



# JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

## A STUDY ON PRESENCE OF BIOPHILIC PATTERNS IN WORK SPACE

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**Abstract :** This study has been undertaken to investigate the required biophilic patterns for designing a working space. One of the important phases of our life is spent in working environment. Most of the working spaces is secluded from the nature. This shows that in working environment people spend only less time outside and distracted from nature. The separation between the human & nature negatively impacts human wellbeing and performance of the employees. To solve this by connecting human with nature, biophilic architecture is introduced which is an old approach with new concept. Biophilic architecture has numerous patterns from nature to connect with human. This study has identified the patterns from biophilic that is suitable for designing the working environment to enhance wellbeing and performance of the employees by applying those identified patterns in design.

**Keywords –** Biophilic patterns, work space design, working environment, human well being, nature.

### 1. INTRODUCTION

Biophilic design is a concept used within the building industry to increase occupant connectivity to the natural environment through the use of direct nature, indirect nature, and space and place conditions. Focuses on health and wellbeing. Biophilic design is an approach to architecture that seeks to connect building occupants more closely to nature. Used at both the building and city-scale, this idea has health, environmental, and economic benefits for building occupants and urban environments.



Fig.1.1 City view with absence of biophilic patterns & presence of biophilic patterns

### 1.2. Difference between biophilic design & sustainable design:

In a sense, they are two sides of the same coin. Biophilia asserts that humans intrinsically need nature in order to thrive. Sustainability aims to minimize resource consumption so that we are able to find balance within our ecological systems, and ensure the longevity of resources for future use.



Fig.1.2 Biophilic Design



Fig.1.3 Sustainable Design

**Biophilic design:**

Focuses on health and wellbeing.

Biophilic design is an approach to architecture that seeks to connect building occupants more closely to nature.

**Sustainable design:**

Focuses on minimize resource consumption.

The basic objectives of sustainability are to reduce consumption of non-renewable resources, minimize waste, and create healthy, productive environments.

**2. CASE STUDIES**

**2.1. VALLEY- MIXED USE DEVELOPMENT BY MVRDV AT NETHERLAND**

Valley truly is a place where people will want to live, work and simply enjoy urban life. It is an exciting mix of prime offices and residential apartments, combined with cultural retail and leisure space. Valley is a unique building, offering an exciting mix of cultural exposition, retail and leisure space, enhanced by the green and biophilic environment.

**2.1.1. Direct Experience of Nature**

**View to Nature**

A view to elements of nature, living systems & natural processes.  
Work areas next to windows with a view to natural elements (trees, mountains, water, sky)



Fig.2.1 view to nature

**Airflow**

Workspaces with outdoor balconies. The residential levels have large openable windows and sliding doors for outdoor spaces which allow air flow into the interior spaces. Dynamic Facade allows more air flow into the space.

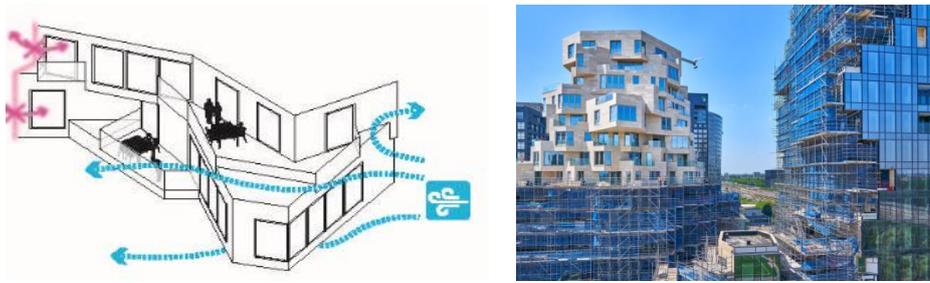


Fig.2.2 Airflow

**Light**

Daylight from multiple angles (glass ceilings, windows). The public will access the building from street level, via a pedestrianized path that climbs up to an outdoor “central valley” spread across the 4th and 5th levels. Two giant water filled ponds will double as skylights for the interior space below.



