# Buildings as Habitat: Biophilic Design toward Biophilic Urbanism

Course Number – TH 315

Thursday, June 21, 2018  8:45 – 9:45 AM

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# Speakers List

**Helena van Vliet, AIA, Dipl.-Ing.**

Helena van Vliet LLC

BioPhilly

Adjunct Faculty Pratt Institute

**Julia Kane Africa**

Biophilic Design and Wellness Consultant

# Course / Learning Objectives

- Learn to identify innate human spatial preferences and their evolutionary survival origins by studying an overview of current science supporting these preferences.
- Discover the biophilic design ingredients necessary for the design of physiologically restorative "well-being places," which measurably sustain us.
- Study examples of biophilic urbanist interventions as essential design and public health initiatives, and learn how they restore urban ecologies and mitigate heat stress, drought, and stormwater events in urban centers.
- Examine the quantifiable economic and public health benefits of biophilic design and biophilic urbanism.

# Buildings as Habitat: Biophilic Design towards Biophilic Urbanism

Bosco Verticale, Stefano Boeri, Milan, Italy

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# $CO_2$ Emissions of Cities

- By 2050, **80%** of **global population** are projected to live in **urban areas**.
- Cities consume **75%** of the world's **natural resources** and account for more than **70%** of **global $CO_2$ emissions**.
- Cumulative **emissions** of **$CO_2$**, together with methane and other greenhouse gases, largely determine **global mean surface warming of the planet**, causing ice melting, biodiversity loss and rising sea levels.

# Carbon

**The element that threatens to smother civilization is also, in different forms,**
**the fundamental building block of life.**

**In addition to reducing our carbon footprint, we need to pull carbon from the air and restore it to the earth.**

# $CO_2$ as Fertilizer

- **Trees** and **Plants absorb** nearly **40%** of **fossil fuel emissions** largely produced by cities every year.
- By increasing **urban forests**, the city can solve the problem it creates by using **$CO_2$ as fertilizer**.

- **Urban forests are $CO_2$ sponges**

- **Stefano Boeri**

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

# What if Buildings became vertical Forests?

- Stephano Boeri

# What if we abandoned making a distinction between Buildings and Landscape?

- Muse House, Bere Architects, London, UK

# What if Buildings became Landscape?

- Liuzhou Forest City, Stephano Boeri, Liuzhou, China

BOERI
STEFANO
BOERI
ARCHITETTI

# Public Health Imperative:
# Building Healthy Air

- **Urban forests reduce particulate matter pollution, absorb dust, & reduce noise**
- Trees & plants mitigate the **urban heat island** effect.
- **Volatile airborne forest compounds** (Phytoncides) **strengthen immune response.**
- **Increased biodiversity** elevates the quality of life, **reduces stress & crime**
- **Cities become biophilic: more beautiful & healthier**

# Healthy Human Habitat?

# Public Health Crisis: Chronic Stress

- Anxiety
- Aggression
- Depression
- Disorientation
- Hypertension
- Elevated Heart Rate
- Elevated Pulse Rate
- Circadian Disruption
- Cortisol Overproduction
- Elevated Hemoglobin Levels
- Impaired Concentration & Memory
- Increased Cell Aging
- Impaired Immune Function & Damage to the Hippocampus

AI18 ACM SIGKDD Conference on Artificial Intelligence
June 21-23, New York City


Forest Bathing in the City
What if we made it our responsibility to design places that are Biophilic Habitats, reduce Stress and foster Neurological Well-Being?
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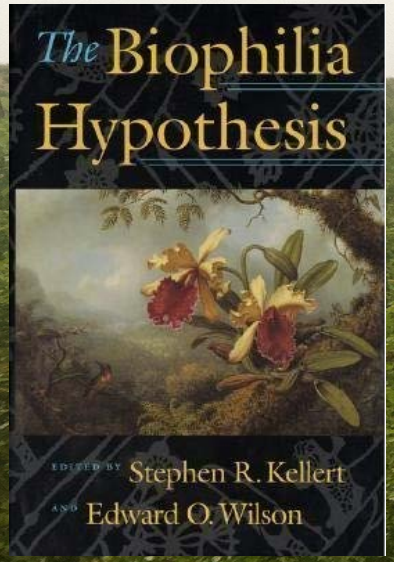
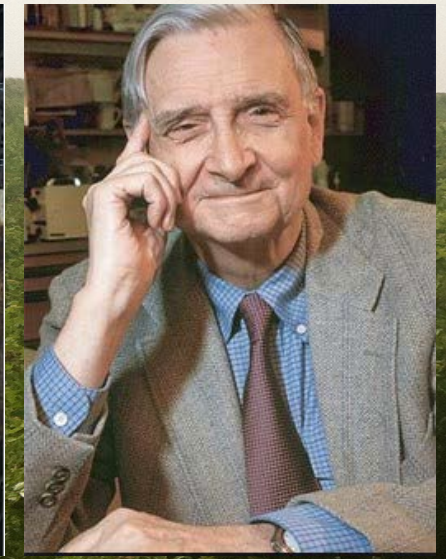
Nature is our Habitat of Origin
As biological organisms we have evolved in Response to Nature's Systems & Nature's Challenges

# bio=life/nature + philia=love/kinship

**Biophilia is the instinctive emotional Bond between Human Beings and other Living Systems.**

(E.O. Wilson, Harvard Biologist)



# Our Innate Sensory Awareness knows what is healthy for us

- Aidlin Darling Design – Photo: Matthew Millman Photography


Beauty = Evolutionary Survival

# Beauty = Evolutionary Survival

**Beauty is our Word for the Perfection of those Qualities that have contributed most to our Survival.**

E.O. Wilson, Biologist, Harvard

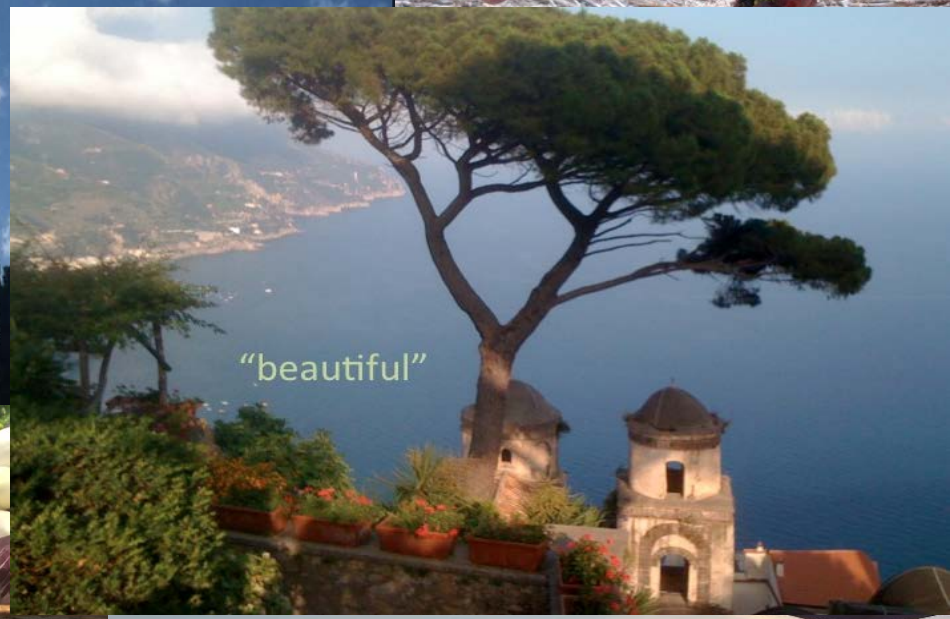
# Essential Elements of Advantage for Human Survival

- Lush varied foliage, bright colored flowers
- Clear waters, lakes, rivers, waterfalls, the sea
- Sunlight
- Transparent tree canopy
- Breezes
- Refuge places
- Prospect places

# Essential Patterns of Advantage for Human Advancement

- Curiosity/Exploration
- Play
- Organized Complex Pattern Recognition
- Awe

# Beauty




# Beauty = Cognitive Ease

-

# Beauty = Cognitive Ease

**Beauty is defined by the extent to which features of the environment engage organized processing structures in the brain, and are thus readily acquired, organized, and ‘understood’.**

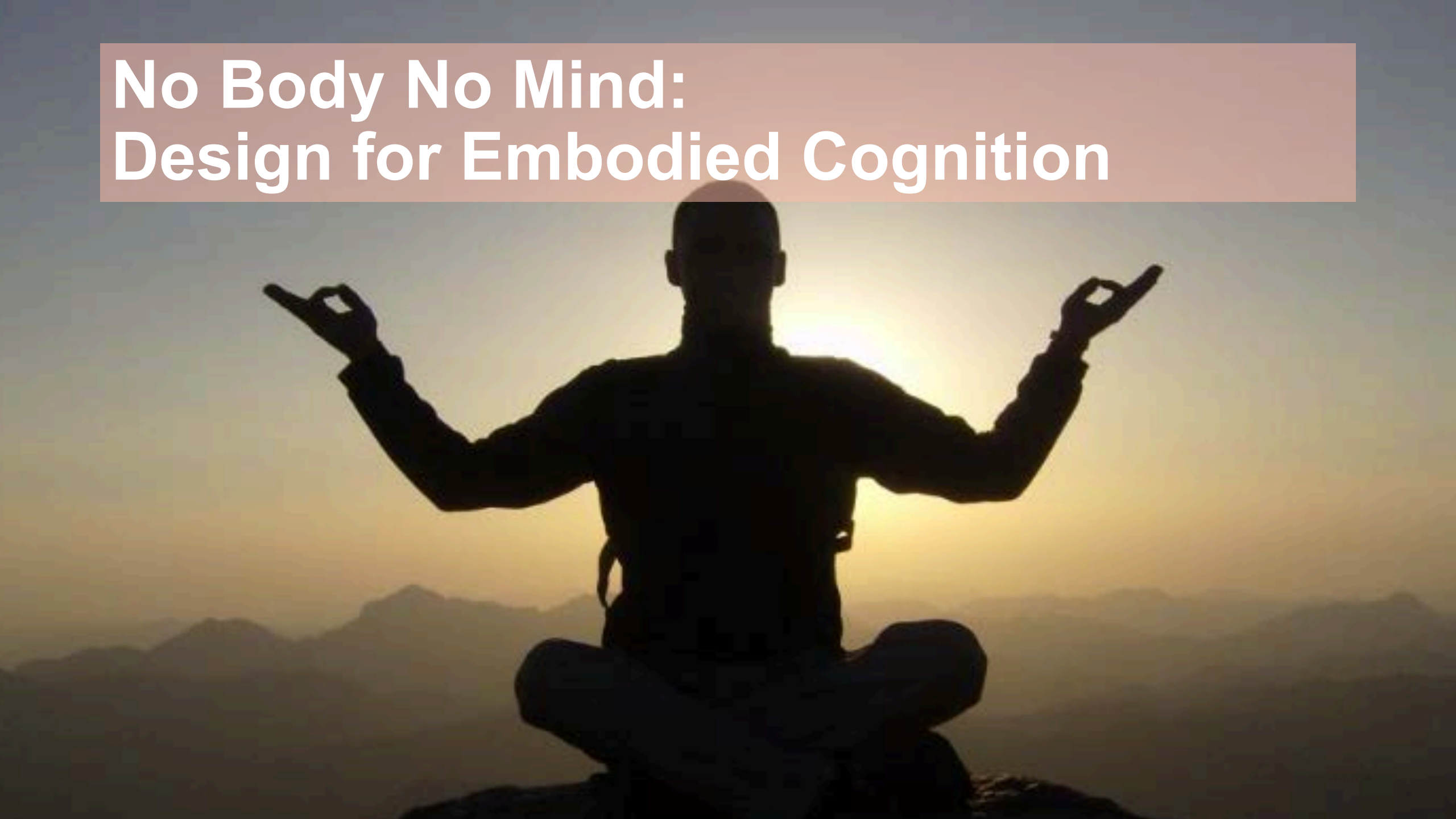
Thomas D. Albright, Neuroscientist ANFA

# The Relaxation Response

- **Triggered by Contemplative Experiences of Nature**

- **Metabolic rate decreases**
- **Heart beats slower and muscles relax**
- **Breathing becomes slower**
- **Blood pressure decreases**
- **Levels of nitric oxide are increased**
- **Brain wave patterns calm**
- **Antidote to stress,**
- **Antidote to depression**
- **Important element in maintaining health & fostering healing.**

# No Body No Mind:
# Design for Embodied Cognition



- **One of Cognitive Revolution's most astonishing Revelations:**
- **90% of our cognition is non-conscious**

- **Sarah Williams Goldhagen, 'Welcome to your World'**

# I Feel therefore I am

- **The Cartesian Split is dead!**
- **Descartes' "I think therefore I am" has become a casualty of Cognitive Neuroscience**

- **Antonio Damasio, Neuroscientist, 'Descartes' Error'**

**What emerges here are design criteria that have been forged over eons of evolution on this planet – whose imperatives are neither arbitrary nor negotiable…**

….attention is not narrowed in algorithms, signifiers, and particles, but directed toward the emergent, the affective, the sensual, the gestural and kinesthetic factors that pattern human perception and experience.

