High-performance Tropical Buildings that Connect with Nature

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A New Era: Impact of Green Initiatives on the Architecture & Building Industry
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What we want


What we got!

Status quo for most people

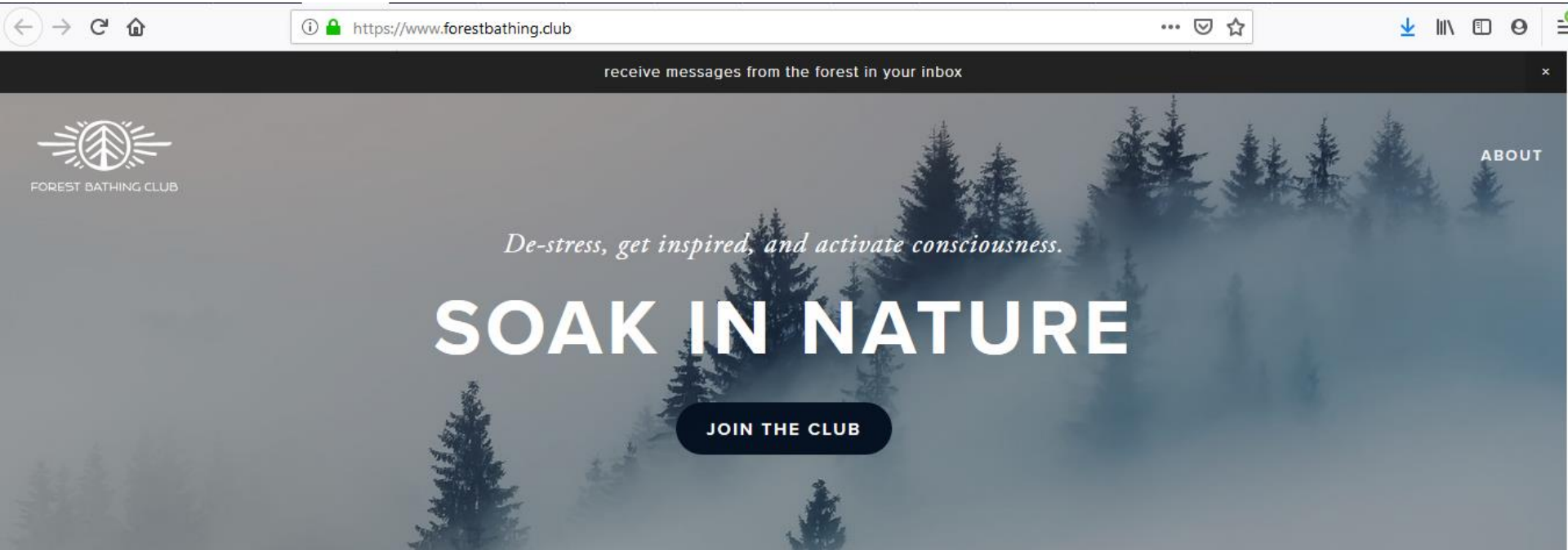
90%
of time spend indoors

less than 1%
of time spend in true Nature

We need the build environment to strike a better balance

In fact
we are already so decoupled from Nature that doctors now prescribe

FOREST BATHING



Forest Bathing (Shinrin-yoku)

Mindful time spent under the canopy of trees for health and wellbeing purposes

- Started in 1980s in Japan
- The Japanese government incorporated it into the country's health programme.
- Medical studies have show Forest Bathing can:

  i) Reduce blood pressure, lower cortisol levels and improve concentration and memory.

  ii) A chemical released by trees and plants, called phytoncides, was found to boost the immune system

Contents

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2) We are ‘hardwired’ for biophilia
3) Biophilia and green rating tools
4) Biophilia makes ecomomic sen$e
5) Examples of built environment connecting with Nature

What is Biophilia?

BIOPHILIA AS A CONCEPT

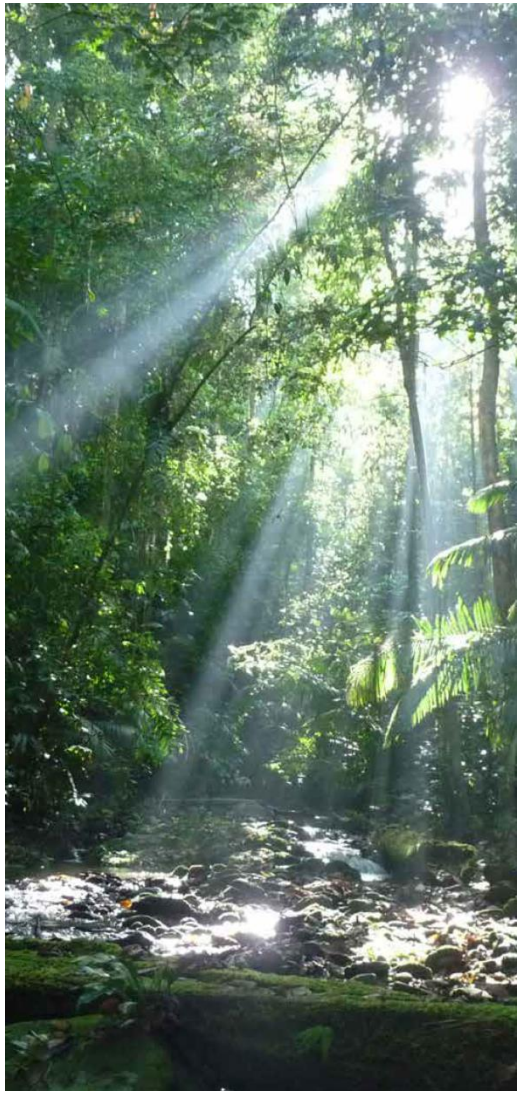
The concept of biophilia implies that humans hold a biological need for connection with nature on physical, mental, and social levels and this connection affects our personal well-being, productivity, and societal relationships. – *Sheeps Meadow, 2004*

Bio	connected with life and living things
philia	denoting fondness, especially an abnormal love for a specified thing

loosely translated as

Love of Nature

Biophilia is real



- **“What is the most attractive office space?”**
  Along the façade with a view out

- **When asked to**
  “Draw your favorite place”
  96% of the kids drew an outdoor location

- **20% more self-discipline**
  for teenage girls with greenery outside their home

We are Hardwired for Biophilia…

WE'RE HARDWIRED FOR IT

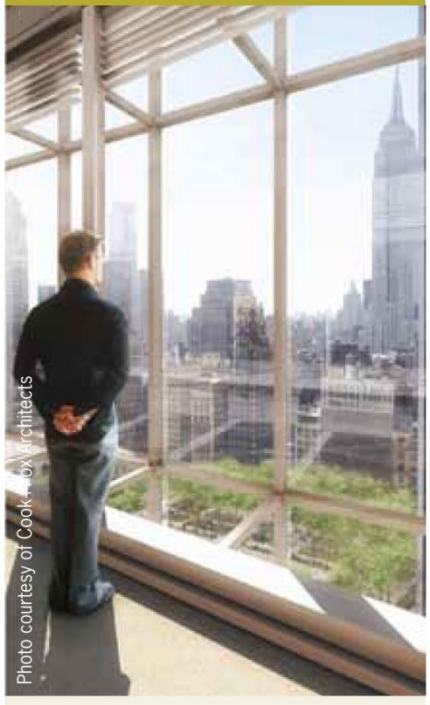


Photo courtesy of Cook + Fox Architects

Affective responses toward environmental settings are not mediated by cognition but stem from a rapid, automatic, and unconscious process by which environments are immediately liked or disliked... because of the hardwired emotional affiliation with certain natural elements, nature-based architecture can awaken fascination for natural forms – *Joye, 2007*