Fig.2.3 Light

**Landscapes**

Offices with patios or roof top gardens. Native plantings that grow & die with the seasons.

**2.1.2. Indirect Experience of Nature**

**Texture**

In mirroring the corporate surroundings by way of its reflecting glass exterior façade, the design acknowledges its corporate heritage and visually connects to its immediate neighbours. In direct contrast to this, the inner façade is defined by a series of rugged, stone terraces creates Non Visual Connection with Nature with rough texture of the inner walls in the interior of office space and exterior of the residential apartment.



Fig.2.4 Materials applied in Exterior & Interior

**Biomimicry**

Valley is composed of three conjoined buildings of different heights, linked by a terraced podium that emulates the low area of land between mountains, giving the project its name.



Fig 2.5 Form of the Tower

**Material Connection to Nature**

In mirroring the corporate surroundings by way of its reflecting glass exterior façade, the design acknowledges its corporate heritage and visually connects to its immediate neighbours. In direct contrast to this, the inner façade is defined by a series of

rugged, stone terraces the natural stone with textured surface creates a feel raw structure of the stone from the nature without any treatments.

### 2.1.3.Experience of Space & Place

#### Prospect

An unblocked view over a distance for surveillance & planning.The unblocked view of the valley space designed with landscape and access to it with 2 grand staircase on either side of the central tower is clearly visible from the street level.The residential levels have large openable windows & sliding doors for outdoor space integrated within the stone facades.

## 2.2. SOLARIS- OFFICE BUILDING BY T.R. HAMZAH & YEANG AT SINGAPORE

Solaris is a 15 storey office building located in the Fusionopolis hub of central Singapore's one-north business park. Fusionopolis operates as a research and development hub for the info-comm technology, media, physical sciences and engineering industries.

### 2.2.1.Direct Experience of Nature

#### View to Nature

The landscaped ramp on the perimeter of the building creates a view to nature from the interior space. A **diagonal shaft that cuts through the upper floors of Tower B** allows daylight to penetrate deep into the building's interior. This solar shaft was one of the innovative features designed to create positive environmental impact. Plants was added on the south west positioned solar shaft as solar screens to reduce heat gain into the units.

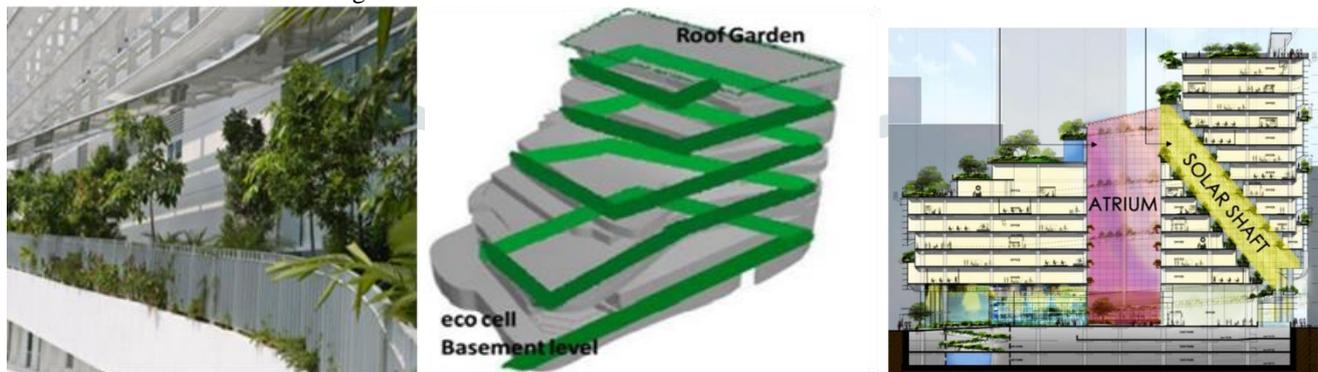


Fig.2.6 view to nature

#### Airflow

SOLARIS is comprised of two towers connected with a passively-ventilated central atrium. A public plaza between the two tower blocks provides space for communal activities and creative performances. This atrium design attains strive to provide ventilation effectiveness through mixed-mode zone; the used of passive and active system.This naturally-ventilated atrium has operable slanted louvers glass roof was adjusted through mechanical systems. It is sensor-operated thus protects the interior from extreme weather condition. The stack effect is achieved with the naturally ventilated atrium.



