ECO-LANDSCAPE
DE KNIP AS A BIODIVERSITY INSTRUMENT

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# CONTENT

## INTRODUCTION 12

## RESEARCH 26
- Urban ecology
- Nature & Architecture 56
- Nature & Human 68

## RESEARCH- DESIGN 73
- 2030 De Knip 104
- Reflection

## DESIGN 105
- Positioning
- Changing perspective 113
- Design toolbox 139
- Application 152
- Eco-landscape 168

## CONCLUSION 195

## WHAT’S NEXT? 196
ABOUT

Design question: How can the transformation of De Knip improve biodiversity & nature connectiveness in Sloterdijk? What is the role of architecture in biodiversity conservation?

This thesis is a celebration of diversity, a reflection of urban ecology in built environment, by sharing the pie with animals, instrumenting animals and people in this vertical block, I hope to cast a light on people's opinion about nature. The story begins with an iconic building in a densifying district which is facing vacancy problem and need a new identity. It is about the growing tension between city development and nature, the opportunity of a vertical landscape in urban ecology. It is also about the disconnection between nature and human and how architecture can re-establish a new synergies between the two.

As biodiversity is a complicated topic in a vast subject, the project aims to explore the meaning of design for biodiversity in two levels. Firstly, is to understand the limitations and opportunities of buildings in conservation performance which help to anticipate alternative strategies to achieve such conservation goal. Another goal is to understand the meaning of biodiversity design to human and to human-nature relationship. Human aspect is important human can be co-conspirator that facilitate radical changes. Both directions look into adding extra dimensions, either spatial or programmatic to animal conservation in building as a way to strengthen the power of architecture.

The proposal transforms De Knip into an Eco-working hub, a stepping stone between two ecological zone/public space, a common ground for urban animals and people. It split the tower into two operations mimicking a condensed city with private back and public front. It experiments public ownership as a way to address flexibility. By inserting and integrating urban ecology in design architecturally and programmatically it becomes a place that is functional to nature and promote nature connectiveness by making urban ecology visible & tangible. The assorted facade is a biodiversity design which demonstrates various possibilities of building as a vertical landscape. The public front is a catalyst for everyone including animals, scientist, eco enthusiast, and for public. It is a mixed experience of a hiking path, sanctuary, museum, library and more. It is a new landmark reinforcing biodiversity vision of the area and a pilot showcase to the world.
THESIS OVERVIEW

Nature & Building
- Biodiversity design

Nature & Human
- Nature connectiveness

Human & Building
- 2030 De Knip

Problem
- Biodiversity & urbanism

Research
- 1. 7 design considerations
  - Cognitive approach
- 2. Promote urban ecology
  - Emotional affiliation
- 3. Design toolbox
  - Infusing responsibility
- New facade + walkway

Product
- Facade design toolbox
- New facade + walkway
- Public + Private
- New typology
METHODOLOGY

1. Knowledge
2. Data Collection
3. Design/Speculation

Design Criteria

- 3 focus 7 considerations (research paper)
- Typology Innovation
- Vertical Public space
- Toolbox
- Design steps
- Probability booster

Design Parameter

Functional
Urbanism is an inevitable trend and cities are expected to grow when more people prefer living an urban life. The negative impacts of human to nature will only perpetuate if not accelerate. While habitat fragmentation reduces quantity and quality of natural habitat, urban intensification and disturbance from human activities also challenge the livelihood of many non-human species. In Netherlands, with 16% of total land area as urban area, more than 50% of the wild bee species are under threat and 13 out of 20 of urban bird species are recorded with a declined population. In fact, the struggles of various species indicated a larger threat to our ecosystem (CBS, 2018).

**GLOBAL/LOCAL CONTEXT**

**1. URBANISM & BIODIVERSITY**

Urbanism is an inevitable trend and cities are expected to grow when more people prefer living an urban life. The negative impacts of human to nature will only perpetuate if not accelerate. While habitat fragmentation reduces quantity and quality of natural habitat, urban intensification and disturbance from human activities also challenge the livelihood of many non-human species. In Netherlands, with 16% of total land area as urban area, more than 50% of the wild bee species are under threat and 13 out of 20 of urban bird species are recorded with a declined population. In fact, the struggles of various species indicated a larger threat to our ecosystem (CBS, 2018).

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**UNSTOPPABLE URBAN GROWTH**

- **54%**
  - Urban population
- **16%**
  - urban land NL
- **50%**
  - wild bee under threat
- **13/20**
  - urban birds population decline

**NATIONAL FOCUS ON NATURE INCLUSIVENESS**

- **Amsterdam**
  - $38.5 million sustainability fund
  - 50% of public green spaces with native plants

- **Den Haag**
  - Green point system: legally binding and are a part of the contract
  - “hard” points for nesting boxes for nest box, “soft” points for green roofs and gardens.