…yet, we spend **90%** of our time indoors

…so, better make it worthwhile through biophilic design

Examples of Biophilia

Fallingwater
by Frank Lloyd Wright

Kampung House
(Vernacular Malaysian Architecture)

Example of Biophilia (Malaysia)

Paramit – factory in the forest

Architect: Design Unit

ESD: IEN Consultants

Project performance: Measured 40% energy savings. High occupant satisfaction. More info: *http://ien.com.my/projects/paramit.html*

Nominee for **"Best New Building of the World 2018"**
RIBA International Prize

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Example of Biophilia (Malaysia)

Repies to anonymous survey question **”What do you like about the building?”**:

1) Its the best place i worked.. The greenery around the factory is simply amazing.. It give us a peaceful feeling..
2) Very green, light and healthy
3) Give a balance and serene feel (able to reduce stress). Work place = 2nd HOME
4) I like the environment of this building that have been surround by tress. Comfortable. Outstanding from others building.
5) The beauty of the natural, de-stress while working

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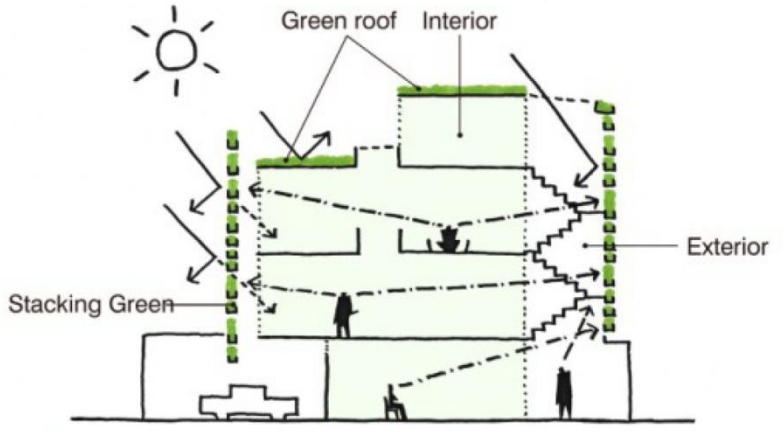
Example of Biophilic building (Vietnam)



The people can feel the greenery illuminated by sunlight from everywhere of this house

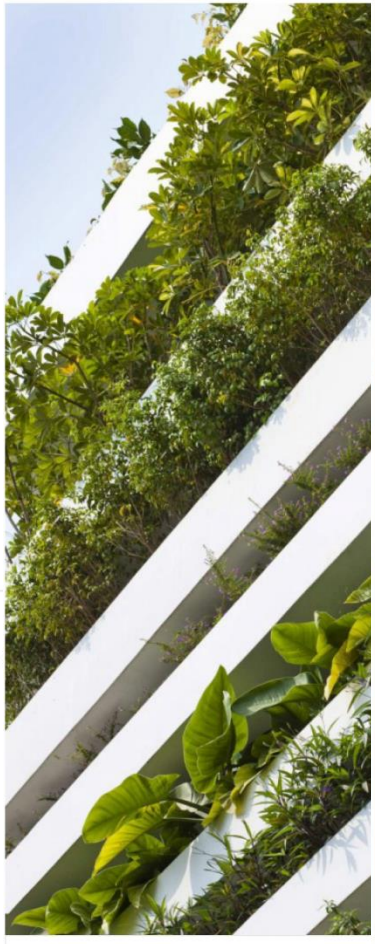
Section Diagram

Stacking Green

Greenery, daylight, air flow and views are important to this reinvented tube-house in Ho Chi Minh Vietnam, by architect Vo Trong Nghia. The award-winning project – without Green certification – addresses well being at the building and argues for the same at the urban scale.

