with biophilia on nature.**

***Keywords*: Biophilic design, Built environment, environmental psychology, health, energy.**

1. Introduction

The word Biophilia is made up of two words 'Bio: nature' and 'Philia: love' [1] express the connection between nature, science and assembled condition with the goal that we may encounter its advantages. Biophilic Design is an impression of human instinct relationship structurally retouch into the manufactured and scene spaces. The Biophilic concept rotates around a conviction that people hold a biological requirement for interfacing with nature on physical, mental and social levels and their associations influence our prosperity, profitability, and cultural connections.

2. Related work

A. Literature review

1. Wilson, E. O. Biophilia; Harvard University Press: Cambridge, MS, USA, 1984 [2].

The biophilic design depends on the Biophilia hypothesis, which suggests that people have an inborn relationship with nature. As per the Biophilia hypothesis, these constructive outcomes of presentation to nature begin in an organic bond among people and the common world. We can comprehend the biophilia speculation as an outflow of Wilson's determination to study the human's relationship with nature. The viewpoint, which structures the nature of Wilson's contradiction, similarly as the environmental subtext of the biophilia hypothesis, empower this plan to be consolidated into the field of history. As this theory deals with the ethics of humanity's relationship with nature (biological ethic) it might be requested.

2. Dimensions, elements & attributes of biophilic design-(Stephen Robert Kellert), 2008 [3].

Biophilic design is a structured hypothesis that empowers the use of standard systems and strategies in the arrangement of the amassed condition. The thought behind the Biophilic structure at that point is to consolidate regular highlights and frameworks into the manufactured condition to give people their truly necessary introduction to nature. Biophilic configuration empowers the utilization of common components and procedures as structure motivation in the manufactured condition. A survey of Biophilic structure from a therapeutic situation point of view yielded numerous outcomes exhibiting the advantages of Biophilic plan for human prosperity.

B. Case study

1. Singapore's Khoo Teck Puat Hospital. [4]

As compared to other hospitals Singapore's Khoo Teck Puat (KTPH) is the very well-planned hospital in Asia with the concept of biophilic architecture. In no other hospitals this scale of components of space & landscape so expressly attached to the objective of human well-being the very meaning of biophilic design. The KTPH rivalry brief, from the beginning, asked that the new hospital should be a 'healing environment', a thought that drew from early research in ecological brain science, connected to biophilia, and which was insightful of patterns in Southeast Asian structure where engineers like Vo Trong Nghia (Vietnam) and Woha (Singapore) try different things with profound coordination of plants and design.

That concise set moving a biophilic mission that ventured into five standards:

- Sight- visual access to greenery and water;
- Smell- determination of scented plants;
- Sound- of water falling;
- Decent different plants, butterflies; & winged animals
- Network- open space arranged inside blue-green territories.

The principle thought sketch by winning gathering, CPG Consultants, showed a V-framed arrangement of squares, depicting a central court. The 'V' opened toward the north, letting in breezes that first skim over whirlwind water lake neighboring the crisis facility site. To exploit this typical breeze current, the envelope of the structures expected to change permeability and shade. The target here was that patients could get to typical light, cooling breezes, and points of view without threat of sun-controlled glare or deluge section. The green plot proportion of KTPH – a marker of how much greenery there is

in an improvement – is 3.92; at the end of the day, the all-out surface zone of level and vertical greenery consolidated is very nearly multiple times the size of the land that the clinic sits on. This is surprising for an advancement in a thick urban setting. As an extent of complete floor zone, blue-green spaces represent 18%. 40% of every such space are freely open. In post-inhabitance estimations, the microclimate of this court was some 2 ºC cooler than spaces simply outside the hospital.

Fig. 1. Site View (Singapore's Khoo Teck Puat Hospital) [5].

3. Scope of study

The objective of the study is to introduce biophilic architecture as a concept in India, to make buildings in which we can maintain the connection between humans and nature. And to provide a comfortable and healthy environment within the building.

4. The principles of biophilic design [6]

Following are the biophilic design principles,

- Biophilic design requires rehashed and continued connection with nature [6].
- Biophilic design centers around human adjustments to the regular world that over developmental time have propelled individuals' wellbeing, wellness and prosperity [6].
- Biophilic design urges a passionate connection to specific settings and spots [6].
- Biophilic design advances constructive associations among individuals and nature that support an extended feeling of relationship and duty regarding the human and characteristic networks [6].
- Biophilic design supports shared fortifying, interconnected, and coordinated engineering arrangements [6].

5. Green components in biophilic architecture

The term green components refer to elements like plants and trees. It works as an external component which is mostly used as a façade of the building. This external component helps to protect the building from direct sun rays and improve its thermal performance. The green components are mostly used as Green Roof or as a Façade. Green components are also planned as a green space within the building. The green components can be planned and placed easily; it is aesthetically pleasing as well as it also solves the environmental problems. It reflects very positive effects to the health of people in that building.

6. Application of biophilic design

The Biophilic Design includes its application on various structures, what we studied as experiences & attributes. The actual practice of biophilic design is stick to the principles, attributes, patters, etc. The very important biophilic design should not occur in disconnected pattern, yet rather in away whereby the different applications commonly strengthen & supplement each other, bring about an in general coordinated biological entirety.

There are 3 types of experience of nature: [6]

- The direct experience of nature.
- The indirect experience of nature.
- The experience of space & place.

Within these three group of experience, 24 attributes of biophilic design have been identified. Following are the Experience & Attributes of Biophilic Design:

A. Direct Experience of Nature [6]

1) Light
2) Air
3) Water
4) Plants
5) Animals
6) Weather
7) Natural landscapes and ecosystems
8) Fire

B. Indirect Experience of Nature [6]

1) Images of nature
2) Natural materials
3) Natural colors
4) Simulating natural light and air
5) Naturalistic shapes and forms
6) Evoking nature
7) Information richness
8) Age, change, and the patina of time
9) Natural geometries
10) Biomimicry

C. Experience of Space and Place [6]

1) Prospect and refuge
2) Organized complexity
3) Integration of parts to wholes
4) Transitional spaces
5) Mobility and wayfinding
6) Cultural and ecological attachment to place

Table 1
14 patterns of biophilic design [7]

Nature in the space.	Natural analogues.	Nature of the space
1) Visual connection with the nature.	8) Biomorphic Forms & Patterns	11) Prospect
2) Non-visual connection with the nature.	9) Material Connection with Nature	12) Refuge
3) Non-Rhythmic Sensory Stimuli.	10) Complexity & Order	13) Mystery
4) Thermal & Airflow Variability.		14) Risk/Peril
5) Presence of Water.		
6) Dynamic & Diffuse Light.		
7) Connection with Natural Systems.		

7. Benefits of biophilic design

- Breathing Easier.
- Purifying Air.
- Improving Health.
- Sharpening Focus.
- Lower background noise.
- Helps in stress reduction and create a feeling of well-being.

8. Conclusion

As we study above theories, it is concluded that the Biophilic Design have the ability to restore health, strength, or well-being by planning green space within the building. It is a creative way of designing the place where we live, work & learn. Biophilic is still at its earliest stage, a structure is prescribed to be proposed to the methodologies for introduction with nature, this study makes 3 huge contributions to the field of Biophilic Design:

- A detailed study of biophilic design, states the latest studies about the connection between human- nature research.
- Offering an in-depth framework as to how can architects adopt this concept into their design system.
- A well-defined framework about literature of Biophilic patterns, Biophilic Attributes, & applicability into the field of Biophilic Design process.

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