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BIOPHILIC ARCHITECTURE

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1. INTRODUCTION

1.1 AIM & OBJECTIVE

Main objective of this research is to study Biophilic Architecture in detail with examples to induce inferences that can be applied to a standard building to create an epitome of human-nature harmony.

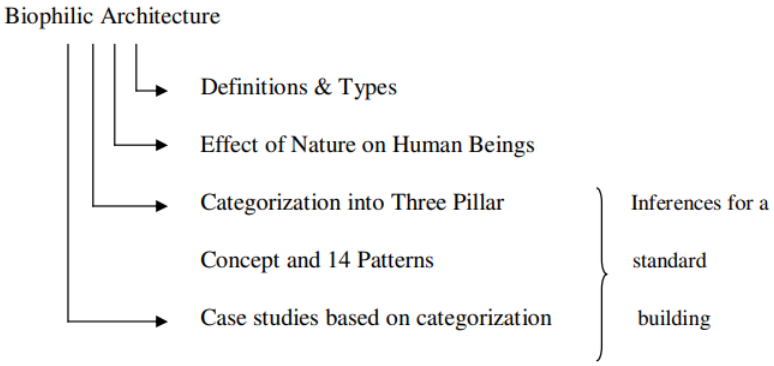
1.2 SCOPE

This research includes definition and types of Biophilic Architecture with researching nature and its effect on human behavior's result in well-being within architecture. Also it summarizes the vastness of the topic into 14 patterns through which any standard building could connect biophilic architecture. Case studies on buildings and spaces are studied and also analyzed according to these patterns and their key biophilic feature is highlighted.

1.3 LIMITATIONS

There are a lot of features under biophilic architecture out of which a few are studied in detail through case studies but this dissertation doesn't include structural details of all elements.

1.4 METHODOLOGY



INTRODUCTION TO BIOPHILIC ARCHITECTURE

1.1 What is Biophilia and Biophilic Architecture?

Biophilia is the inherent human preference to affiliate with nature that even in the modern world continues to be significant to people's physical and psychological health and wellbeing. The idea of biophilia originates in a considerate of human evolution, where for more than 99% of our species history we biologically urbanized in adaptive response to natural not artificial or human created forces.

Most of what we regard as normal today is of moderately recent origin (figure 1) —raising food on a large-scale justin the last 12,000 years; the development of the city, 6000 years old; the mass productionof goods and services, beginning 400 years ago; and electronic machinery, only since the19th century. The human body, mind, and sanity evolved in a bio-centric not human engineered or invented world.

1.1 The Practice of Biophilic Architecture

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 advancespeople's health, fitness and wellbeing.

The successful application of biophilic design necessitates consistently adhering to certain basic principles. These principles represent fundamental conditions for the effective practice of biophilic design. They include:

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

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

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

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

5.Biophilic architecture encourages mutual reinforcing,interconnected, and integrated architectural solutions

Biophilic architecture further seeks to sustain the productivity, functioning and resilience of natural systems over time. Alteration of natural systems inevitably occur as a result of major building construction and development. Moreover, all biological organisms transform the natural environment in the process of inhabiting it. The question is not whether ecological change occurs, but rather will the net result over time be a more productive and resilient natural environment as measured by such indicators as levels of biological diversity, biomass, nutrient cycling, hydrologic regulation, decomposition, pollination, and other essential ecosystem services. The application of biophilic design can alter the environmental conditions of a building or landscape in the short term, but over the long run, it should support an ecologically robust and sustainable natural community.

DIRECT EXPERIENCE OF NATURE

- Light
- Air
- Water
- Plants

INDIRECT EXPERIENCE OF NATURE

- Images of Nature
- Natural Materials
- Natural Colors
- Mobility and Way finding
- Cultural and Ecological Attachment to Place
- Simulating Natural Light and Air
- Naturalistic Shapes and Forms
- Evoking Nature
- Information Richness
- Age, Change, and the Patina of Time
- Natural Geometries

3. THE HUMAN - NATURE RELATIONSHIP

Biophilic architecture can reduce stress, improve cognitive function and creativity, improve our well-being and expedite healing; as the world population continues to urbanize these qualities are ever more important. Given how quickly an experience of nature can elicit a restorative response, and the fact that U.S. businesses squander billions of dollars each year on lost productivity due to stress-related illnesses, design that reconnects us with nature – biophilic architecture – is essential for providing people opportunities to live and work in healthy places and spaces with less stress and greater overall health and well-being.