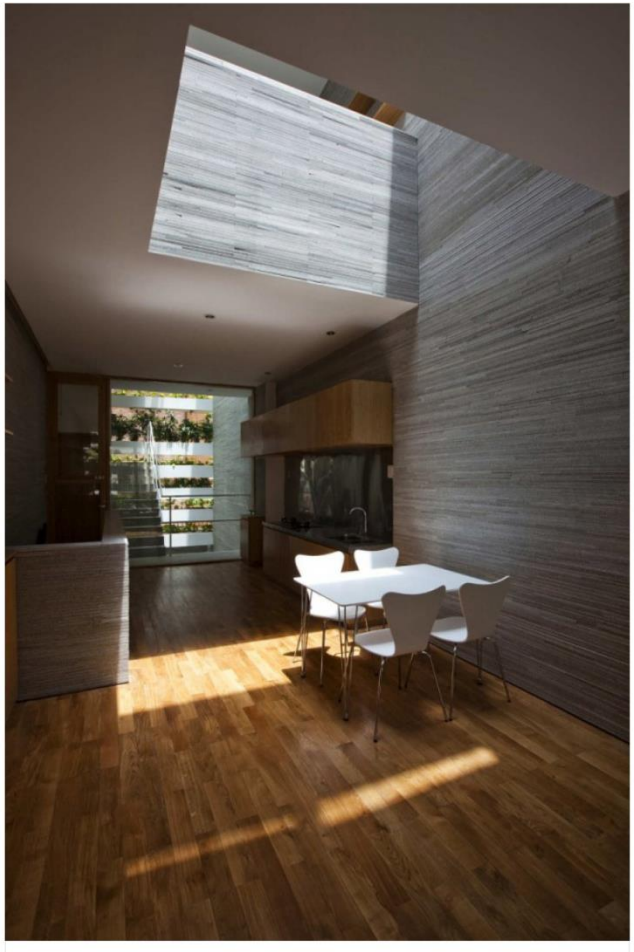
Drawing by Vo Trong Nghia

Visual connection to nature & greenery from all rooms



Stacking Green
Vo Trong Nghia - Green façade

Image by Hiroyuki Oki

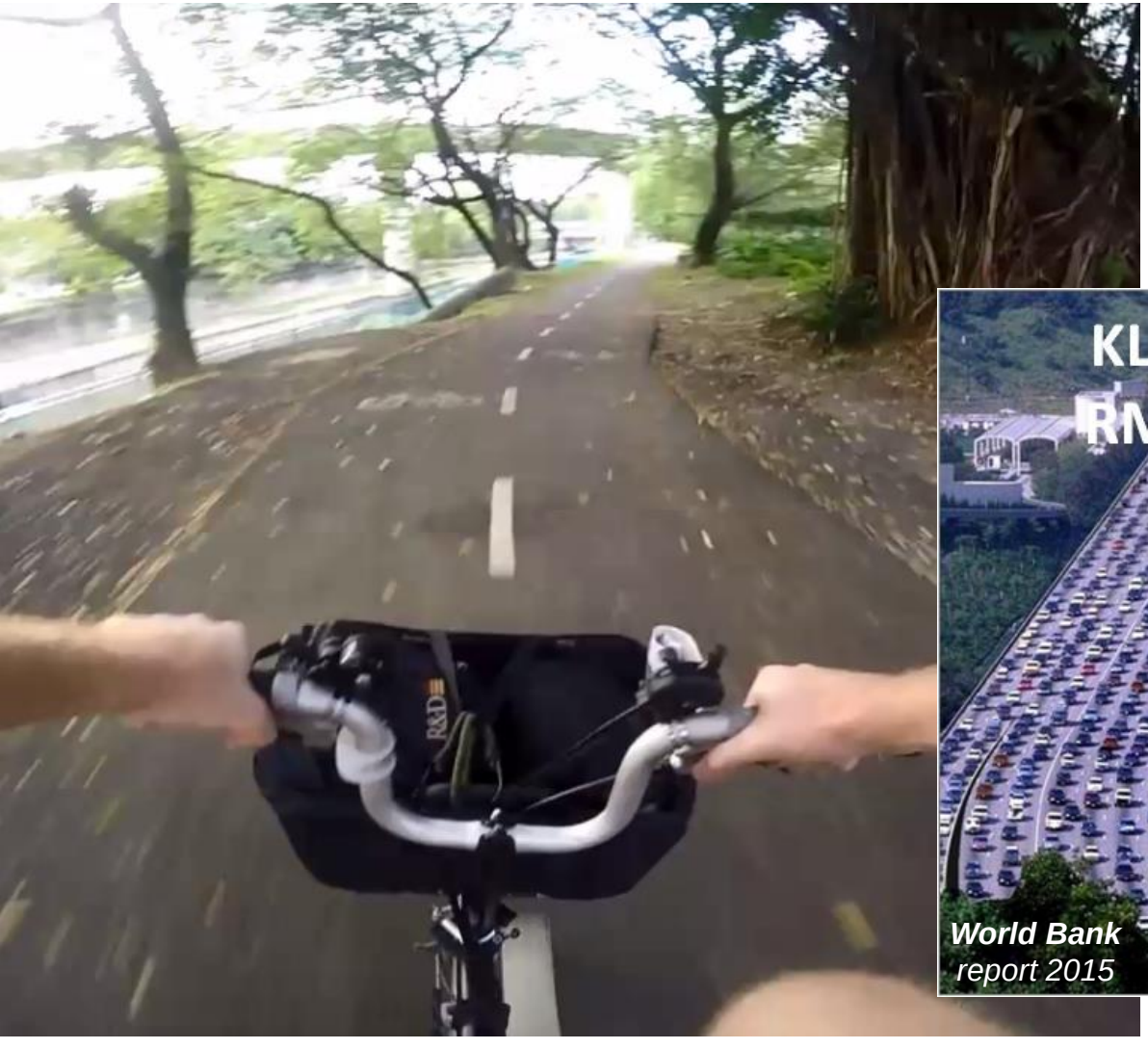


Stacking Green
Vo Trong Nghia - Daylit Interior

Image by Hiroyuki Oki

Project by architect Vo Trong Nghia

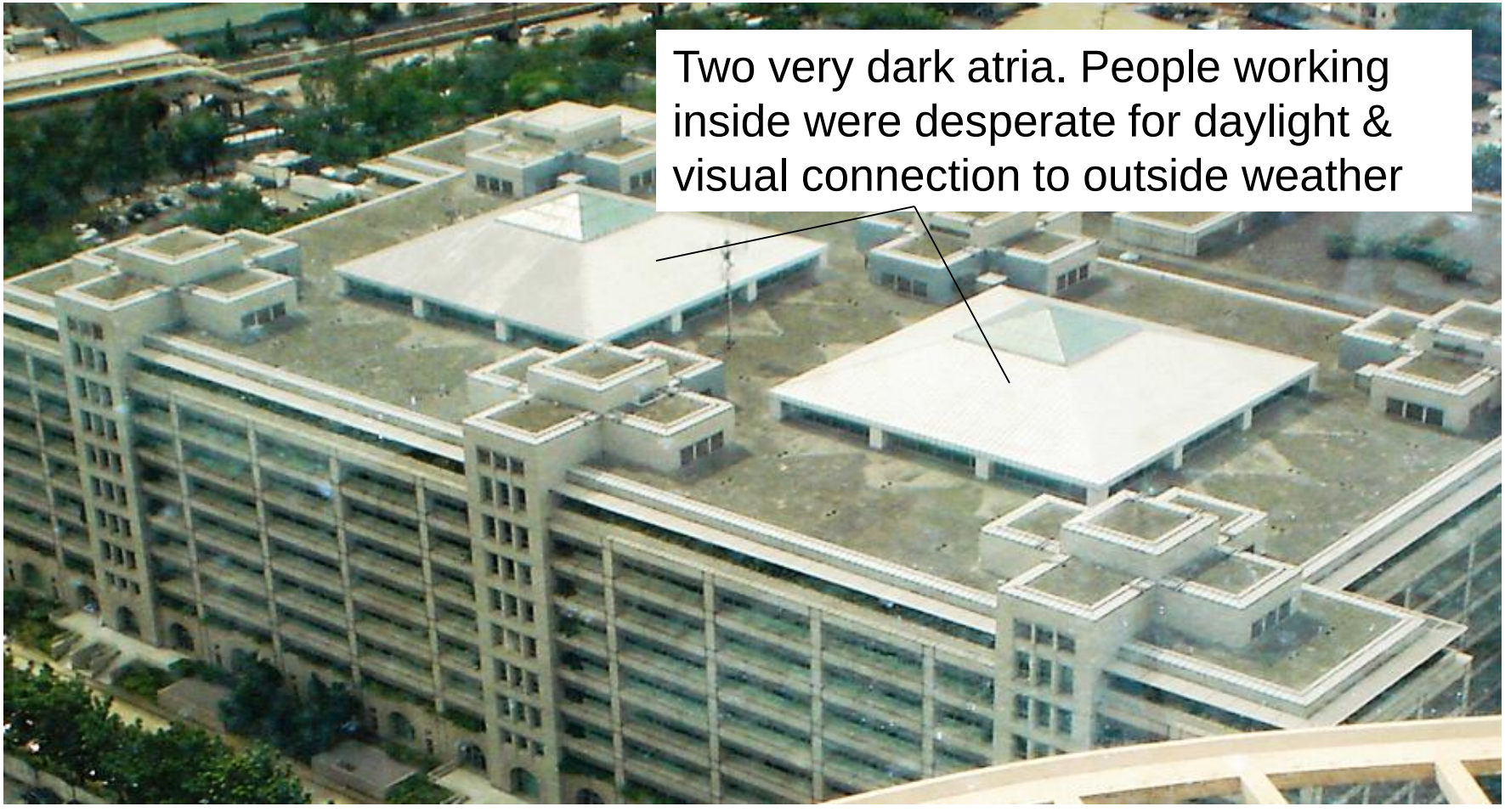
Example of Biophilia (Malaysia)



Commute in nature along river in Kuala Lumpur

…. instead of being stuck in traffic

Biophilic atrium retrofit case study: Asian Development Bank, Philippines



Retrofit by CPGreen

Biophilic atrium retrofit case study: Asian Development Bank, Philippines

BEFORE

AFTER

Survey after the retrofit showed that 92% of the occupants preferred the retrofitted atrium.

Only heard 1 complaint: “Give me even more daylight please!”

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Biophilic elements in the Building Codes

- "Right to Light" [UK]

Right to light is a form of easement in English law that gives a long-standing owner of a building with windows a right to maintain the level of illumination. It is based on the **Ancient Lights** law.[1] The rights are most usually acquired under the Prescription Act 1832. Neighbours cannot build anything that would block the light without permission.
Once a right to light exists, the owner of the right is entitled to "sufficient light according to the ordinary notions of mankind": *Colls v. Home & Colonial Stores Ltd* (1904).