Fig.2.7 Airflow

#### Light

The solar shaft arranged diagonally juts out of the tower –b block and allows sunlight to percolate into the interiors, reducing the need for artificial lights.A **diagonal shaft that cuts through the upper floors of Tower B** allows daylight to penetrate deep into the building's interior.

#### Landscapes

Solaris introduces vegetation which exceeds the area of the building's original site.

The overall vegetated area in the building will be over 110% of the site area.

Total landscaped area is **8,363**.

Landscaped areas are **Roof Gardens, Atrium Planter Boxes , Eco Cell , Green Ramp , Solar Shaft , Ground Level Landscaping , Green Walls.**

### 2.2.2. Indirect Experience of Nature

#### Biomimicry

The site of Solaris is part of a Zaha Hadid master-planned office park in central Singapore called Fusionopolis 2B. A March 2008 competition held by the Jurong Town Council. TR Hamzah & Yeang won the competition with a distinctively green articulation of Hadid's fluid envelope. Free flow form of the exterior connects with form from the nature.

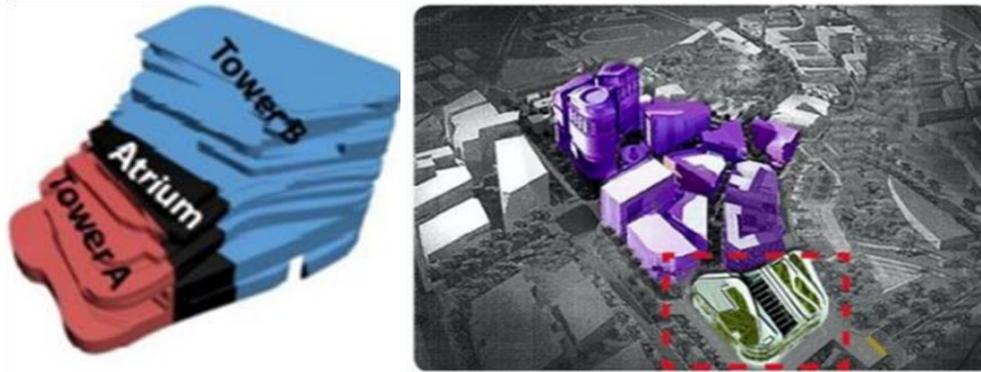


Fig.2.8 Form of the building

### 2.2.3. Experience of Space & Place

#### Prospect

The atrium at the centre divides the structure into 2 towers connected with bridges gives an unblocked views over the atrium space and the sides of the office located along with the atrium side. The roof gardens taper towards upper level creates an unblocked view over the terrace area. The solar shaft, atrium and roof gardens creates an unblocked views.

## 2.3. TITAN INTEGRITY CAMPUS @ BANGALORE

### 2.3.1. Direct Experience of Nature

#### View to Nature

A view to elements of nature, living systems & natural processes.

#### Terrace Gardens

Garden spaces on each floor connected with work areas.



Fig.2.9 view to nature

#### Airflow

Free flow forms with open terraces allows more air flow into the interiors. porosity in planning and form allows continuous movement of breeze with wind tunnels creating venturi effect. common areas are open and non-air conditioned.

#### Water

A bio lake is conceived towards eastern side of the site which responds to the existing lake and would seem like an extension of it. office building with all its ancillaries is proposed around this bio lake.



Fig.2.10 Presence of water

**Light**

The five atriums in the campus vertically connect all the floors from basement bringing in natural light and creating sense of one community, togetherness and encouraging interaction between different departments.