Sarah Robinson & Juhani Pallasmaa , ‘Mind in Architecture’

# Designing Experiences (rather than Buildings) in-tune with innate Human Preferences

- Buildings serve…… to frame & heighten Experience

# Biophilic Methodology: Building Blocks

- 1.) Inter-Sensory Experience
-
-
- ©2018 Helena Van Vliet, AIA

# Circadian Well-Being

- Circadian Balance
- Faster Recovery from Illness
- Enhanced Emotional & Mood Regulation
- Healthy Vitamin D Metabolism (strong immune function, bone growth & density)
- Hormonal Homeostasis
- Improved Attention & Cognitive Function
- Decreased Cell Aging

# Acoustic Well-Being

- Restorative Soundscapes
- Improved Concentration and Calm
- Nature sounds quantifiably reduce Stress
- Sound of Water: Grounding Sense of Here and Now

# Olfactory Well-Being

- Direct path to our Ancient Brain and to Memories
- Aromatic Oils for Stress Reduction
- Phytoncides

# Haptic Well-Being

- Touch is the first sense developed in the womb
- The skin is our largest organ
- We are entirely tactile beings

# Thermal Well-Being

- Thermoception

# Negative Air Ionization
## Living Plants + Living Water

- Inter-Sensory Well-Being Places

# An Architect must respond to the non-negotiable facts of human biology.

**Thomas D. Albright, Neuroscientist ANFA (Academy of Neuroscience for Architecture)**

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

# Biophilic Methodology: Building Blocks

- 1.) Inter-Sensory Experience
- 2.) Biophilic  Elements

# Building Blocks of Biophilic Well-Being
# 10 Biophilic Elements

- Dynamic, diffused Sun/Moonlight, dynamic Shadows
- Building woven into Site (topographic design)
- Inhabited & breathing Building Skin
- Transitional Inside-Outside Spaces
- Flowing Water & Rain made visible
- Harvesting warming Sun & cooling Breezes
- Living Plants & aromatic-therapeutic Scents
- Acoustic Intimacy
- Natural haptic Materials
- Biomorphic Forms

© Helena van Vliet

# Biophilic Methodology: Building Blocks

- 1.) Inter-Sensory Experience
- 2.) Biophilic  Elements
- 3.) Biophilic  Patterns

# Building Blocks of Biophilic Well-Being
# 10 Biophilic Patterns

- Refuge & Prospect
- Ordered Complexity (spatial & fractal)
- Building as Medium to experience Seasons & Place
- Silhouettes engage the Sky
- Soft Edges
- Play
- Mystery, Exploration & Discovery
- Hearth
- Sanctuary
- Awe

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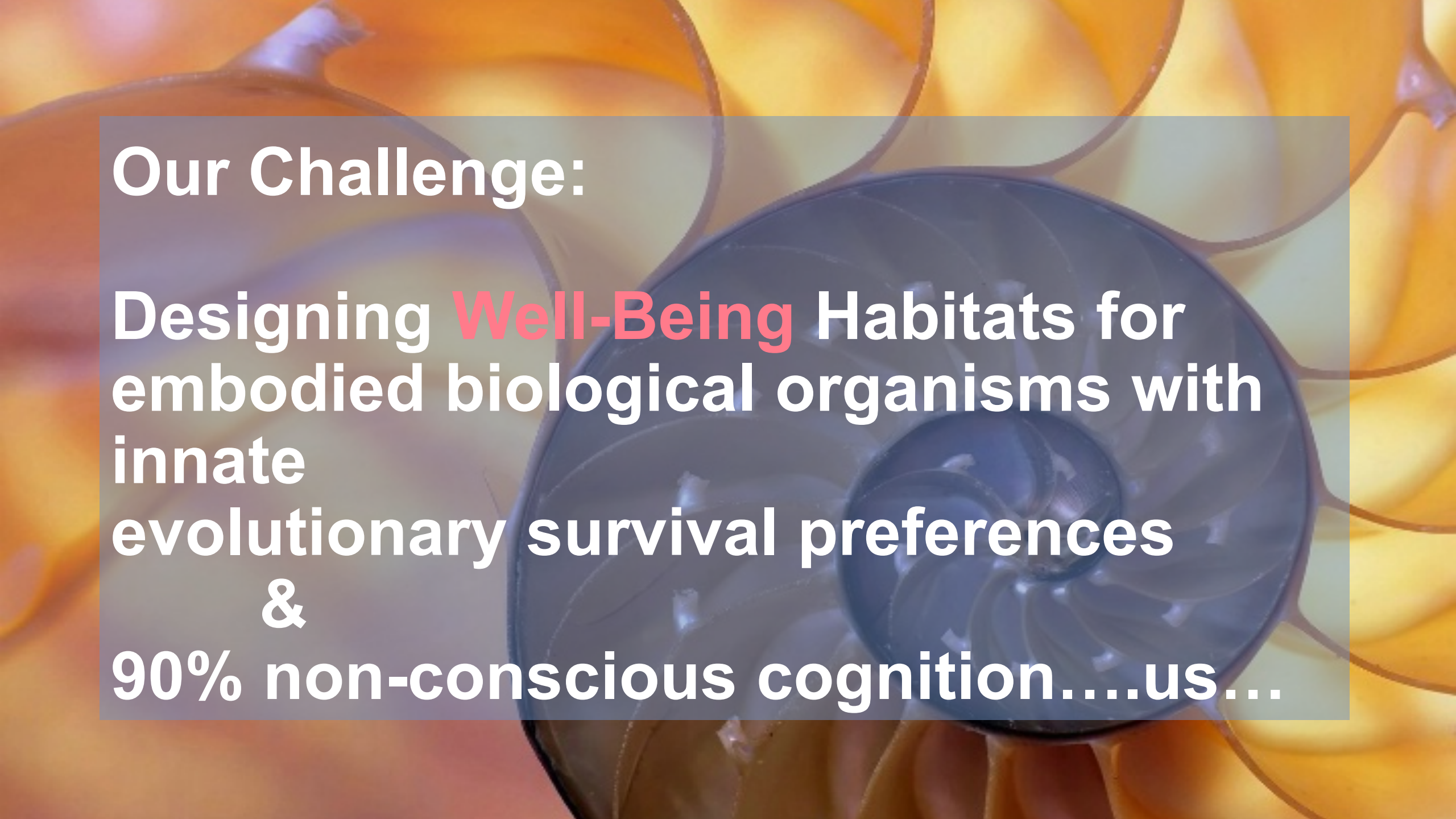
Our Challenge:
Designing Well-Being Habitats for embodied biological organisms with innate
evolutionary survival preferences
&
90% non-conscious cognition….us…

# ….and others:
# Designing for Bio-Diversity

# Biophilic Urban Habitat

- In tune with evolutionary elements & patterns of human survival & advancement
- Designed towards non-conscious cognitive ease & cognitive legibility
- Physiologically & neurologically nourishing/restorative for humans as embodied biological organisms
- Designed to foster biodiversity

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# Bio-Diversity as a Design Challenge: bio-diverse places are neurologically restorative

# Maintaining biodiversity is important…the more species live in a park, the greater the psychological benefits to human beings…

**Richard Louv, ‘The Nature Principle’**

# Designing Bio-Diverse Habitats: Vertical Forests, Habitat Roofs, Habitat Cities

# Buildings as Habitat (Forests, Mountains)

- Designing Bio-Diversity
- Non-human-centric
- Bird-friendly
- Pollinator-friendly

- **Bosco Verticale, Stefano Boeri, Milan, Italy**

# ‘Bosco Verticale’ was designed to

- **Increase biodiversity** by creating an attractive space for birds and pollinators
- **Build a microclimate** - enables residents to enjoy the cool shade of the trees on their balconies
- Create a diverse palate of plants that **absorb $CO_2$** and particles, and **produce oxygen** while simultaneously providing protection from the sun and noise pollution

# A new Aesthetic Language: neurologically & cognitively restorative

- The incorporation of vertical & horizontal greenery creates a new aesthetic language for our buildings
- Plantings are dynamic, organic material that can bloom, flower, fall, die back, and grow.
- Just think of the dynamism that gives the façade!

- Anthony Wood, Exec Dir. Council on Tall Buildings and Urban Habitat

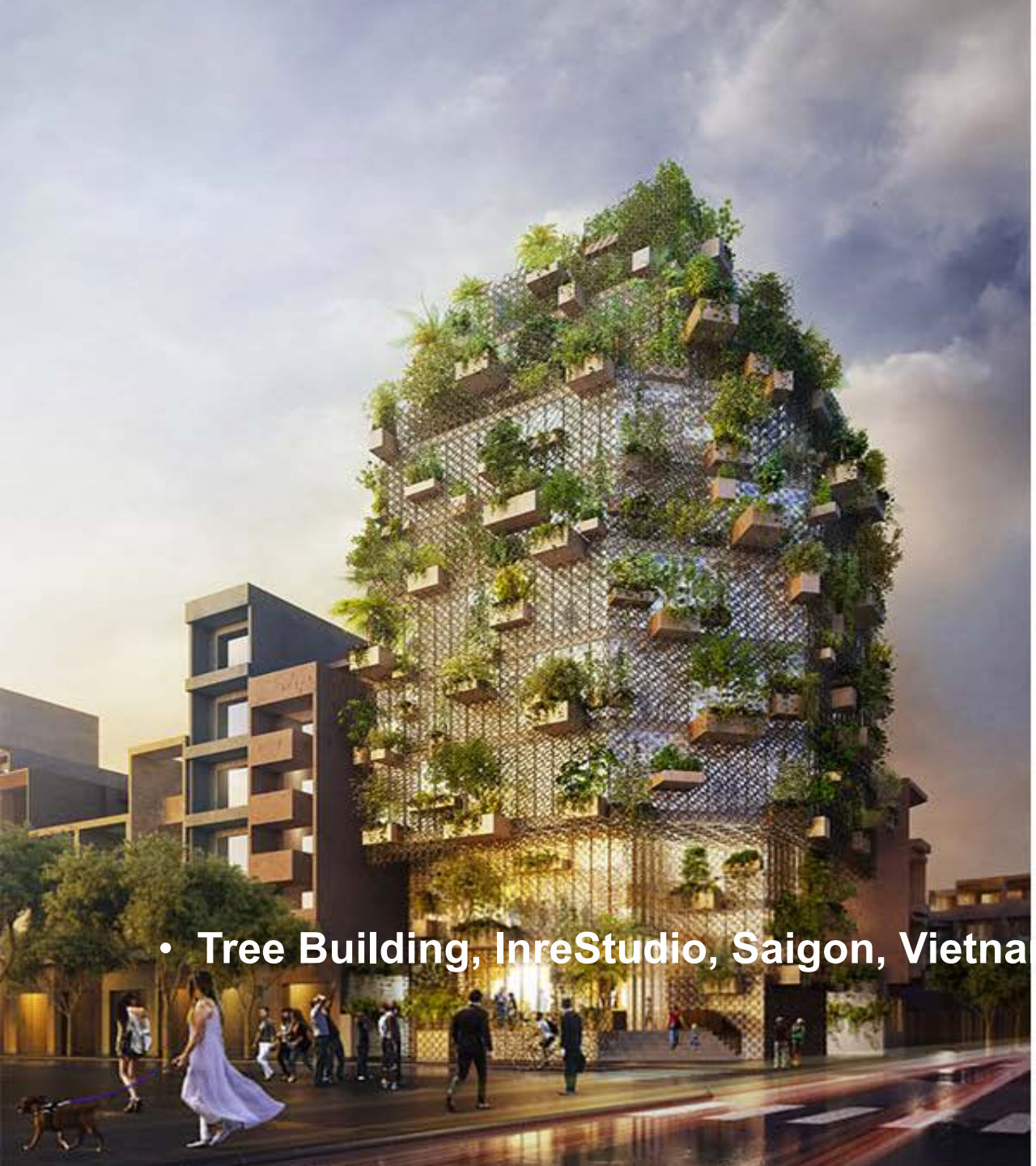
# Buildings as Mountains

- Acros ‘Mountain’ Fukuoka Prefectural International Hall, Emilio Ambasz, Fukuoka, Japan

- Arboricole, Vincent Callebaut, Angers, France


- Mountain Forest Hotel, Stefano Boeri, Guizhou, China

- Flower Tower, Edouard Francoi, Paris, France



- Tree Building, InreStudio, Saigon, Vietnam

- The Valley, MDVRD Amsterdam, Netherlands

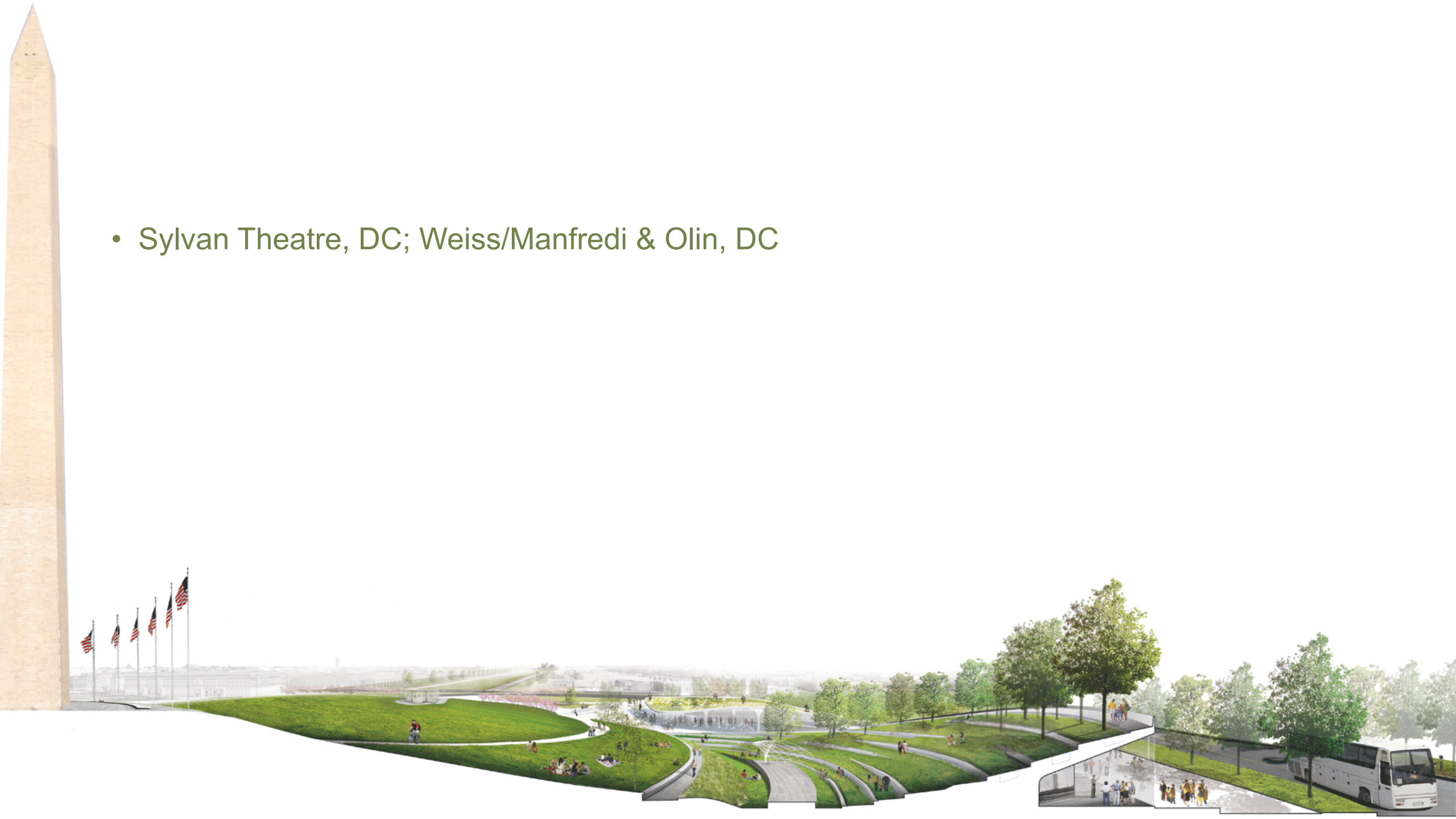
- Rosewood Tower, Stefano Boeri, Sao Paulo, Brazil