- View out & Daylight requirements for work and living spaces [Denmark]

View out (§378): Windows must allow occupants to view the surroundings. Window shading systems must be designed to maintain views out most of the time

Daylight (§379-381): The area of unshaded facade glazing must correspond to 10% or more of the floor area. If the glazing is shaded, the glazed area must be increased accordingly.

Alternative compliance: The daylight level must be 300 lux or more for 50% of the floor area during the daylight hours.

Biophilia in Green Building Tools?

Asian Green building tools reviewed

1. Green Mark (Singapore): RB version 4.1 + NRB version 4.1
2. GBI (Malaysia): RNC version 1.02 + NRNC version 1.02
3. Greenship (Indonesia): All buildings, version 1.1
4. BERDE (Philippines): VRD version 1.1.0 (2013) + CB version 1.1.0 (2013)
5. Lotus (Vietnam): R version 2.0 + NR version 2.0
6. BEAM Plus (Hong Kong): All buildings, version 1.1 (2010.04)
7. CGBL(China): Residential version 2006 + Commercial, version 2006
8. EEWH (Taiwan): EEWH-RS version 2007 + EEWH-BS version 2007
9. TREES (Thailand): All buildings, version 1.1
10. CASBEE (Japan): All buildings, 2011 Edition
11. KGBC (South Korea): Multi-unit residential version 2002 + Others version 2002
12. GREENSL (Sri Lanka): All buildings, December 2010
13. GRIHA (India): SVA GRIHA, version 2013 + All buildings, version 3
14. LEED (India): All buildings, version 2011

Study by: Kishnani et al. (2012)

Biophilia in Green Building Tools?

Findings of Asian Green building tools review

- All tools seem to say that greenery and water are important, but almost none link these to the occupant well-being
  - e.g. use greenery to reduce urban heat island effect, but not for biophilic purposes
  - e.g. harvest rainwater to reduce potable water, but not for biophilic purposes

- The tools are not deeply biophilic

- Biophilic principles are undervalued
  - missing
  - (mis)placed in a category other than well-being

Study by: Kishnani et al. (2012)

Biophilia in Green Building Tools?

Most and least biophilic tools

Percentage of achievable credits that are linked to natural system or biophilic features

1. *Green Mark (Singapore): RB version 4.1 + NRB version 4.1*
2. *GBI (Malaysia): RNC version 1.02 + NRNC version 1.02*
3. *Greenship (Indonesia): All buildings, version 1.1*
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5. *Lotus (Vietnam): R version 2.0 + NR version 2.0* — **Highest score 18%**
6. *BEAM Plus (Hong Kong): All buildings, version 1.1 (2010.04)*
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14. *LEED (India): All buildings, version 2011*

5% or less

Study by: Kishnani et al. (2012)

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New WELL Certification

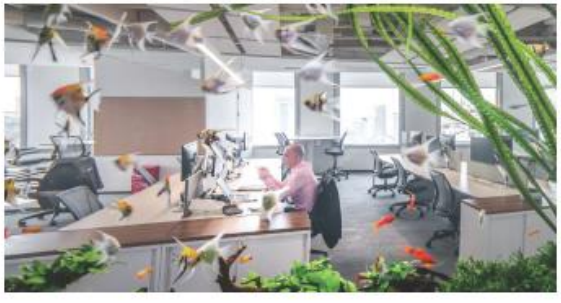
with credits for Biophilia (qualitative & quantitative)

INTERNATIONAL WELL BUILDING INSTITUTE™

International Insights

NEW TREND: HEALTHY BUILDINGS

"We shape our buildings, and afterwards our buildings shape us" These words, uttered by Winston Churchill during his speech at the House of Commons in 1943, are the very essence of a new trend that has emerged for buildings globally and in the Asian region.



With over 500 registered projects in over 30 countries, covering more than 100 million sq.ft, one third of which is located in Asia, the WELL Building standard is pushing being? The answer is no, only partially, and unlike WELL typically not as predominantly mandatory requirements. Most of the existing green building

by the immense financial logic of the WELL building standard. With attractive ROIs related to overall health care cost- savings, worker productivity increases and reduced sick days and intangible benefits such as improved sales from better customer experience and increased work value produced by employees, the WELL building standard provides a great business case - one that in this region has been picked up very quickly by China, where WELL certification is highest outside of the US.

The WELL Standard addresses seven

a year and costing nations like Indonesia an estimated RM160billion [$35 billion] in economic losses.

For most people living in cities, 90% of our time is spent indoors – be it at our workplace, home or even in the car stuck in traffic. Unfortunately for a lot of people, while being stuck in the office to avoid bad outdoor air pollution might sound like a good idea, the comfort of being indoors can be nothing but an illusion as concentrations of some pollutant indicators can be 2 to 5 times higher indoors compared to outdoors. In

as studies issued under the Population Health Management Journal shows that eating unhealthily can be linked to a 66% increased risk of productivity loss. And Malaysia is the fattest nation in Asia with 42% of the population being overweight and 14% obese, in part because more than half of Malaysians have been reported to practice inactive lifestyles (defined as weekly exercise amounting to less than 150 minutes).

The WELL Building Standard looks at creating wellbeing at the workplace by setting forth preconditions that call

About The Contributor

Sheena is in the process of joining the WELL Faculty while working as a green building consultant at IEN Consultants.

Gregers is the managing director of IEN Consultants, the pioneering green building consultancy in Malaysia.

Let's do a WELL calculation example in the Malaysian context using our own office as an example, where 81% of our company's monthly expenditure goes to staff salaries, while other expenses (15%) and rental (4%) account for the rest of the expenses. From the employer's perspective, and under the assumption that by following the WELL standard, the absenteeism and presenteeism can

Article in Property Insight magazine (December 2017 issue)