Fig.2.11 Atrium

**Landscapes**

The landscape design is conceived as a vertical park where each level is a green terrace starting from waterfront park at the ground level to the sky park at the roof level.

**2.3.2. Indirect Experience of Nature****Biomimicry****Form of the building**

Freeflow form of the building reflects the free flow form of the lake.

Free flow form connects closely with nature.

Free flow form of the green terraces acts as a relaxing space.



Fig.2.12 Form of the building

**2.3.3. Experience of Space & Place****Prospect**

The elevated planed with free space on ground floor creates unblocked view.

Open work areas create an unblocked view over a distance.

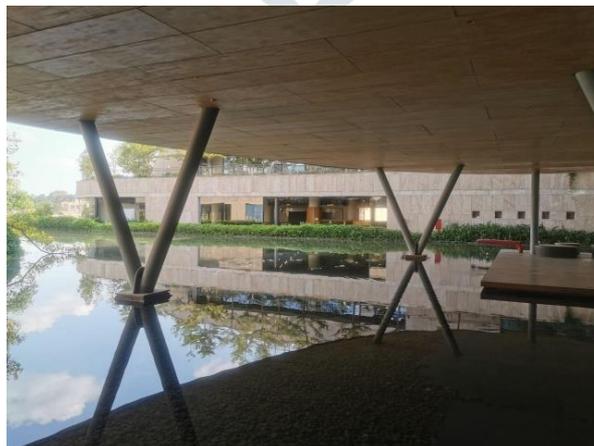


Fig.2.13 Unblocked view

## 3. COMPARATIVE ANALYSIS

Table 3.1 Comparative analysis of Case studies

S.NO	DESCRIPTION	VALLEY	SOLARIS	TITAN INTEGRITY CAMPUS
A.	Location	Netherland	Singapore	Bangalore
B.	Type	Mixed use	Office	Office
C.	Architect	MVRDV	T.R.Hamzah & Yeang	Sanjay Mohe
1.	Visual connection with nature (p1)	✓	✓	✓
2.	Non visual connection with nature (p2)	✓	-	-
3.	Non-rhythmic sensual stimuli (p3)	-	-	-
4.	Thermal / airflow variability (p4)	✓	✓	✓
5.	Presence of water (p5)	-	-	✓
6.	Dynamic and diffused light(p6)	✓	✓	✓
7.	Connection to natural systems (p7)	✓	✓	✓
8.	Biomorphic forms and patterns (p8)	✓	✓	✓
9.	Material connection to nature (p9)	✓	-	-
10.	Complexity and order (p10)	-	-	-
11.	Prospect (p11)	✓	✓	✓
12.	Refuge (p12)	✓	✓	✓
13.	Mystery (p13)	-	-	-
14.	Risk / peril (p14)	-	-	-

## 4. RESEARCH FINDINGS

Visual connection with nature (P1), Thermal / airflow variability (P4), Dynamic and diffused light (P6), Connection to natural systems (P7), Biomorphic forms and patterns (P8) & Prospect (P11), Refuge (p12) patterns are present in all projects. These patterns are compulsory added while designing a workspace. These patterns are termed as primary patterns. Non visual connection with nature (P2), Presence of water (P5) & Material connection to nature (P9) patterns are present individually in the project. These patterns are termed as secondary patterns. Mystery (p13), Risk / peril (p14) are not compulsory needed for the workspace design. These patterns are termed as tertiary patterns.

## 5. CONCLUSION

In today's world the common issue faced in working environment is stress. every person started moving towards the society as an individual from the working environment. so, the better solution to all problems we facing in working environment and also to improve the productivity rate by designing a working environment with the interaction happens naturally between employees, nature & built form. This is achieved with the biophilic patterns by inviting nature into the space to create a strong connection between the user & the environment to enhance the performance of the employees with stress free environment. So, the built spaces designed with the identified patterns, that engages with the employees at places where employees can interact with the building itself. The identified patterns should be implemented in planning level will be more effective in improving the performance of the employees and creating stress free environment.

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