- Tanpopo (Dandelion) House, Terunobu Fujimori, Japan

# Buildings create Hills


- U Penn College House Dorm; Bohlin, Cywinski, Jackson, Philadelphia

- Sylvan Theatre, DC; Weiss/Manfredi & Olin, DC



# Buildings as Landscape: the new vernacular relevant to the Challenges of our Age

- Abandoning the distinction between buildings and landscape
- Abandoning the distinction between city and landscape
- Designing bio-diverse Habitats

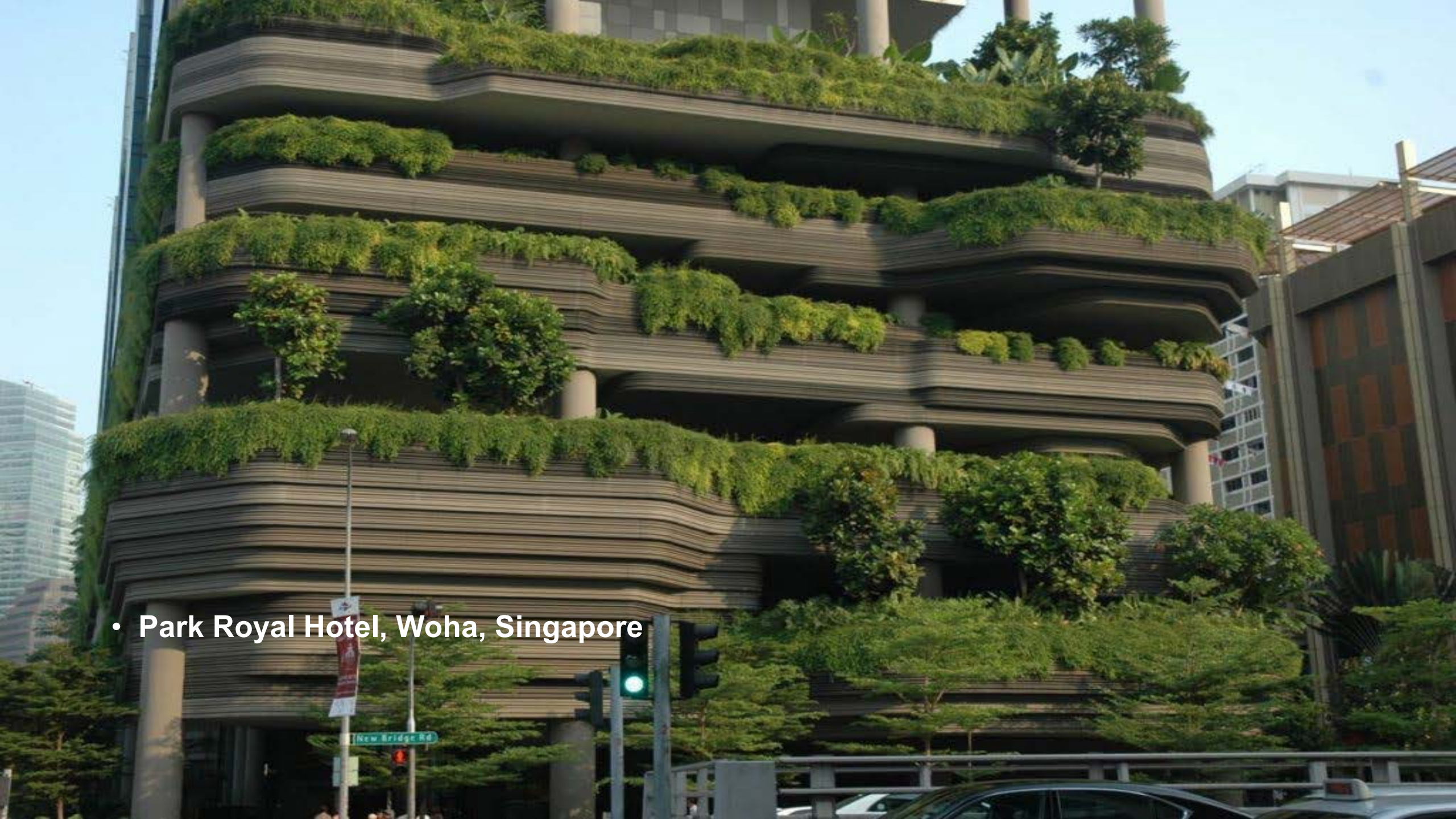
- Designed to mimic the nearby hills
- Designed to provide habitat for endangered Bay Checkerspot and Smiths Blue butterflies.
- Supports native birds, hummingbirds, bees

- Ca Academy of Sciences, Pelli, Rana Creek Design, San Francisco


- Brooklyn Botanical Garden Visitor Center; Weiss/Manfredi


- Musee du Quai Branly, Patrick Blanc, Paris

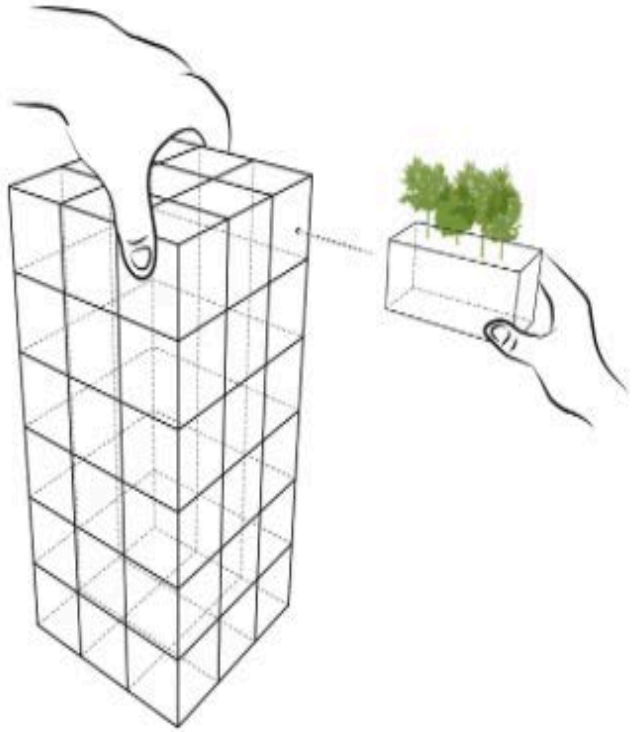

- **Liuzhou Forest City, Stefano Boeri, Liuzhou, China**




- Park Royal Hotel, Woha, Singapore


- **Timber High Rise**
  **Plants and trees sprout from modular units, Penda, Toronto**

# Customizable modular Planters (Penda Architects)



A modular system of a structural framework and functional plug-ins offers the residents a great amount of flexibility to design their own home.

**Air-purifying Plants will use the grid on the facade to grow along and, after some time,**
**nature will be the main design-language.**

Penda Architects

- Hawthorn Tower, Stefano Boeri, Utrecht, Netherlands

- One Central Park, Jean Nouvel, Sydney, Australia

# Multi-Sensory Interior Habitats: Circadian, Acoustic, Olfactory, Haptic, Thermal Comfort

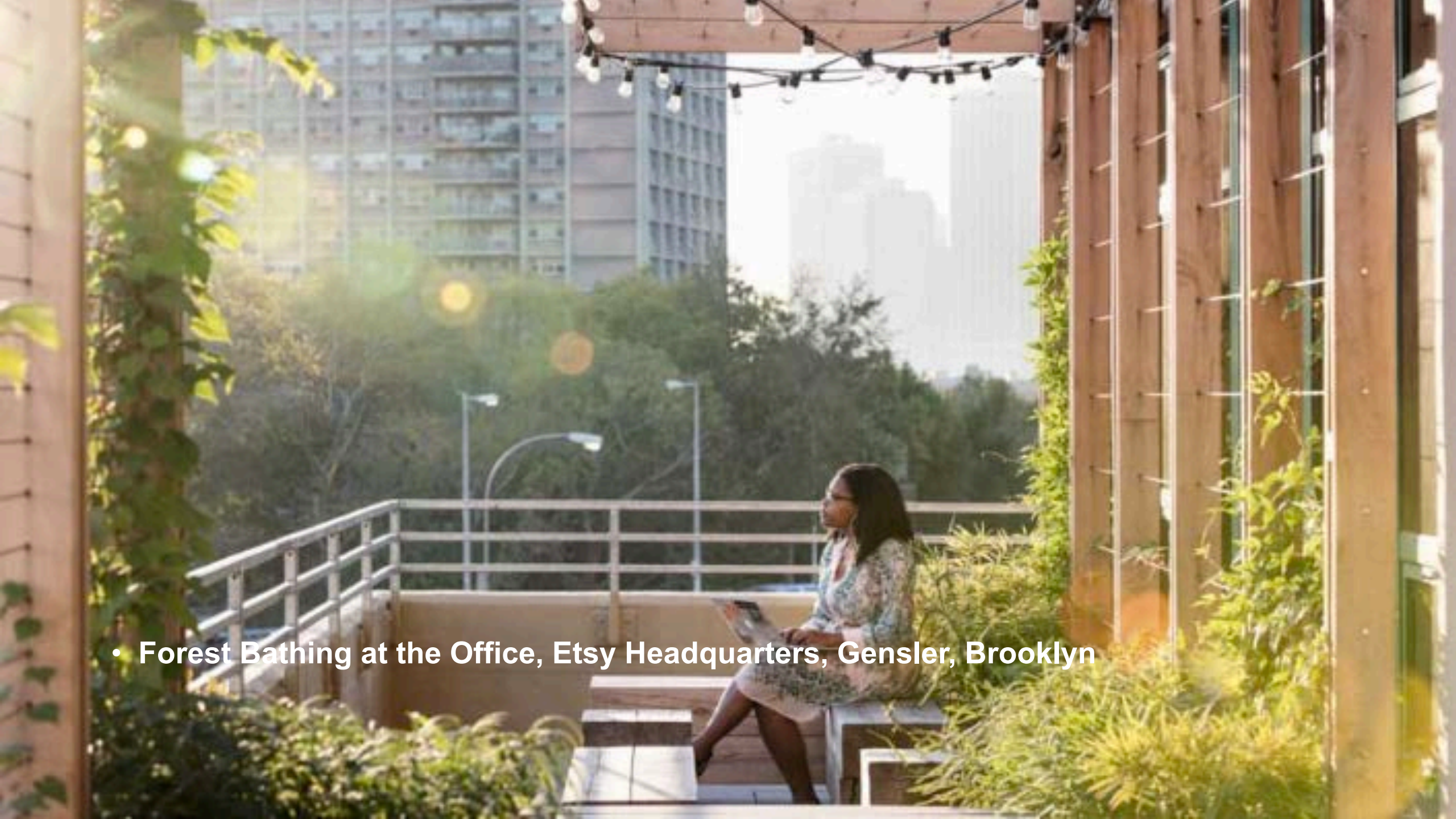

- Changi Airport Terminal 3 Baggage Claim, CPG/SOM, Singapore

- 158 Cecil Street, Park+Assoc, Singapore

# The Soft Edges of the New Design Vernacular

- Rosewood Tower, Jean Nouvel, Sao Paulo, Brazil

- CookFox Offices, CookFox, NYC  Restorative Social Spaces



- Forest Bathing at the Office, Etsy Headquarters, Gensler, Brooklyn

# Meadow Roof Habitats

- Chicago City Hall, Conservation Design Forum/Alelier Dreiseitl, Chicago, Ill

As a potential tool for preserving and restoring biodiversity in urban areas, green roofs need to be seen less from the perspective of ornamental gardening and energy conservation and more from a regional perspective of landscape and ecological planning.