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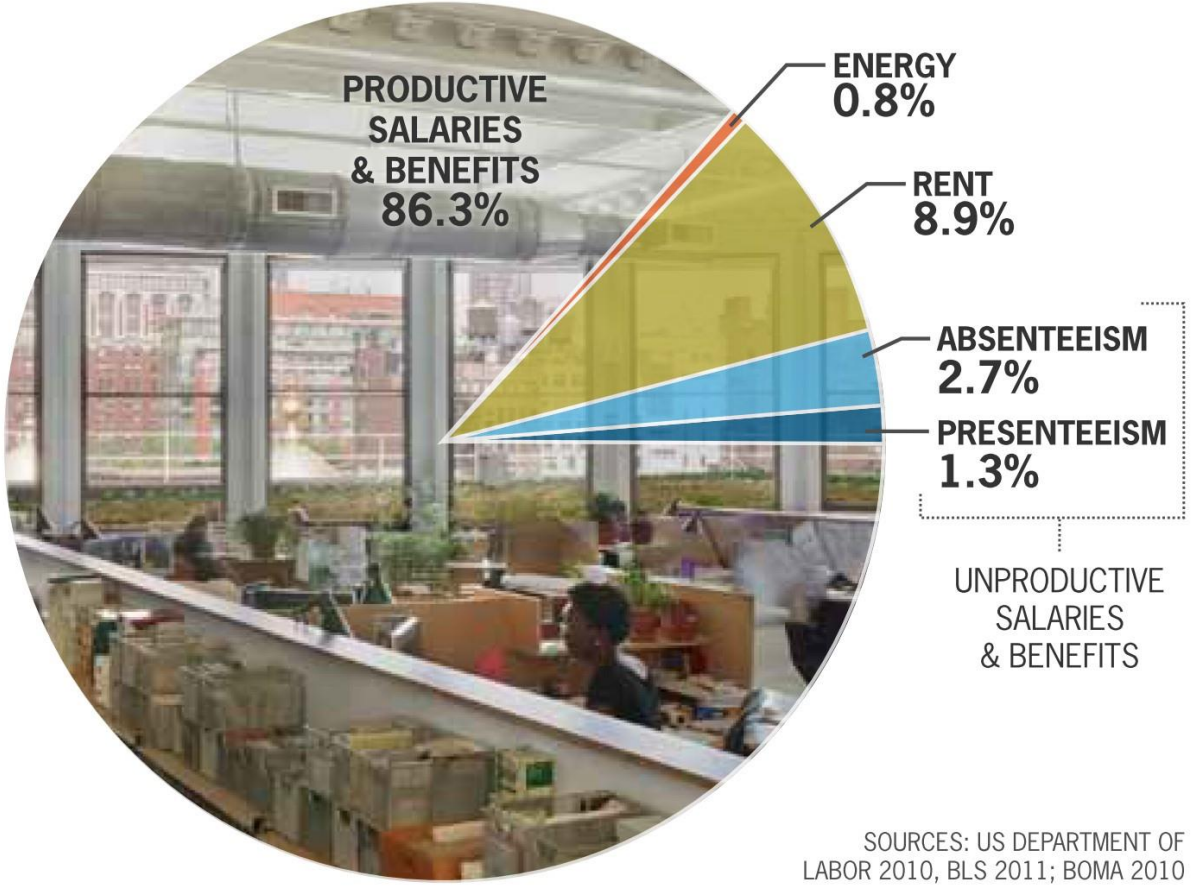
Biophilia & Economic Sen$e

There's great economic value in the positive effects of biophilic design on well-being, stress reduction and enhanced learning

Biophilia & Economic Sen$e



SOURCES: US DEPARTMENT OF LABOR 2010, BLS 2011; BOMA 2010

BIOPHILIA CAN RE-ENGAGE LOSSES FROM UNPRODUCTIVE OPERATING COSTS

*More than 90% of a company's operating costs are linked to human resources, and **financial losses due to absenteeism and presenteeism account for 4%**. Commercial spaces that give occupants access to nature serve as a release to outside stresses, and tend to cause less environmental stress themselves. It makes fiscal sense for companies to try to eliminate environmental stress that cost them thousands of dollars per year in employee costs.*

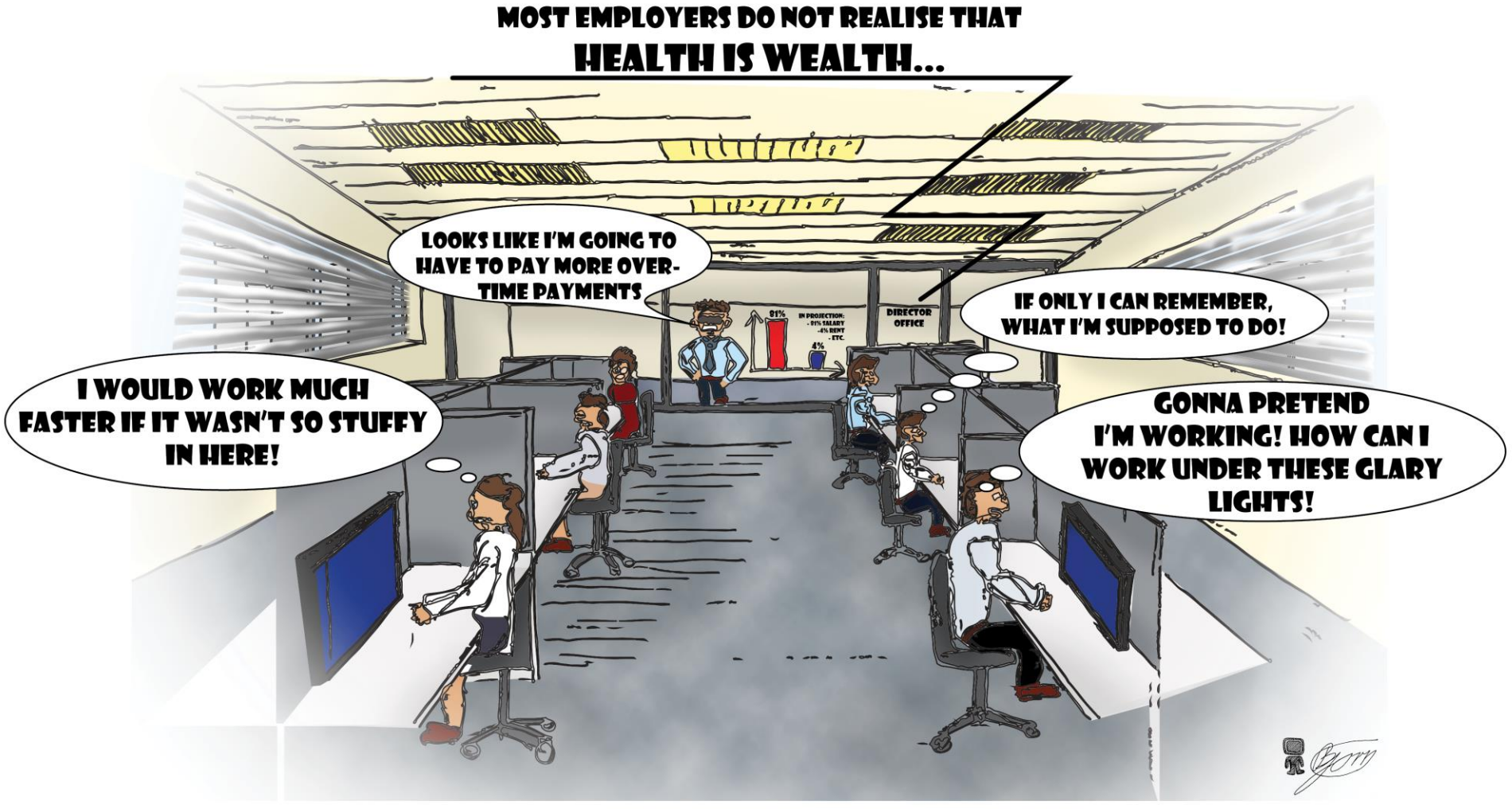
Graphics credit: Catie Ryan for Terrapin Bright Green

There's great economic value in the positive effects of biophilic design on well-being, stress reduction and enhanced learning

Unproductive 66 days per year!