3.1 DEFINING NATURE

Biophilia is humankind's innate biological connection with nature. It helps explain why crackling fires and crashing waves captivate us; why a garden view can enhance our creativity; why shadows and heights instill fascination and fear; and why animal companionship and strolling through a park have restorative, healing effects. Biophilia may also help explain why some urban parks and buildings are preferred over others. For decades, research scientists and design

practitioners have been working to define aspects of nature that most impact our satisfaction with the built environment. But how do we move from research to application in a manner that effectively enhances health and well-being, and how should efficacy be judged?

3.2 NATURE-DESIGN RELATIONSHIPS

Biophilic architecture can be organized into three categories – Nature in the Space, Natural Analogues, and Nature of the Space – providing a framework for understanding and enabling thoughtful incorporation of a rich diversity of strategies into the built environment.

3.3 NATURE-HEALTH RELATIONSHIP

Much of the evidence for biophilia can be linked to research in one or more of three overarching mind-body systems – cognitive, psychological and physiological – that have been explored and verified to varying degrees, in laboratory or field studies, to help explain how people's health and well-being are impacted by their environment. To familiarize the reader with these nature-health relationships, these mind-body systems are discussed here in the briefest sense, and are supported with a table of familiar hormones and neurotransmitters, environmental stressors, and biophilic design strategies.

3.4 THREE PILLAR CONCEPT AND 14 PATTERNS

NATURE IN THE SPACE

Nature in the Space addresses the direct, physical and ephemeral presence of nature in a space or place. This includes plant life, water and animals, as well as breezes, sounds, scents and other natural elements. Common examples include potted plants, flowerbeds, bird feeders, butterfly gardens, water features, fountains, aquariums, courtyard gardens and green walls or vegetated roofs. The strongest Nature in the Space experiences are achieved through the creation of meaningful, direct connections with these natural elements, particularly through diversity, movement and multi-sensory interactions.

Nature in the Space encompasses seven biophilic design patterns:

1. Visual Connection with Nature. A view to elements of nature, living systems and natural processes.

2. Non-Visual Connection with Nature. Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes

3. Non-Rhythmic Sensory Stimuli. Stochastic and ephemeral connections with nature that may be analyzed statistically but may not be predicted precisely.

4. Thermal & Airflow Variability. Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.

5. Presence of Water. A condition that enhances the experience of a place through seeing, hearing or touching water.

6. Dynamic & Diffuse Light. Leverages varying intensities of light and shadow that change over time to create conditions that occur in nature.

7. Connection with Natural Systems. Awareness of natural processes, especially seasonal and temporal changes characteristic of a healthy ecosystem.

NATURAL ANALOGUES

Natural Analogues encompasses three patterns of biophilic design:

8. Biomorphic Forms & Patterns. Symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature.

9. Material Connection with Nature. Materials and elements from nature that, through minimal processing, reflect the local ecology or geology and create a distinct sense of place.

10. Complexity & Order. Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature.

NATURE OF THE SPACE

Nature of the Space addresses spatial configurations in nature. This includes our innate and learned desire to be able to see beyond our immediate surroundings, our fascination with the slightly dangerous or unknown; obscured views and revelatory moments; And sometimes even phobia inducing properties when they include a trusted element of safety. The strongest Nature of the Space experiences are achieved through the creation of deliberate and engaging spatial configurations commingled with patterns of Nature in the Space and Natural Analogues.