Stephan Brenneisen, ‘Urban Habitats’

# Bio-diverse Roofs:
# Creating a Mosaic of Micro-Habitats

- Vary the depth of substrate
- Create landforms
- Use boulders and stones, recycled materials
- Infuse the substrate with local river material
- Sprinkle seed of diverse native plants
- Leave dead stems of wood and logs
- Uneven water content creates wetlands

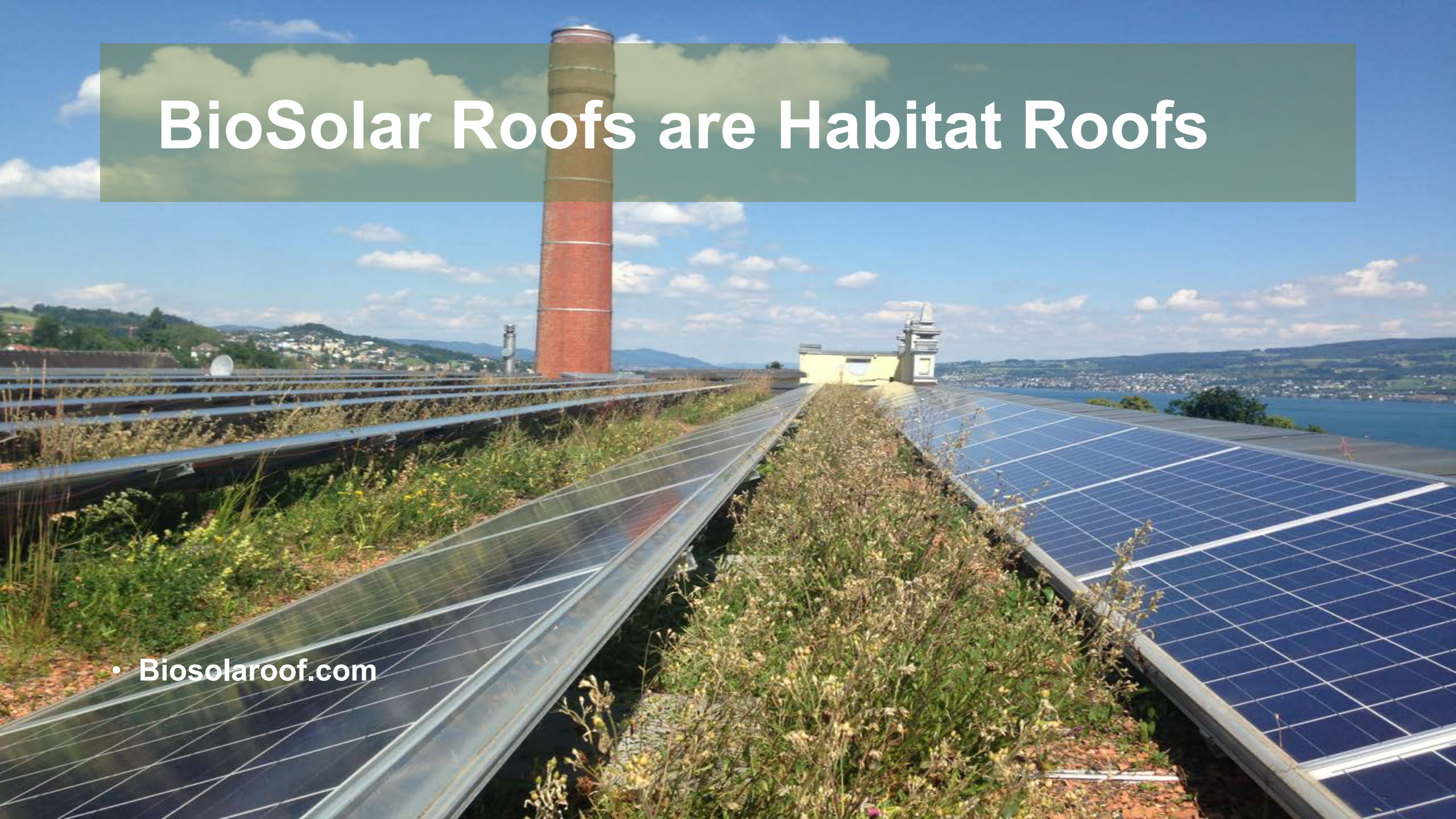
- Source: Anne Lewis FAIA, City Wildlife

Stephan Brenneisen

# 3 in 5 Bites of Food we eat relies on Pollination

- Tower & Podium high rise configuration ideal
- Roof of the podium as biodiverse habitat roof to serve bees' needs.
- Decline in green space area within a 2000 feet radius around each rooftop results in decreasing species diversity and abundance.
- Pollinators do best below the 8th Floor. 5th Floor or lower preferred.

# BioSolar Roofs are Habitat Roofs



- Biosolaroof.com

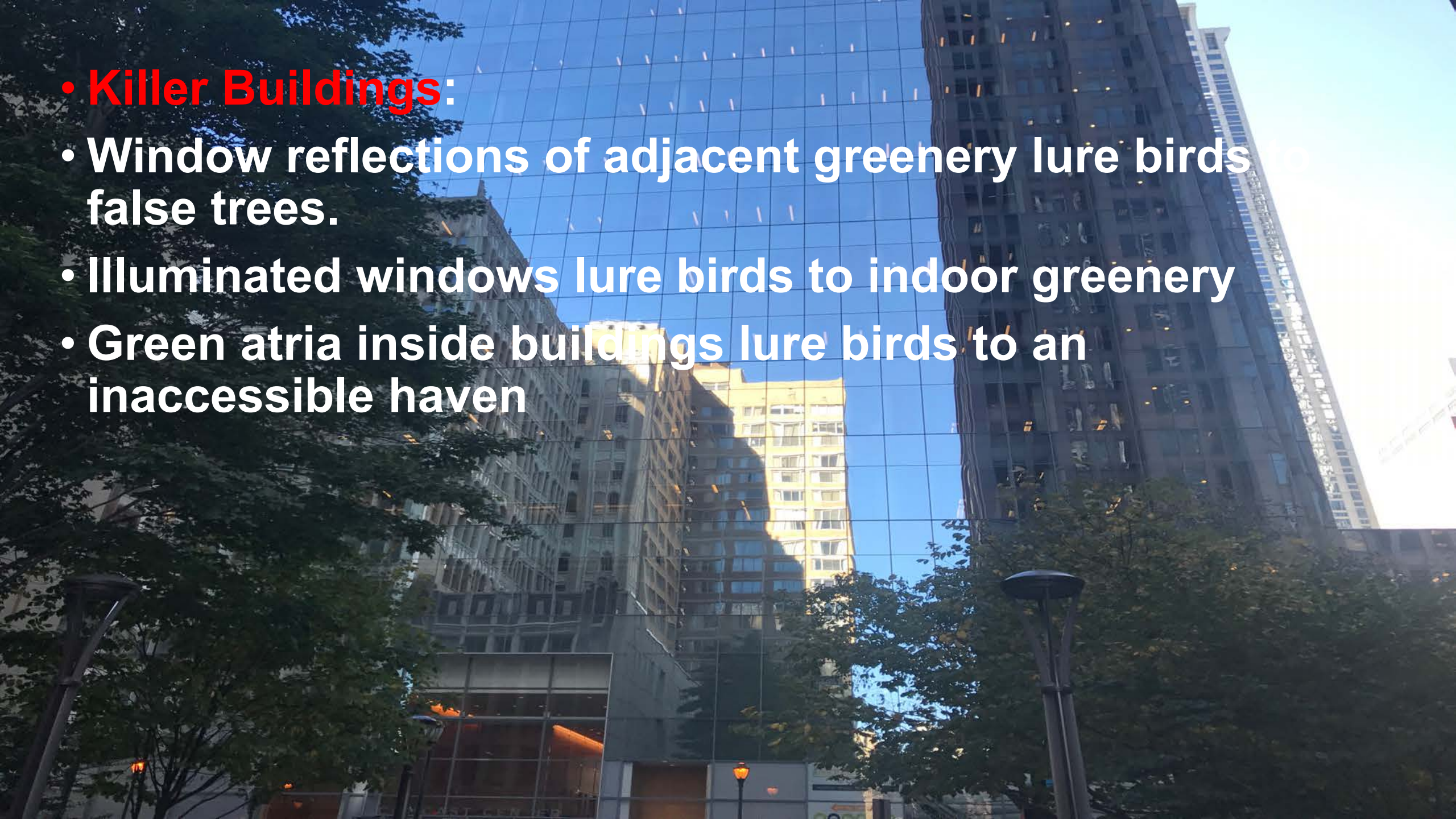
# Buildings support Ambulatory Wildlife

- Alder Hey Childrens' Health Park, BDP, Liverpool, UK

# Buildings as Habitat: Keeping our Friends safe

- Glass in buildings kill 1 billion wild birds in North America – per year….5% of migrating bird populations!

- **Designs that kill are not sustainable designs**



- **Killer Buildings**:
- Window reflections of adjacent greenery lure birds to false trees.
- Illuminated windows lure birds to indoor greenery
- Green atria inside buildings lure birds to an inaccessible haven

# Bird-Safe Fritted Glass

- Transbay Transit Center, Pelli Clark Pelli, San Francisco, Ca

# Patterned Glass

- Rietberg Museum Addition, ARGE,  Zurich

# Bird-Safe Building Guidelines


# Neighborhood Birdsong Cover:

# There is a direct link between the health of bird populations and the quality of life for humans

# The Philia in Bio-Philia

- Designing Symbiotic Relationships

Bird Brick Houses®

- Swift Nest Boxes behind Ventilation Holes

- Austin, Congress Avenue Bridge
- 5:30-7pm

# Green Screens:
# an affordable Habitat Facelift

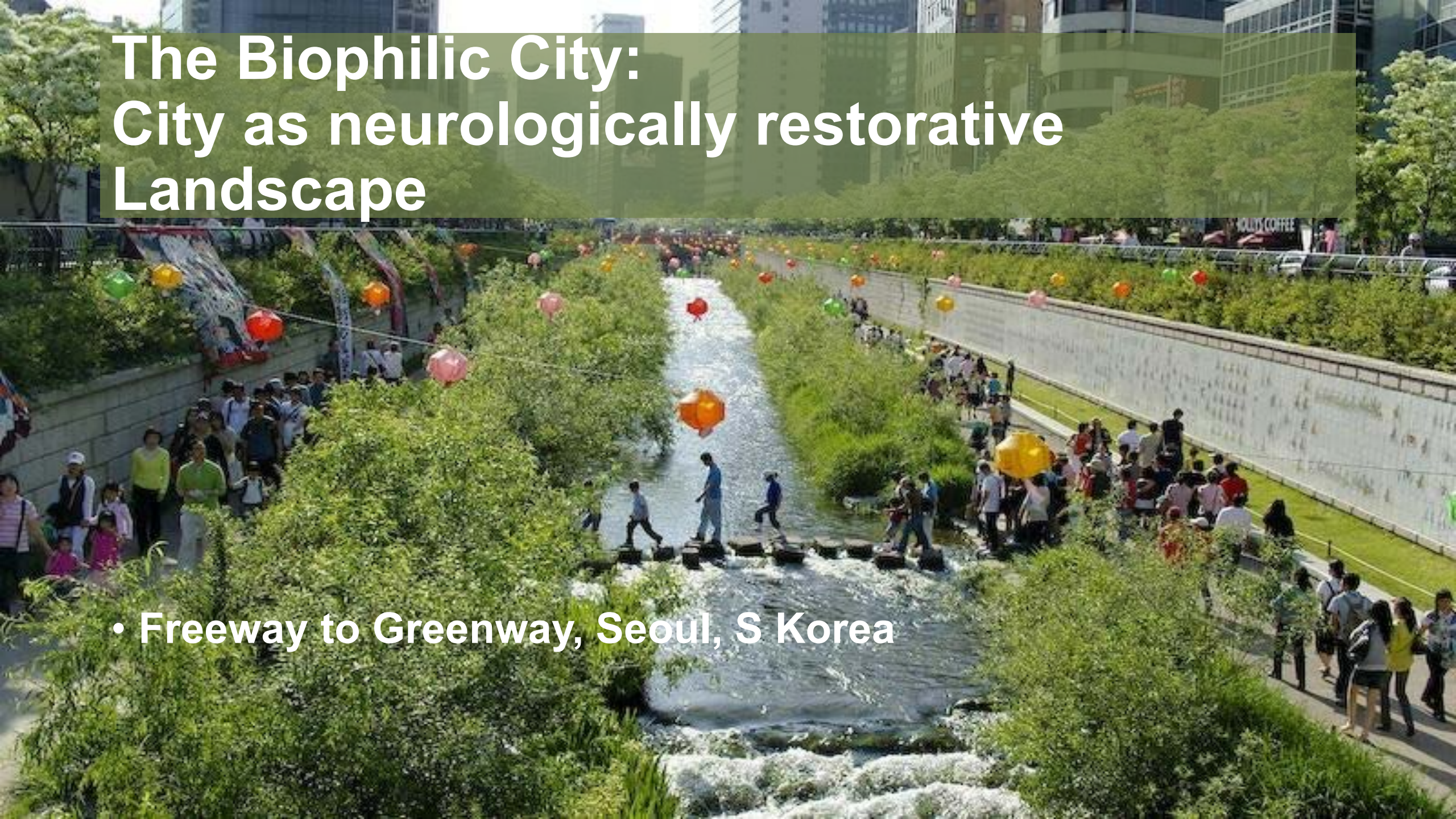
# Buildings grow Food

- Brooklyn Grange, Brooklyn

- Via Verde, Grimshaw+Dattner, Bronx, NY


• JNBY Headquarters, Renzo Piano, Rana Creek Design, China
• Tea Plantation on all Roofs

# The Biophilic City: City as neurologically restorative Landscape



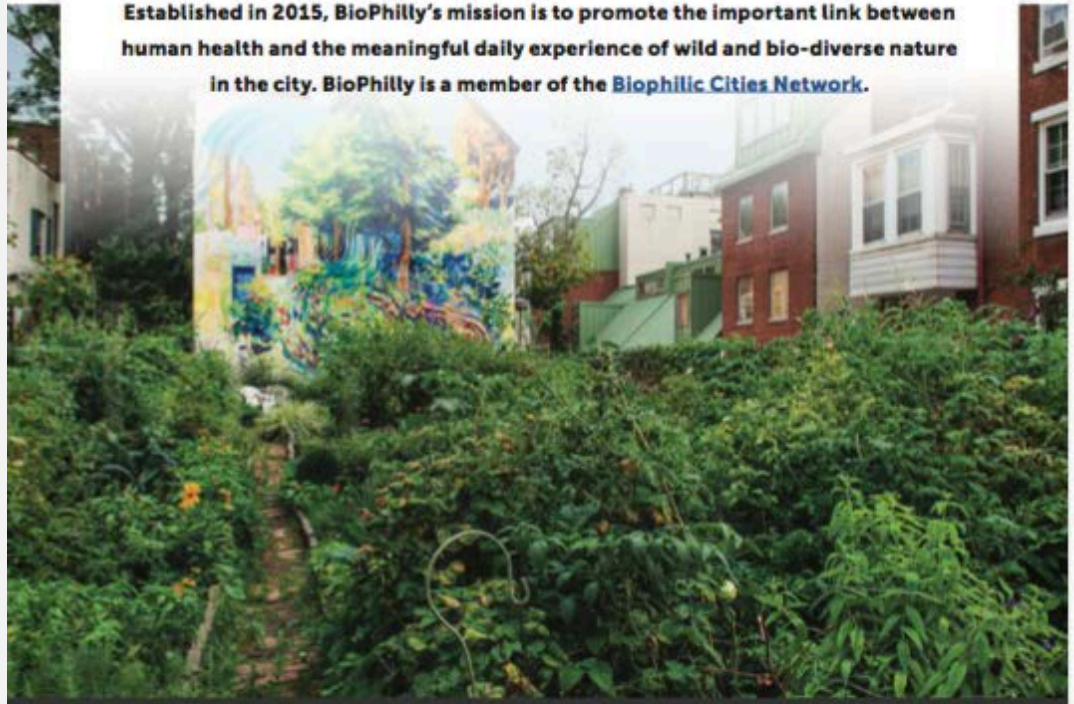
- Freeway to Greenway, Seoul, S Korea


• Before


• After

bioPhilly

**Established in 2015, BioPhilly's mission is to promote the important link between human health and the meaningful daily experience of wild and bio-diverse nature in the city. BioPhilly is a member of the Biophilic Cities Network.**