Amount of time that average Malaysian worker is either absent or suffering from presenteeism

NB. The UK figure is only 30 days per year



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Biophilia & Economic Sen$e

Biophilic retrofit of call center (Sacramento, US)

- Employees with a view to the outside could take 6-7% more calls than employees without a view

- The call center was retrofitted to give everybody a view out (more office space, different seating arrangement, operable windows)
- Cost: USD 1000 per employee
  Savings: USD 2990 per employee
  Payback time: **4 months**

Biophilia & Economic Sen$e

Improved student learning

Biophilia & Economic Sen$e

Hospitals patients recover faster

HEALING VIEWS

Patients with a view to nature, instead of a nondescript wall, are more likely to experience hospital stays that are 8.5% shorter, with fewer negative observational comments from nurses, and significantly fewer strong, post-surgical analgesics. – *Ulrich, 1984*

Patients can discharge 8.5% faster from hospital

Biophilia & Economic Sen$e

Significant increase in property value

PEOPLE WILL PAY

58%

MORE FOR A PROPERTY WITH A VIEW TO WATER

OR

127%

MORE FOR A LAKEFRONT PROPERTY

Photo courtesy of Cook+Fox Architects

Biophilia & Economic Sen$e

Retail spaces

Retail customers judge businesses surrounded by nature and natural features to be worthy of prices up to 25% higher than businesses with no access to nature. – *Albee Square, Brooklyn, NY, 2010*

- Customers were willing to pay more for products when sold in a green retail setting:
  +20% higher for convenient shopping (e.g. sandwich)
  +25% higher for general shopping (e.g. jacket, watch)

- For a retail store chain in California with 73-stores, skylights were installed and sales increased by 40%

Daylit ‘biophilic’ buildings in Malaysia

The GEO office building, Greentech Malaysia HQ, Bangi

Blind encapsulated in double glazing, no maintenance needed. Looks as good as new after seven years and counting….!

Semi-specular tannenbaum reflector in the ceiling. Maintains inward light reflection without causing glare to the occupants. Translucent cubicle walls parallel to the façade ensures daylight passage to table top.

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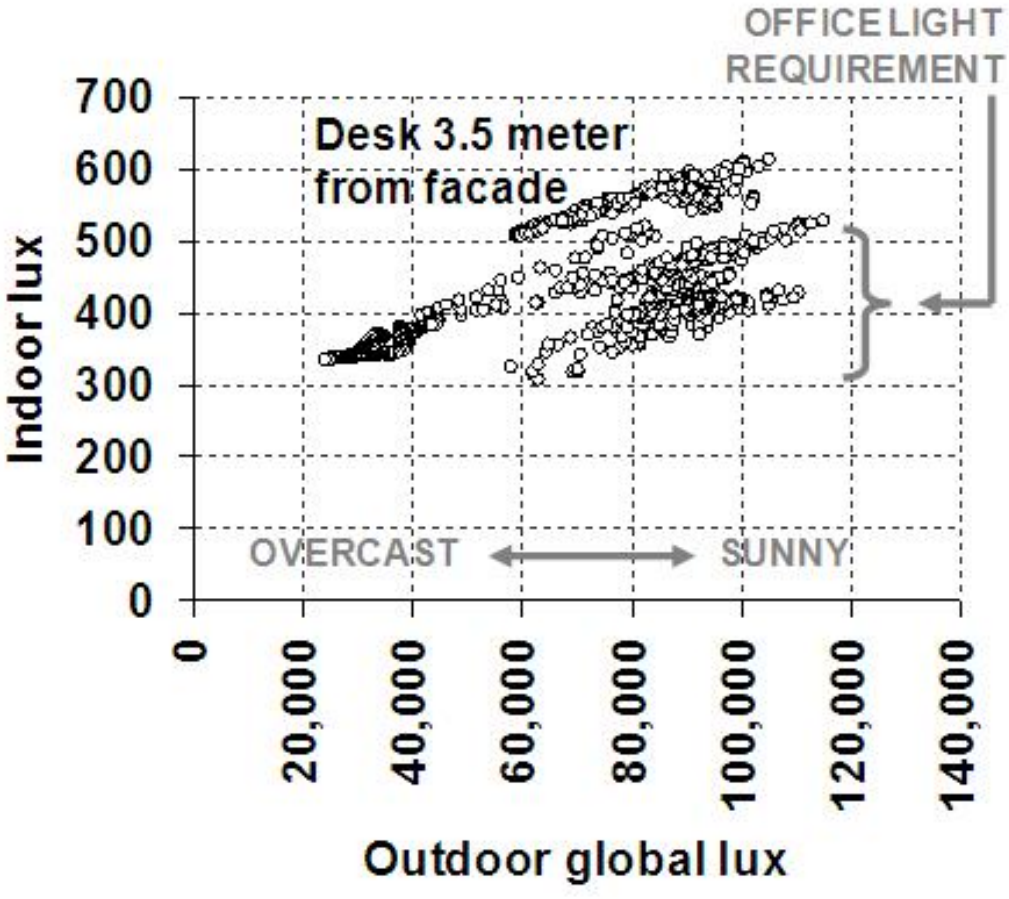
Daylit ‘biophilic’ buildings in Malaysia

The GEO office building, Greentech Malaysia HQ, Bangi



1. Occupants prefer working in daylight

2. Electrical lighting consumption is 25 times lower than the code requirement

Measured lighting consumption during office hours is only 0.56 W/m^2

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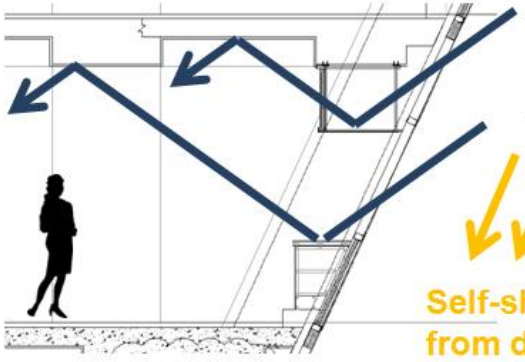
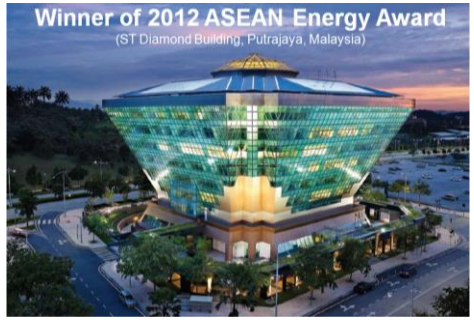
Daylit ‘biophilic’ buildings in Malaysia

The ST Diamond building, Putrajaya



FACADE



Fixed louvers allows daylight to enter and blocks glare

Daylight and view to outside preserved

Façade Daylight Design

The building is 50% daylit. The façade daylighting system consists of a mirror lightshelf and a white painted window sill. Both deflect daylight onto the white ceiling for improved daylight distribution until 5 meters from the façade + 2 additional meters of corridor space. Installed office lighting is 8.4 W/m2, but 1-year measurements show consumption of only **0.9 W/m2** showing high reliance on daylighting