Nature of the Space encompasses four biophilic architecture patterns:

11. Prospect. An unimpeded view over a distance, for surveillance and planning.

12. Refuge. A place for withdrawal from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.

13. Mystery. The promise of more information, achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment.

14. Risk/Peril. An identifiable threat coupled with a reliable safeguard.

CASE STUDY : GLUMAC SHANGHAI OFFICE COMMERCIAL OFFICE

Location: Shanghai, China

Project Address: 753 Yuyuan Rd., Building C, 3/F Shanghai, 200050 China

Project Type: Office, leased

Area: 10,000 ft2 (929 m2)

Year of Completion: 2014

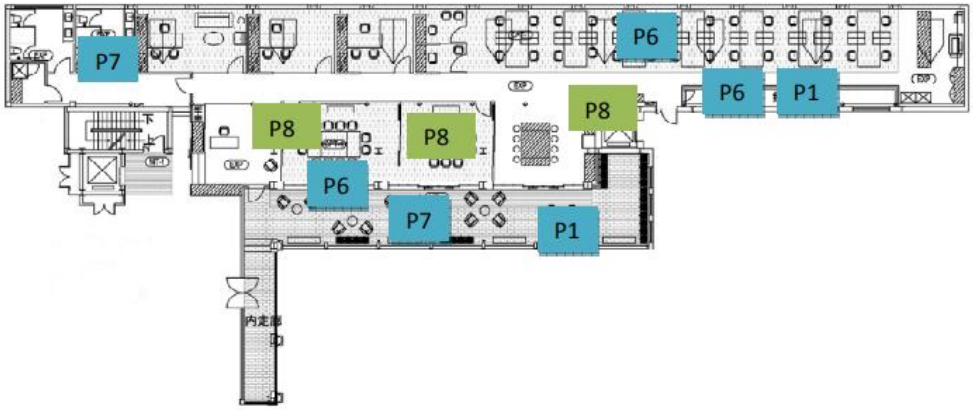
Occupant: Glumac

Design Team: Glumac, Gensler, Shimizu, GIGA, Terrapin Bright Green

Awards: LEED Platinum CI v4

Biophilic Patterns: Connection with Natural Systems Visual Connection with Nature

Floor Plan: The spine of the office is a long hallway, flanked on the north side by private and open plan office spaces and on the south by meeting rooms with adjustable partitions and the bistro. Daylight floods the office through the light well adjacent to the open office, large windows along the entire north wall, and glass with adjustable transparency on the south wall bordering the terrace.



Elevations: Daylight filters into all three of the spaces pictured in the above elevations. The kvadrat cloud adds visual interest to the bistro, and carpet with organic patterning creates a calm atmosphere in the private office.

Based on the 14 PATTERNS :

Visual Connection with Nature. Indoor plantings, and garden views

Non-Visual Connection with Nature. The pleasant odor of indoor plants, the sounds of the birds that inhabit the garden courtyard.

Non-Rhythmic Sensory Stimuli. Not significantly represented in the design.

Access to Thermal & Airflow Variability. Fully operational windows throughout the space, and doors to the patio which can be propped open.

Presence of Water. Not significantly represented in the design

Dynamic & Diffuse Light. A light well and large windows flood the space with daylight

Connection with Natural Systems. Ability to engage with localized waste, water, and energy systems.

NATURAL ANALOGUES

Biomorphic Forms & Patterns. Kvadrat Cloud installation and the traditional Chinese "lucky clouds" pictured on the entry door, and engraved on the stools.

Material Connection with Nature. Reclaimed wood reception desk and bistro table, unpainted strawboard columns and cabinets and reclaimed Chinese gray bricks.

Complexity & Order. Not significantly represented in the design.

NATURE OF THE SPACE

Prospect. Open office plan and an elevated long distance view from the patio.

Refuge. Movable partitions allow occupants refuge space when desired, landscaped courtyard separates the office from the city.

Mystery. A partially obscured view of plants at the end of the long hallway

Risk/Peril. Not significantly represented in the design.

CONCLUSION- The design for disassembly strategy is a crucial development in the direction of a more circular economy. By employing this strategy, we can decrease waste, save resources, and build environments that are more durable. Although it calls for cooperation, creativity, and a readiness to accept change, the rewards are well worth the effort.