**www.biophilly.org**

White Oak leaf and fruit

Hawks perch atop the Philadelphia Museum of Art

## Biophilia: bio=life + philia=love

## Our Biophilic City:

- **City as wild bio-diverse habitat**
- **Connecting all green dots:** promoting wild life corridors, habitat tapestry & green-blue infrastructure
- **Deep place commitment & stewardship** through daily joyful engagement with urban wild nature
- **Healthy lives require Nature.** The Biophilic City is physiologically restorative: boosts immune & cognitive function, supports hormonal & circadian balance, lowers stress, blood pressure, pulse rate, & decreases cell-aging
- **City as a garden, William Penn's "Green Country Town":** living roofs, living facades, urban agriculture
- **Living soil:** toxin-free public spaces, carbon farming
- **Planting healthy air:** heat island and particulate matter reduction
- **Precious water:** rainwater harvesting, rain gardens, experience of seasons & weather
- **Healthy neighborhood birdsong cover:** bird food plantings, dark sky policies
- **Play, discovery, wonder and awe:** nature in the city amazes, stimulates, and propels us to explore, learn & to care
- **Enhanced civic life:** caring for place as an essential ingredient in caring for one another

bioPhilly

**"We cannot continue to believe that the landscape is sacred and the city is profane. They must both be considered sacred."**

*Paul Murrain (British Urbanist)*

**info@biophilly.com**

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**graphic design by BarberGale**

# Healthy City – Urban Habitat

**BioPhilly is an urban habitat stewardship organization of designers, naturalists, educators, public health professionals, collaborators, connectors and concerned citizens.**

***Our goals are to:***

- Promote the important links between human health and meaningful daily experience of wild and bio-diverse nature in urban Philadelphia.
- Build the paradigm of re-imagining Philadelphia as a healthy and safe ecosystem, where a diversity of species, human and non-human, can sustainably thrive together.
- Catalyze collaborations, providing biophilic urbanist expertise and support for groups and projects, which promote caring for place and foster a verdant and livable city.
- Advocate for policies, which incorporate biophilic solutions and values.

***BioPhilly is a member of the International Biophilic Cities Network.***

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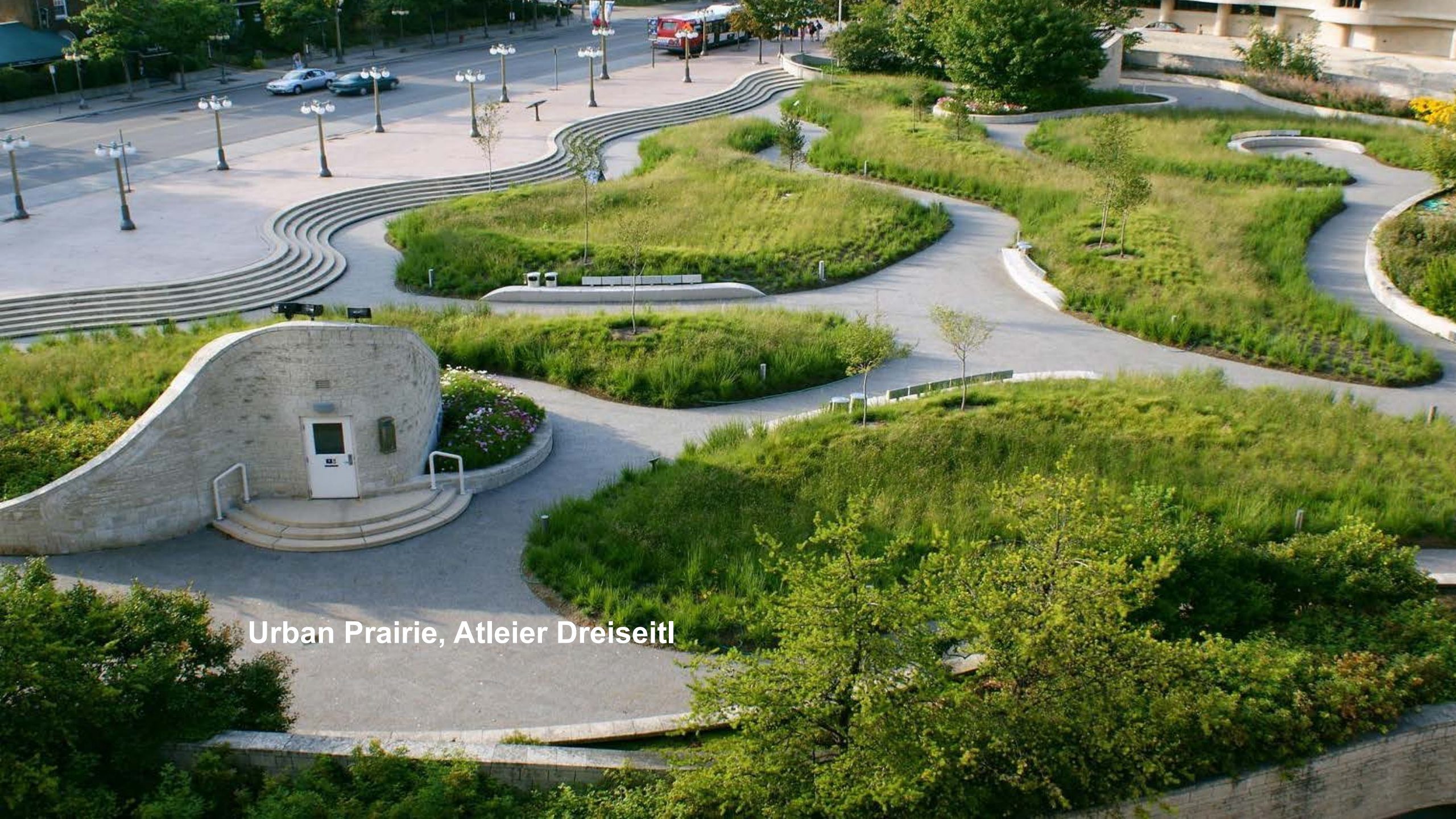
- Namba Parks, Jerde/Obayashi, Osaka, Japan

- Transbay Transit, Pelli Clark Pelli, Rana Creek Design, San Francisco, Ca

- Thousand Trees, Fujimoto Architects, Paris, France

# Biophilic Urban Acupuncture

- Tanner Springs Park, Atelier Dreiseitl, Portland


Urban Prairie, Atleier Dreiseitl

# Restorative Water Sound Intervention

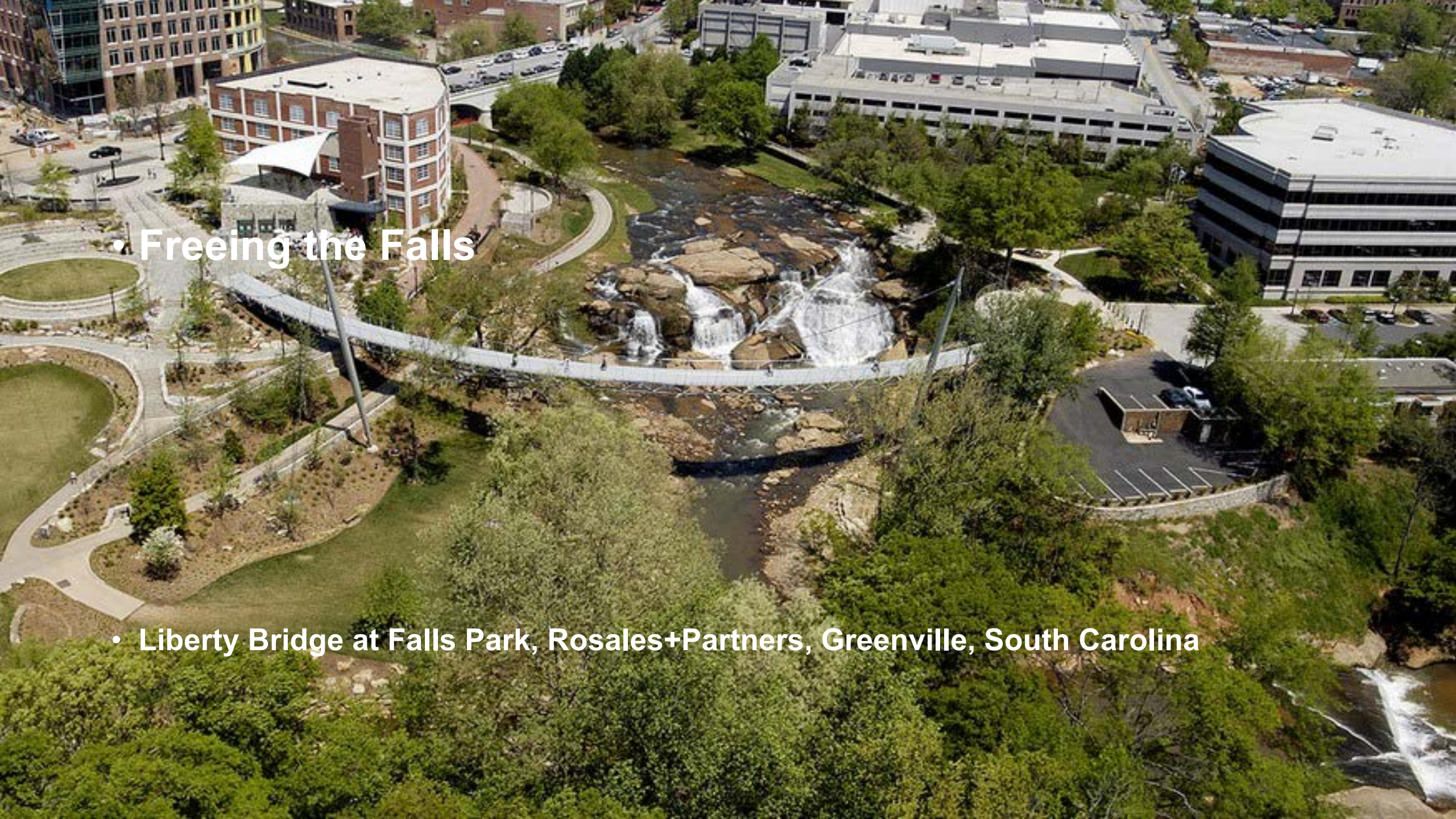
- Masks traffic sounds
- Sense of Freshness
- Sense of Here and Now

# Habitat Restoration

- First place in Seattle where one can touch the water
- Reintroducing Salmon Habitat
- Olympic Sculpture Park, Weiss/Manfredi, Seattle

# Experiencing Rivers

- Dawn Bridge, MVRDV, Shanghai, China



- Freeing the Falls

- Liberty Bridge at Falls Park, Rosales+Partners, Greenville, South Carolina

- before


• after

# Ecological Staircases

- Vancouver Convention Center
- Seamless visual link to adjacent park.
- Reduces urban heat island effect.

Musson Cattell Mackey Partnership/DA

DA Architects

- Selection of indigenous grasses, herbs, and bulbs
- Supports hummingbirds, butterflies, migratory songbirds, insects, small mammals
- Seasonal beauty
- Drainage planes mimic natural terrain and are scientifically sloped to convey rainwater across roofs for irrigation
- Select species filter and purify rainwater for storage and reuse
- Sound attenuating
- Thermal insulation

# Agrihoods

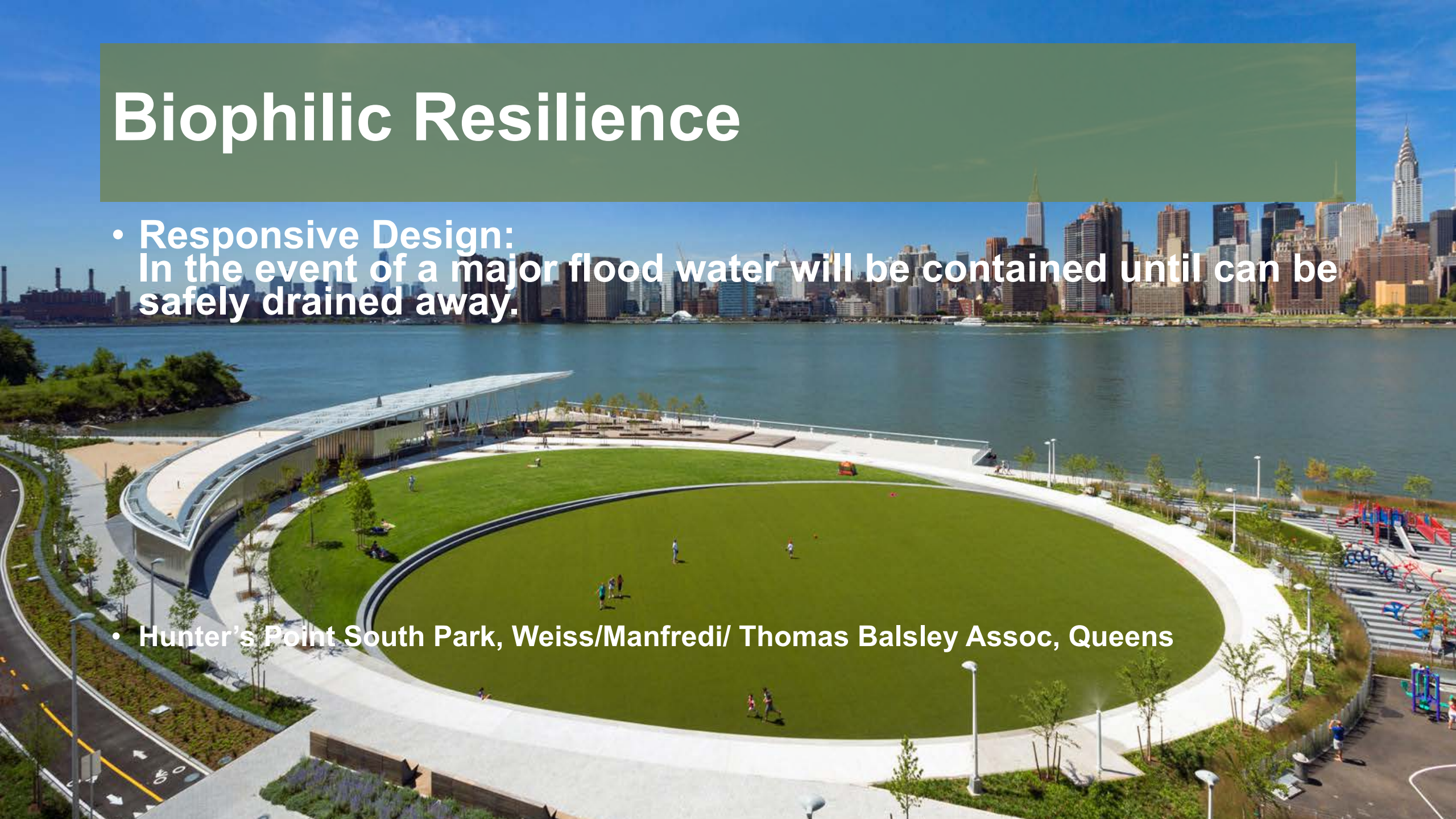

- Perkins + Will

- Terreform Future Proposal, Michael Sorkin, New York

- Reinventer Paris, Jacques Ferrier

# Biophilic Resilience

- **Responsive Design:**
  **In the event of a major flood water will be contained until can be safely drained away.**