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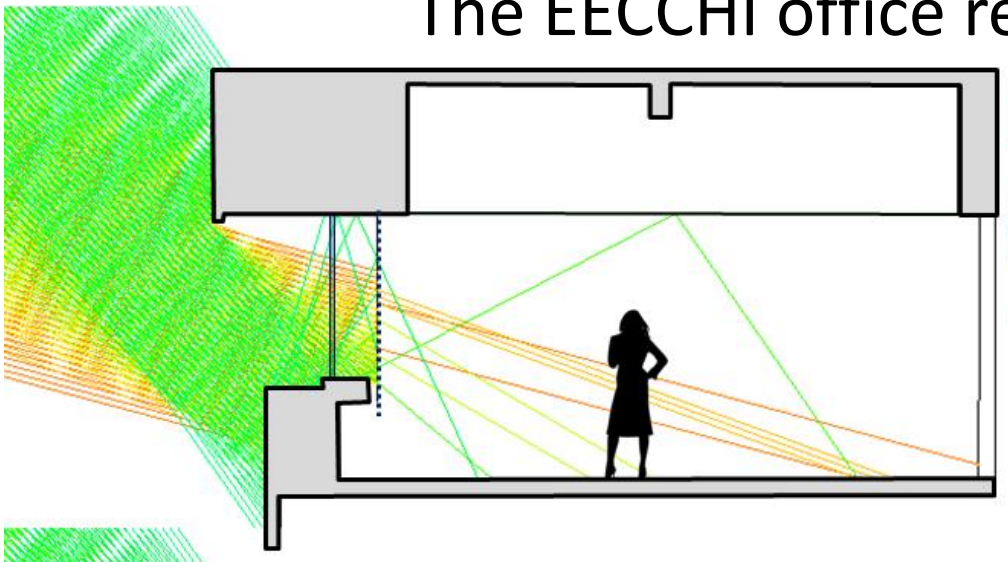
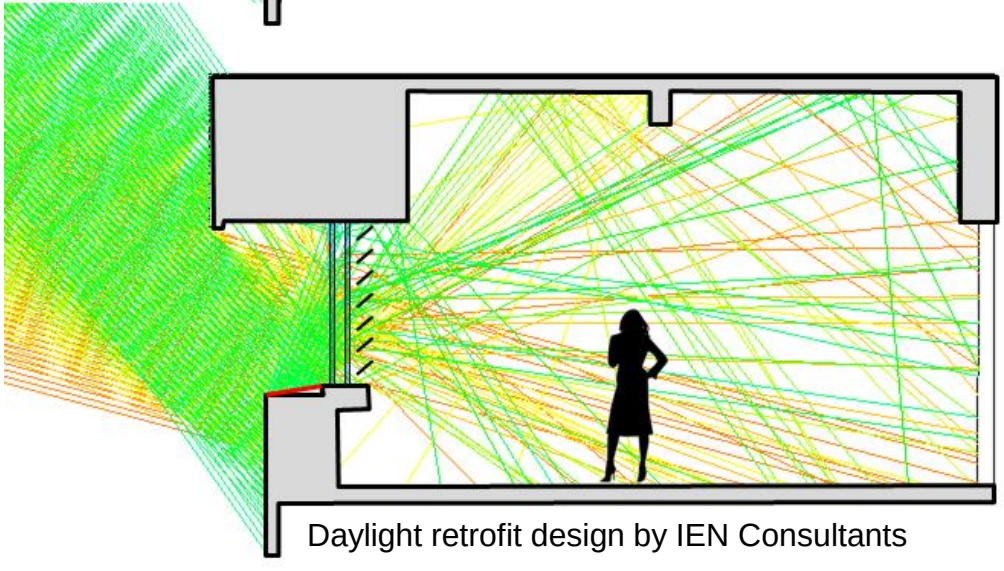
Daylit ‘biophilic’ building in Indonesia

The EECCHI office retrofit, Jakarta



BEFORE RETROFIT

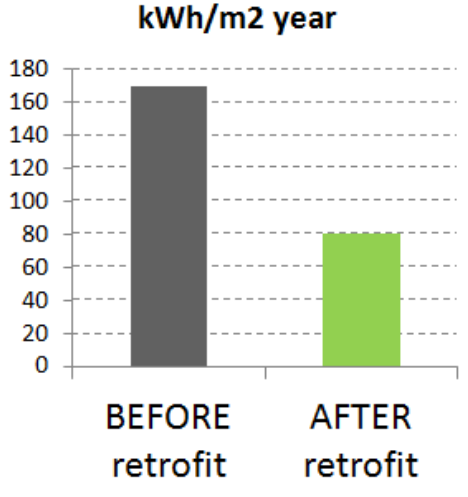
- Vertical blinds blocking most of the daylight
- Suspended ceiling



AFTER RETROFIT

- Mirror lightshelf on external ledge reflecting diffuse daylight onto the high ceiling (suspended ceiling removed)
- Perforate venetian blinds
- Extra window pane

Daylight retrofit design by IEN Consultants



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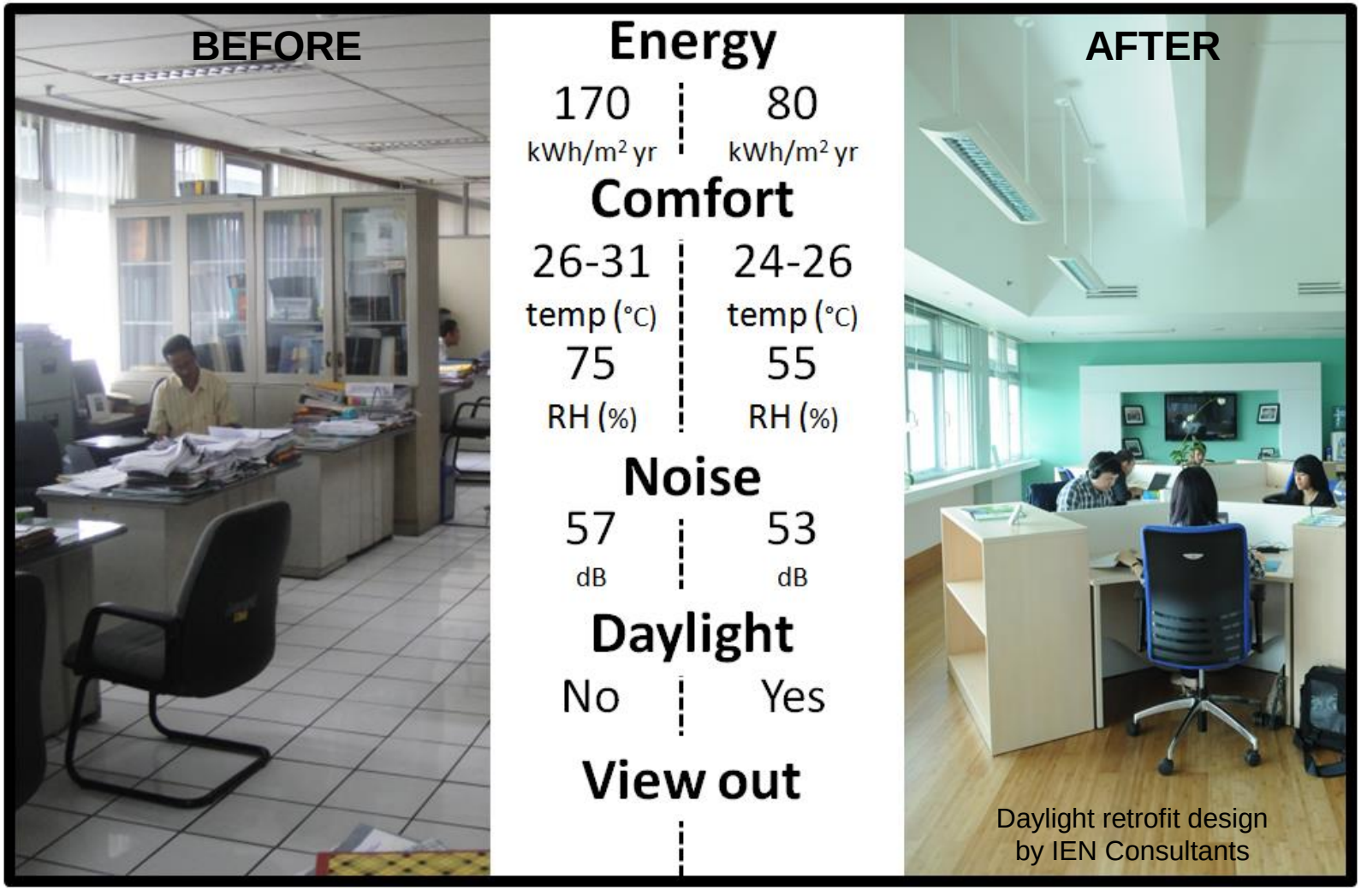
Daylit ‘biophilic’ building in Indonesia

The EECCHI office retrofit, Jakarta



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Daylit ‘biophilic’ building in Malaysia

The MMK high rise office, Damansara Perdana

Daylight design by IEN Consultants

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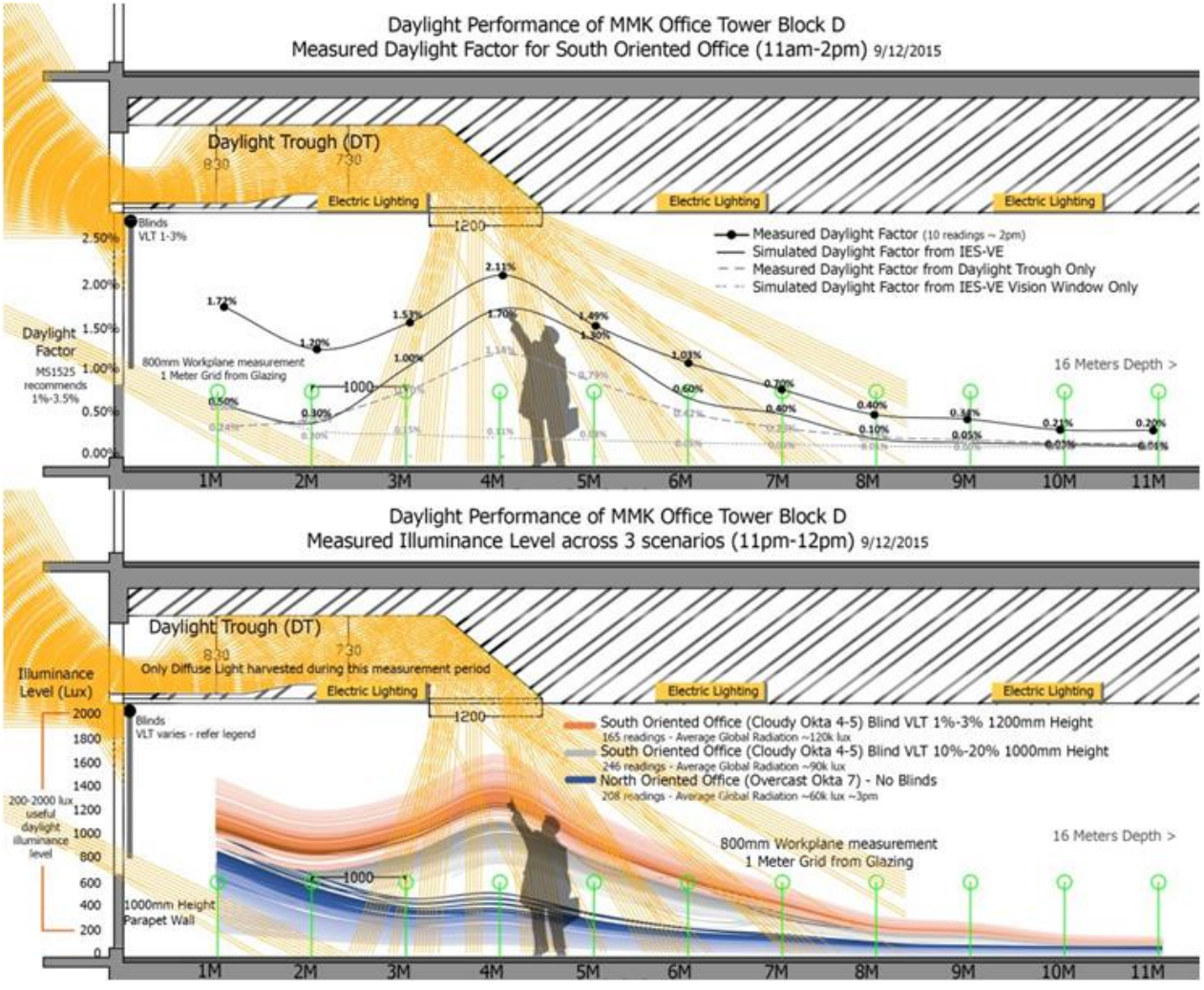
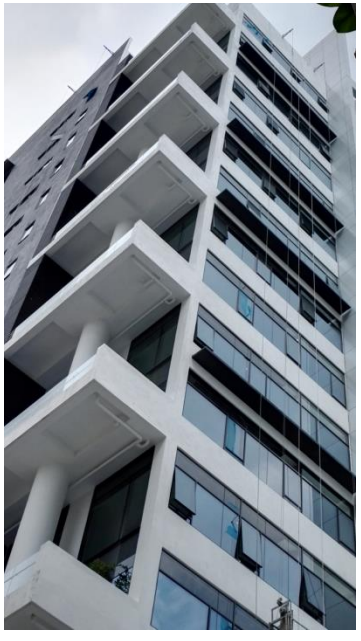
Daylit ‘biophilic’ building in Malaysia

The MMK high rise office, Damansara Perdana



Daylight design by IEN Consultants

Measured daylight show that the first **7 meters** can be daylit, even when the blinds are fully engaged



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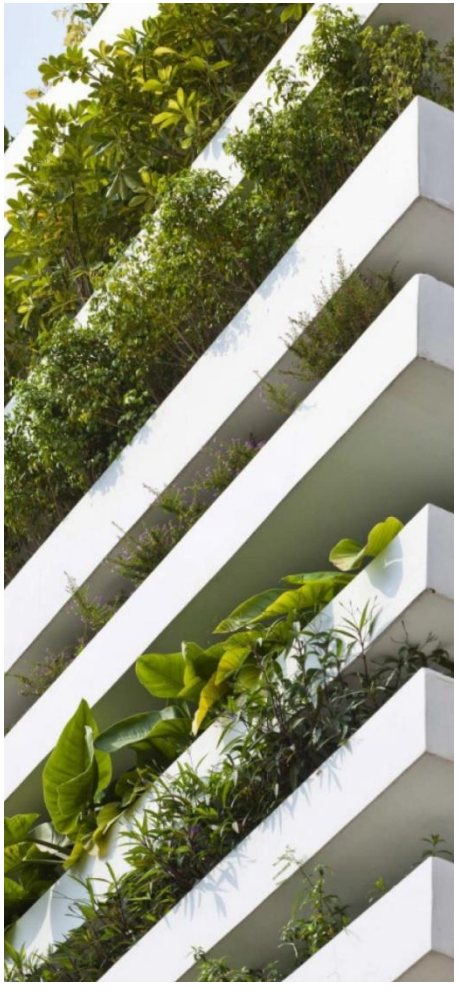
Concluding remarks

- Humans are naturally drawn to nature
- Biophilic design is important
- Biophilic design make economic sen$e
- Biophilic design is arguably under-represented in green building tools in Asia
- Several good examples of built environment allowing occupants to connect with Nature



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Thank you

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