- **Hunter's Point South Park, Weiss/Manfredi/ Thomas Balsley Assoc, Queens**

- **Resilient beauty: the flooded condition**

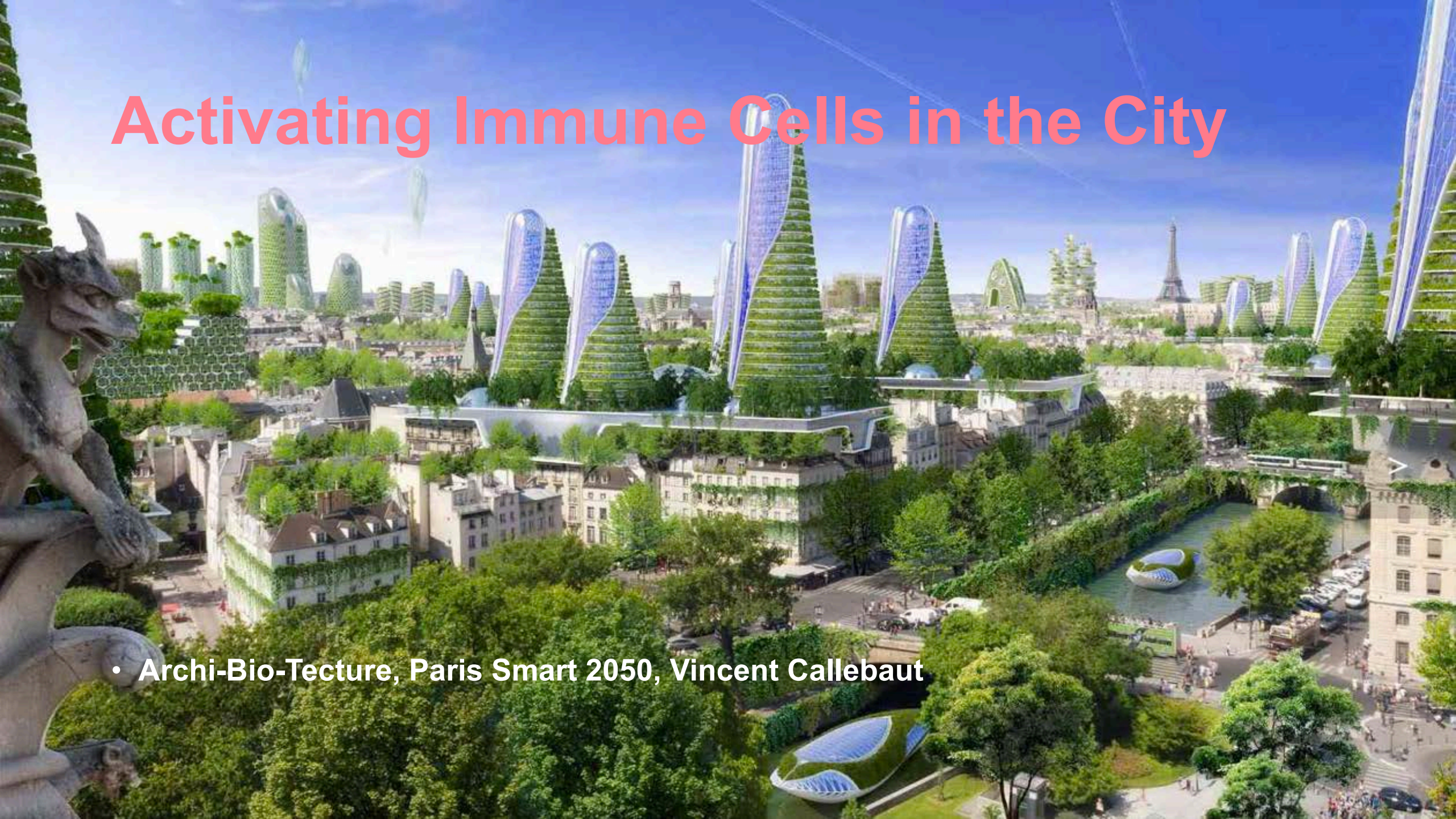
# Contiguous Wildlife Habitat Corridors


Promenade Plantee, Paris

- Highline, James Corner Field Operations/Scofidio+Renfro/Piet Oudolf, NYC

- Freeway Park, Lawrence Halprin Assoc, Seattle

# Activating Immune Cells in the City

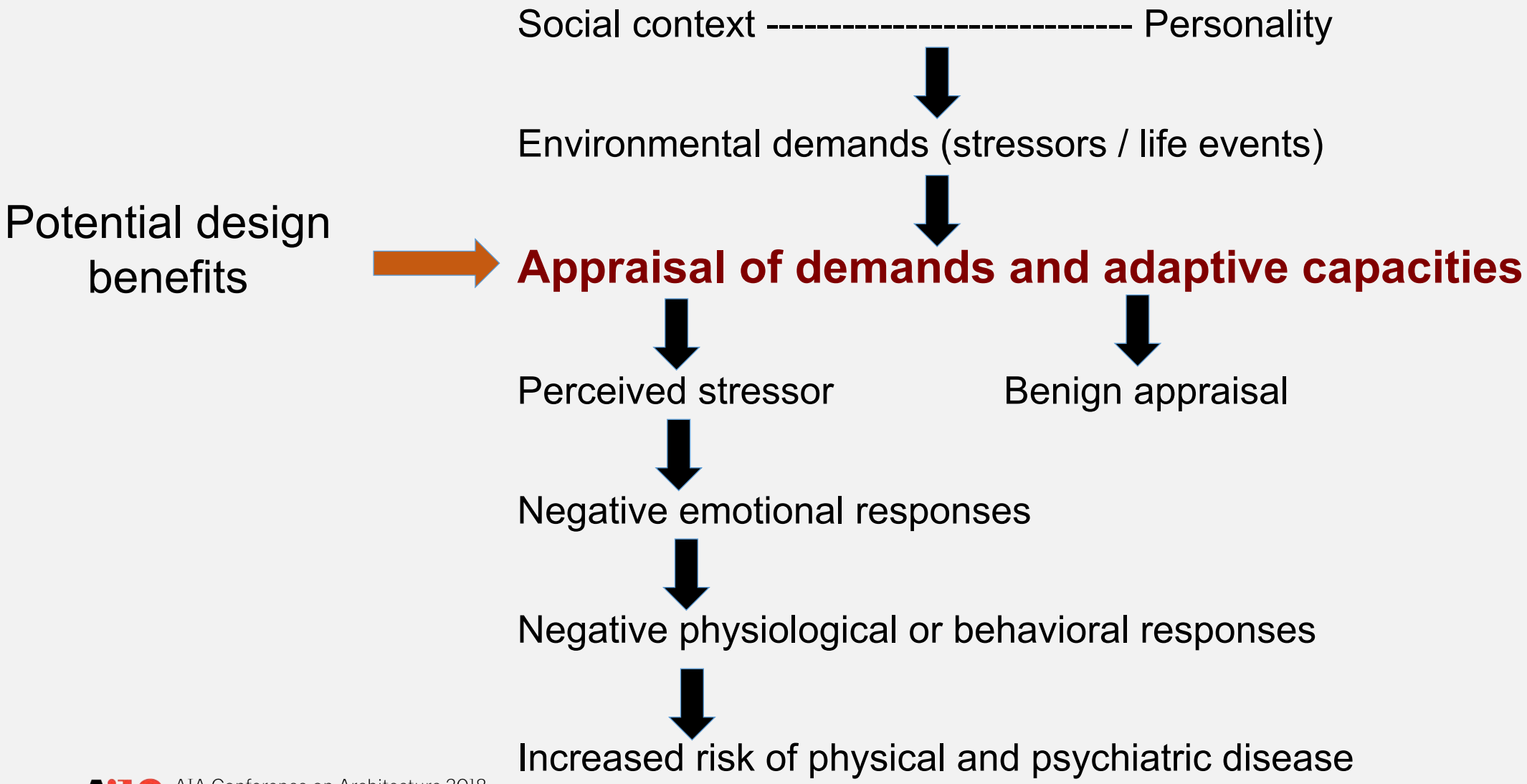


- Archi-Bio-Tecture, Paris Smart 2050, Vincent Callebaut

# What makes a building resilient?


# What makes a person resilient?

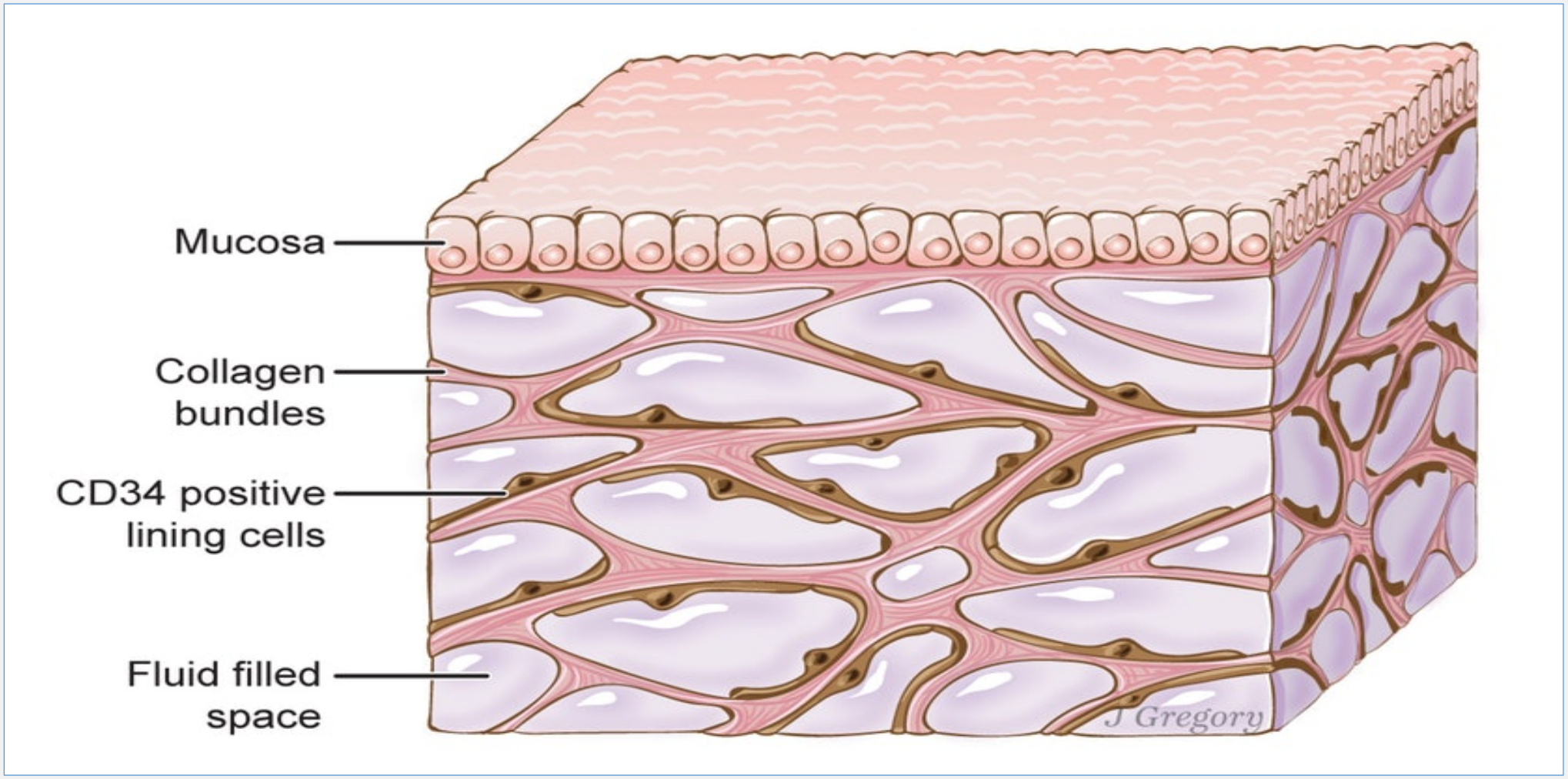
# Stress etiology and pathology






http://bit.ly/1Mbscox
Cohen, S. et al 1995

# Interstitium: not a self contained organ but a system






https://bit.ly/2GjWdrm

# “Nature Contact and Human Health: a research agenda” (2017) Frumkin, et al.

**Table 1.** Summary of evidence-based health benefits of nature contact.

| No. | Health/well-being benefits | References |
|---|---|---|
| 1 | Reduced stress | Berto 2014; Fan et al. 2011; Nielsen and Hansen 2007; Stigsdotter et al. 2010; van den Berg and Custers 2011; van den Berg et al. 2010; Ward Thompson et al. 2016 |
| 2 | Better sleep | Astell-Burt et al. 2013; Grigsby-Toussaint et al. 2015; Morita et al. 2011 |
| 3 | Improved mental health: | |
| | Reduced depression | Astell-Burt et al. 2014c; Beyer et al. 2014; Cohen-Cline et al. 2015; Gascon et al. 2015; Kim et al. 2009; Maas et al. 2009b; McEachan et al. 2016; Nutsford et al. 2013; Sturm and Cohen 2014; Taylor et al. 2015; White et al. 2013 |
| | Reduced anxiety | Beyer et al. 2014; Bratman et al. 2015a; Maas et al. 2009b; Nutsford et al. 2013; Song et al. 2013; Song et al. 2015 |
| 4 | Greater happiness, well-being, life satisfaction | Ambrey 2016; Fleming et al. 2016; Larson et al. 2016; MacKerron and Mourato 2013; Van Herzele and de Vries 2012; White et al. 2013 |
| 5 | Reduced aggression | Bogar and Beyer 2016; Branas et al. 2011; Kuo and Sullivan 2001a, b; Troy et al. 2012; Younan et al. 2016 |
| 6 | Reduced ADHD symptoms | Amoly et al. 2014; Faber Taylor et al. 2001; Faber Taylor and Kuo 2009; Faber Taylor and Kuo 2011; Kuo and Faber Taylor 2004; Markevych et al. 2014b; van den Berg and van den Berg 2011 |
| 7 | Increased prosocial behavior and social connectedness | Broyles et al. 2011; Dadvand et al. 2016; de Vries et al. 2013; Fan et al. 2011; Holtan et al. 2015; Home et al. 2012; Piff et al. 2015; Sullivan et al. 2004 |
| 8 | Lower blood pressure | Duncan et al. 2014; Markevych et al. 2014a; Shanahan et al. 2016 |
| 9 | Improved postoperative recovery | Park and Mattson 2008; Park and Mattson 2009; Ulrich 1984 |
| 10 | Improved birth outcomes | Reviewed by Dzhambov et al. 2014 |
| 11 | Improved congestive heart failure | Mao et al. 2017 |
| 12 | Improved child development (cognitive and motor) | Fjørtoft 2001; Kellert 2005 |
| 13 | Improved pain control | Acutely (Diette et al. 2003; Lechtzin et al. 2010) and chronically (Han et al. 2016) |
| 14 | Reduced obesity | Bell et al. 2008; Cleland et al. 2008; P. Dadvand et al. 2014a; Lachowycz and Jones 2011; Sanders et al. 2015; Stark et al. 2014 |
| 15 | Reduced diabetes | Astell-Burt et al. 2014a; Bodicoat et al. 2014; Brown et al. 2016; Thiering et al. 2016 |
| 16 | Better eyesight | French et al. 2013; Guggenheim et al. 2012; He et al. 2015 |
| 17 | Improved immune function | Li et al. 2006; Li et al. 2008a; Li et al. 2008b; Li et al. 2010; Li and Kawada 2011 |
| 18 | Improved general health: | |
| | Adults | Brown et al. 2016; de Vries et al. 2003; Kardan et al. 2015; Maas et al. 2006; Maas et al. 2009b; Stigsdotter et al. 2010; Wheeler et al. 2015 |
| | Cancer survivors | Ray and Jakubec 2014 |
| | Children | Kim et al. 2016 |
| 19 | Reduced mortality | Coutts et al. 2010; Gascon et al. 2016b; Hu et al. 2008; James et al. 2016; Takano et al. 2002; Villeneuve et al. 2012 |
| 20 | Asthma and/or allergies (studies show both improvements and exacerbations) | Andrusaityte et al. 2016; Dadvand et al. 2014a; Fuertes et al. 2014; Fuertes et al. 2016; Lovasi et al. 2013; Lovasi et al. 2008; Ruokolainen et al. 2015 |

Note: ADHD, attention-deficit hyperactivity disorder. The references in Table 1 are illustrative rather than exhaustive; they include both recent reviews and research reports and older, widely cited publications.



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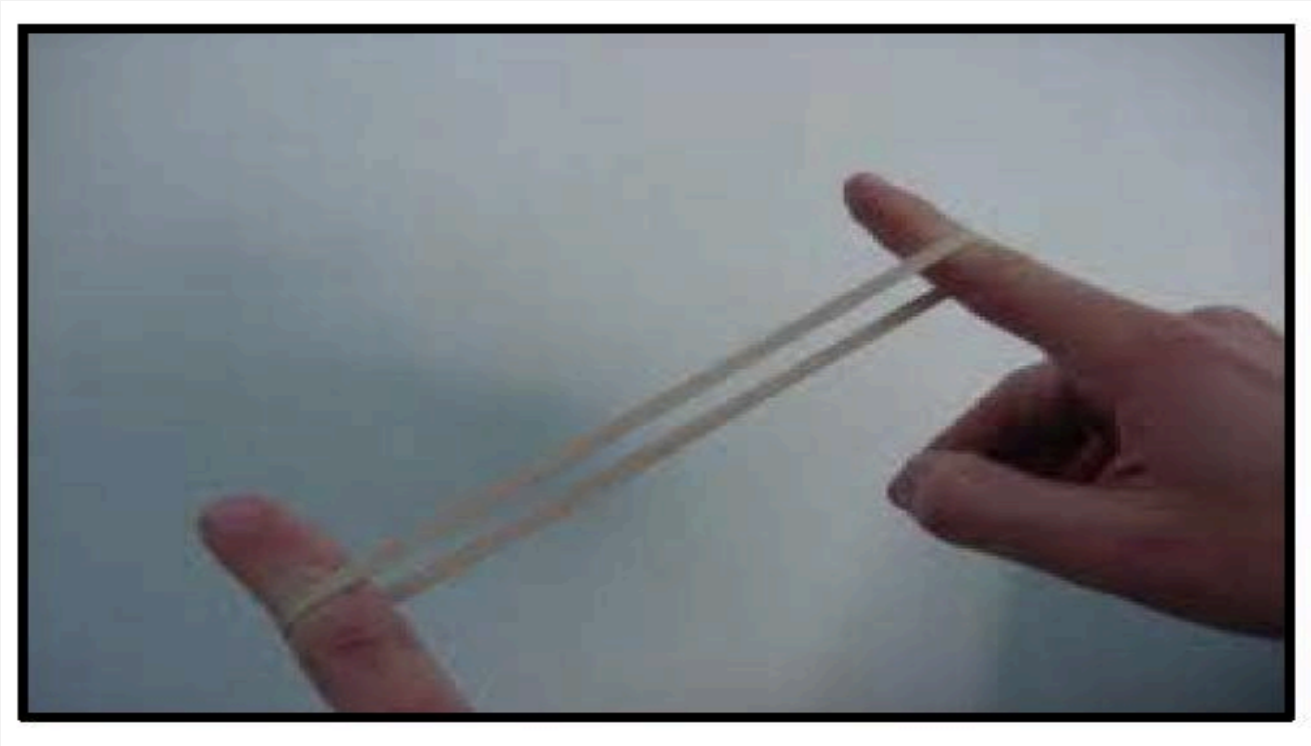
# Homeostasis and Allostasis



The tendency toward a relatively stable equilibrium vs.
the process by which the body responds to stressors
in order to regain homeostasis.



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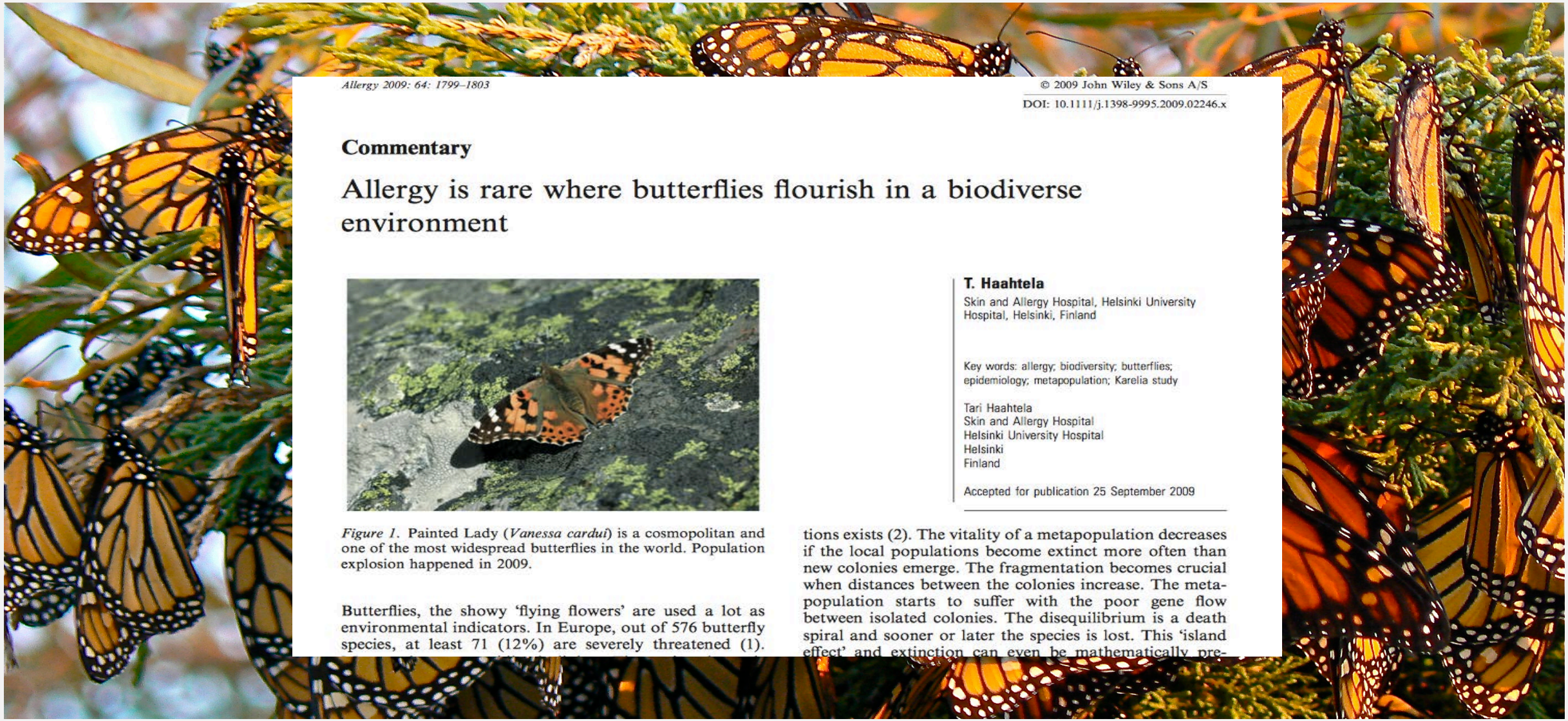
# Biodiversity and allergic sensitization



*Allergy 2009: 64: 1799–1803*

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DOI: 10.1111/j.1398-9995.2009.02246.x

**Commentary**

## Allergy is rare where butterflies flourish in a biodiverse environment

**T. Haahtela**
Skin and Allergy Hospital, Helsinki University Hospital, Helsinki, Finland

Key words: allergy; biodiversity; butterflies; epidemiology; metapopulation; Karelia study

Tari Haahtela
Skin and Allergy Hospital
Helsinki University Hospital
Helsinki
Finland

Accepted for publication 25 September 2009



*Figure 1.* Painted Lady (*Vanessa cardui*) is a cosmopolitan and one of the most widespread butterflies in the world. Population explosion happened in 2009.

Butterflies, the showy 'flying flowers' are used a lot as environmental indicators. In Europe, out of 576 butterfly species, at least 71 (12%) are severely threatened (1).

tions exists (2). The vitality of a metapopulation decreases if the local populations become extinct more often than new colonies emerge. The fragmentation becomes crucial when distances between the colonies increase. The metapopulation starts to suffer with the poor gene flow between isolated colonies. The disequilibrium is a death spiral and sooner or later the species is lost. This 'island effect' and extinction can even be mathematically pre-



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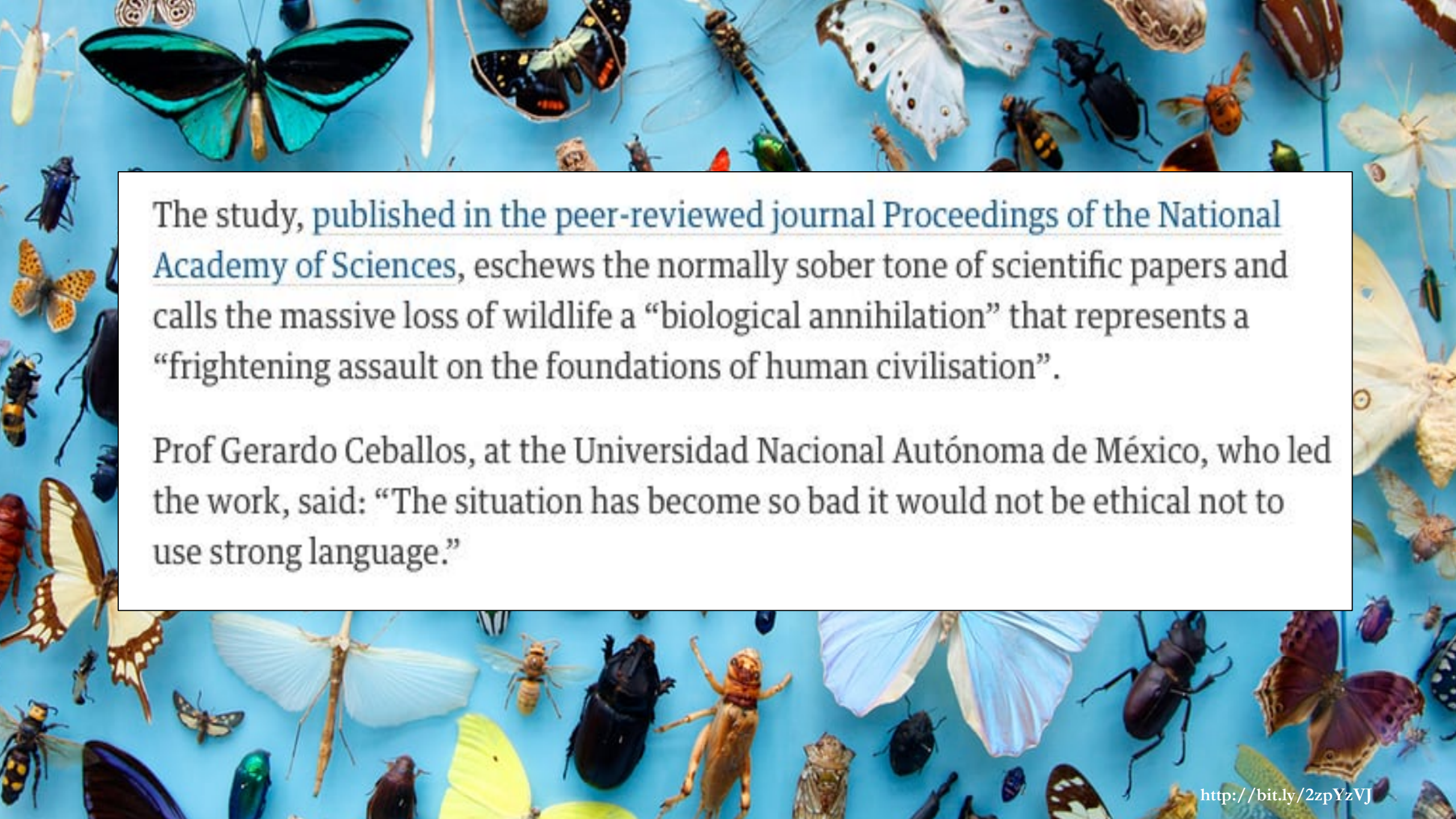

The study, published in the peer-reviewed journal Proceedings of the National Academy of Sciences, eschews the normally sober tone of scientific papers and calls the massive loss of wildlife a "biological annihilation" that represents a "frightening assault on the foundations of human civilisation".

Prof Gerardo Ceballos, at the Universidad Nacional Autónoma de México, who led the work, said: "The situation has become so bad it would not be ethical not to use strong language."

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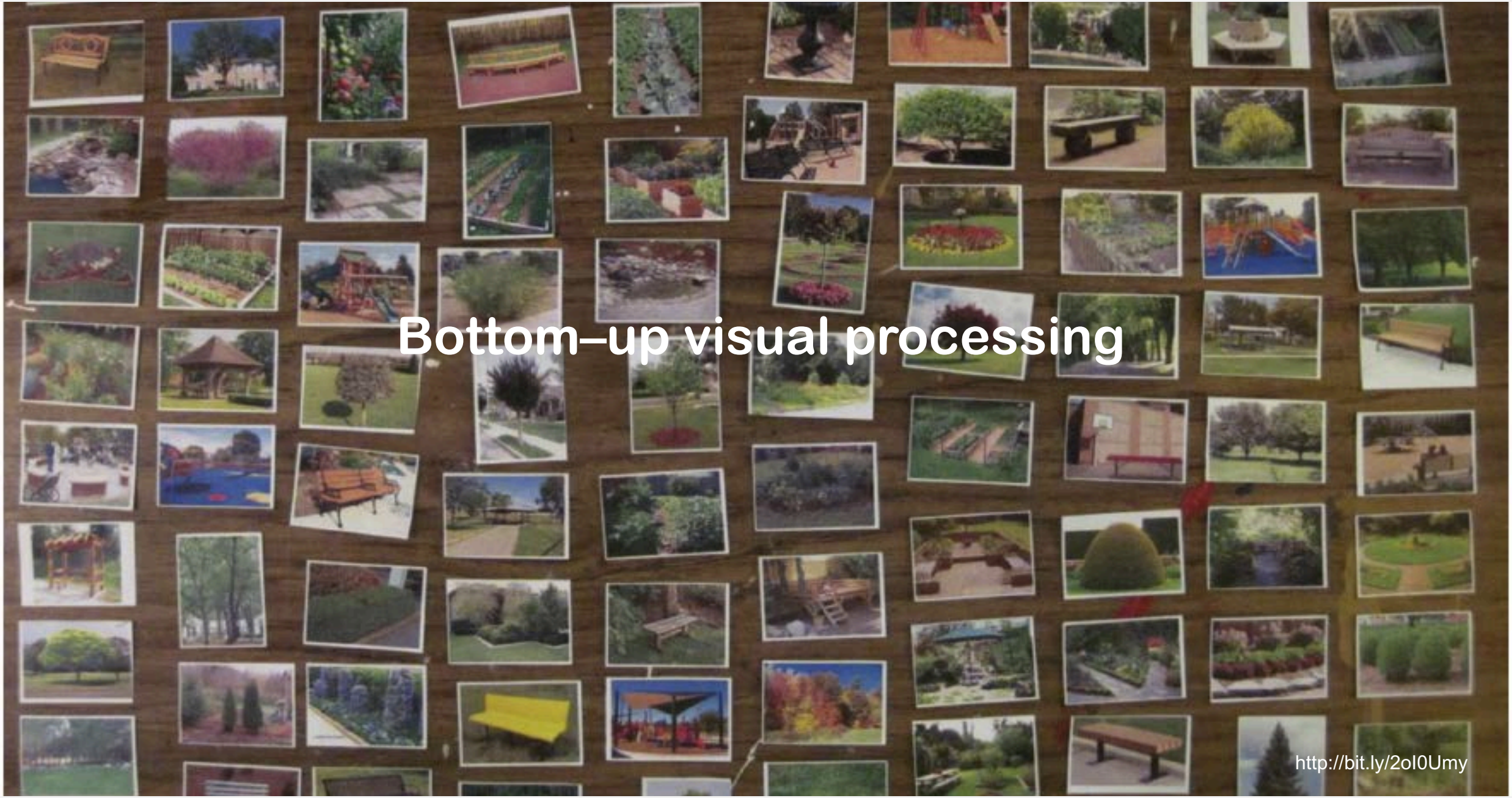

Bottom–up visual processing
http://bit.ly/2oI0Umy

# Analogy Making As Perception in “Computer Vision”

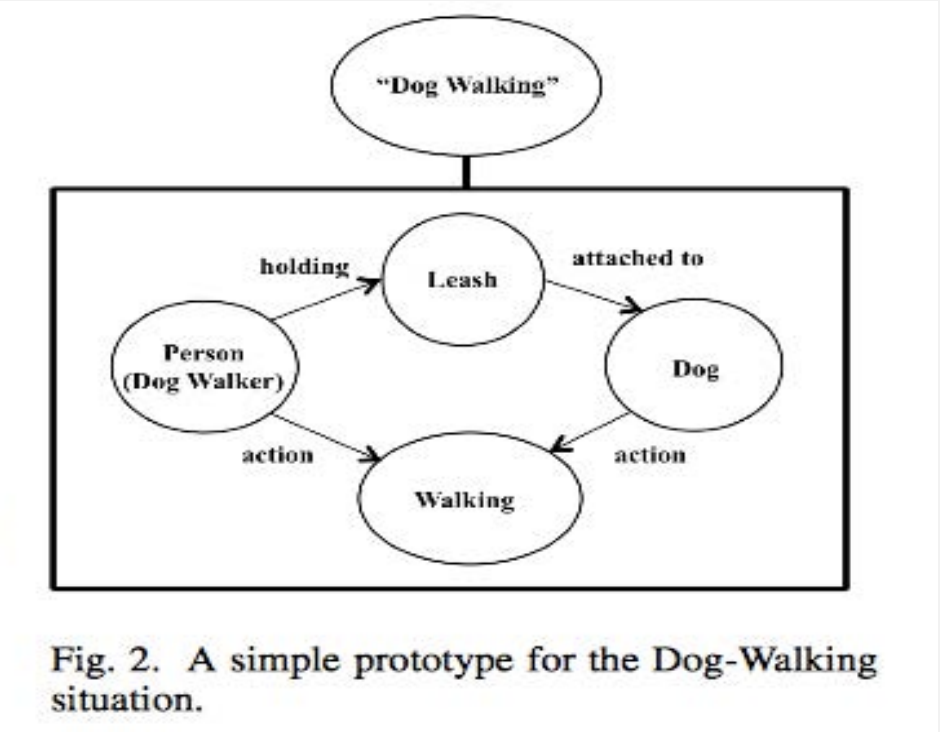



Fig. 2. A simple prototype for the Dog-Walking situation.

Quinn, M. H., Rhodes, A. D., & Mitchell, M. (2016). Active Object Localization in Visual Situations.

“Our goal is a system that can, via analogy, fluidly map its knowledge of a particular abstract visual concept to a wide variety of novel instances, while being able to both explain its mapping and to measure how “stretched” that mapping is…”

# C’est ne pas une pipe


Reading resonance and context
http://bit.ly/2oI0Umy

# Simulacra / 1 - Fire in Water



https://flic.kr/p/QVCAdi

# Simulacra / 2 - Water in Earth



http://dailym.ai/2o1c1IQ

# Simulacra / 3 –
# “…as if viewing a roughened sea surface from below”

Undulatus Asperitus



http://bit.ly/2n1UOfj



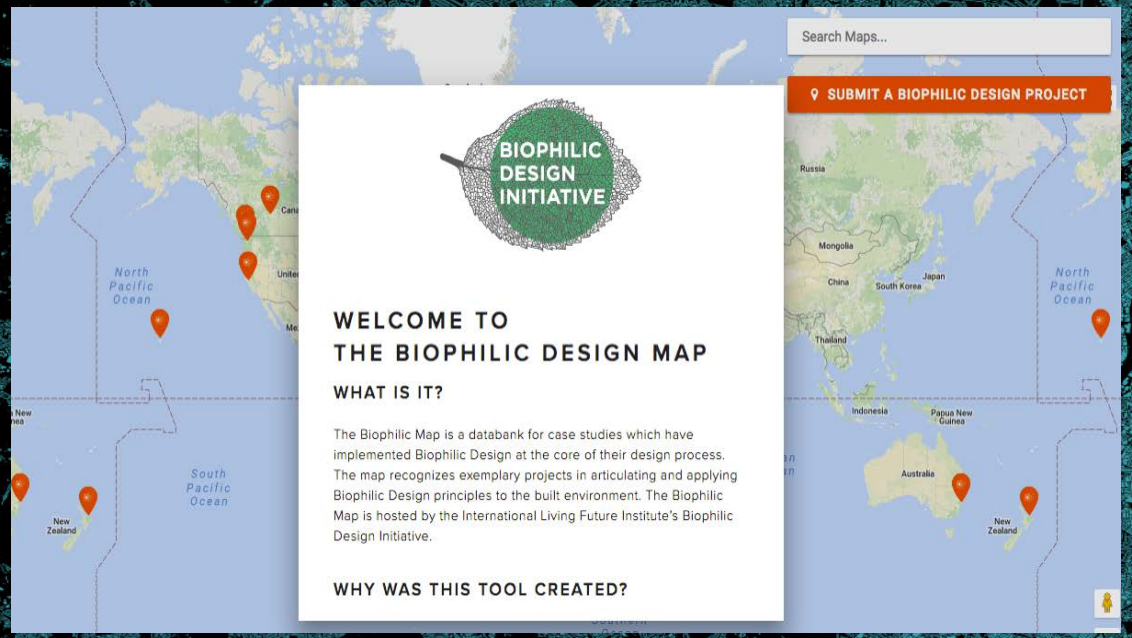
https://bit.ly/2J0U6xn; https://bit.ly/2pIOVWX

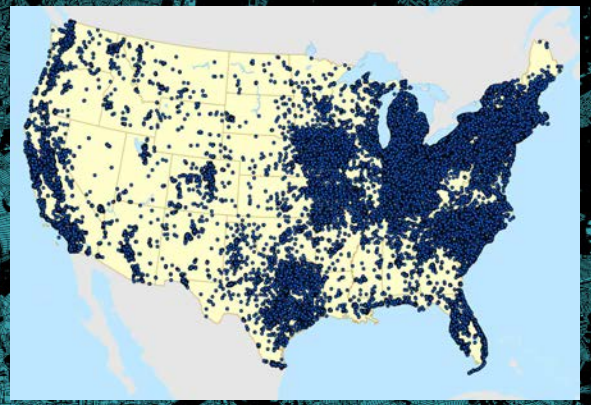

https://bit.ly/2rWEReY

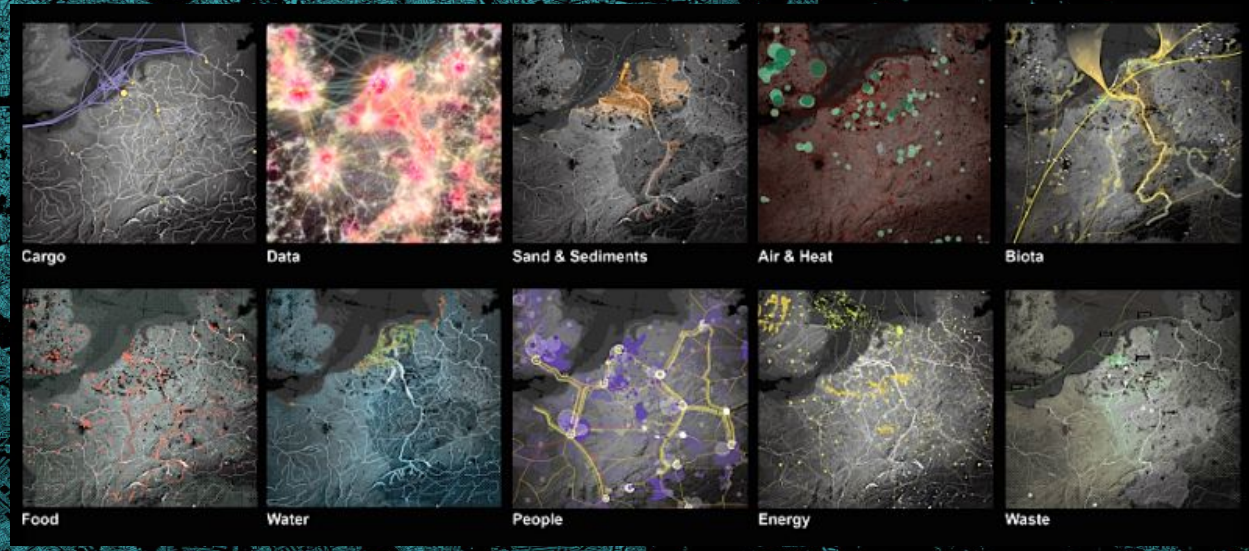


https://bit.ly/2JG85Ww; https://bit.ly/2B5jj1y

# Maps: geolocation + visualization illuminate resilience




https://bit.ly/2lzjf2y


Buildings as Habitat:
Biophilic Design towards
Biophilic Urbanism
Thank You!
urbanfile