- **Eindhoven**
  - ecological corridor
3rd GOLDEN AGE: GREEN CITY BIOTOPES

Tony Muller - "Human, animals and plants are given maximum weight"
GLOBAL/LOCAL CONTEXT

2. HUMAN DOMINATED ECOLOGY

Biodiversity is well recognized as the basis of ecosystem that underlines all ecological processes. It is also crucial to human well-being and sustainable development. Biodiversity design is becoming the new norm in building standard and urban planning. Despite a clear ambition, there seems to be a mismatch in our built reality as demonstrated in the phenomenon of ecological dips. Ecological designs in an anthropogenic environment often downplay the complexity of nature as human interest remains the primary drives in most occasions. For example, green design is commonly perceived as biodiversity design and strategies such as green roof and nest box application are universal design protocols used in the building industries.

VISCIOUS CYCLE OF PROBLEMS

A human driven mindset can be a cause as well as a result, it is in fact driving a vicious cycle of disconnection with nature. It is shown in primitive culture that human and animals had a close relationship in the past, it changed however as people linked animals to diseases and various threats to human life. The stacked-up misconception is another obstacle that hinder human-animal interaction.

GREEN WASH PHENOMENON

image/media as a way to convey: over optimistic/idealistic

HUMAN ANIMAL DISCONNECTION

Disease Aggressive behaviors Nuisance
GLOBAL/LOCAL CONTEXT

3. SLOTERDIJK DE KNIP: TESTING GROUND

ROLE OF BUILDING IN BIODIVERSITY DESIGN

Perhaps cities are not built for wildlife, but cities are a form of habitat and we unknowingly become the host. Wildlife are found under bridges and vegetation overgrowing in vacant buildings. While our strategies with animals in buildings remain “on the surface”, the role of building in urban ecology and their potential as a conservation tool is yet to be explored. Urban Ecology is an emerging study aiming to understand how ecological processes can coexist in urban landscape. As a subject of uncertainties, ecological design is challenging for architects. The role of building can be seen as socio-cultural role that acknowledges human aspect to a larger extent. The focus of this chapter however will be on functional aspect regarding non-human species.

ADAPTIVE REUSE

In Europe, more than 70% of the 2030 building stock is already built, as shapers of the built environment, we will need to work with the existing building stock which very often involves transformation of vacant or underused buildings. “Adaptive reuse” is a term widely used to describe these kinds of transformation projects. Transformation entails new opportunities and new responsibilities in the built environment, such as promoting wildlife. Amsterdam Sloterdijk is a district under transformation with a goal of becoming a livable neighborhood for both human and animal occupants. How can a transformation project contribute to the urban goal? Moving forward, can it set a radical precedence in this rising design genre, as an urban wildlife reserve maybe?

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**Global/Local Context**

**3. Sloterdijk de Knip: Testing Ground**

**Role of Building in Biodiversity Design**

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**Sloterdijk Central**

Livable district + Knowledge Based planning
“how can we create more biodiversity in a densifying city?”

**Haven-Stad**
Dutch Port development

**Global/Local Context**

**3. Sloterdijk de Knip: Testing Ground**

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MIX OF URBAN GREEN

1. Unplanned green
2. Orlyplein Native green
3. Pocket green
4. green plaza
5. green residual

BIODIVERSITY URBAN GOAL

De Bretten

Westerpark
VERTICAL 2020
Competition Year: 2020
2500 m2 of greenery
90 species of plants

KAVEL 0 Crossroads
Completion Year: 2022

De Knip
Year of construction: 1994
Original function: Publishing office
Current function: Office and government function
Height: 85m/20 stories
Composition: 1 tower, 2 low buildings, garage
ECOSYSTEM DESIGN AS A CONSERVATIVE MEASURE

BUILDING AS ECOSYSTEM

Biodiversity

All living organisms in all ecosystems and is the premise of a functioning ecosystem.

All living organisms in all buildings and is the premise of a functioning city.

Ecosystem

Dynamic/ transformable/ interactive

Design for flexibilities/ transformation

Interaction as point of entry

URBAN ECOLOGY
THEORETICAL LINKAGE

Biodiversity

Biodiversity is a dynamic system referring to the variability of living organisms in all ecosystem and is the premise of a functioning ecosystem. It can be measured by the number, relative abundance, composition and interaction between species. The three conservation approaches are restoration, preservation and enhancing. The common regime of biodiversity conservation is preservation of a specific species population. In general, species composition is more important than species richness and local biodiversity is more relevant than in global scale. (Mace, Masundire and Baillie, 2005)

Ecological formation in city

Ecological succession is the gradual process which ecosystem develop in a timescale vary from days to years. It is demonstrated by spontaneous communities found in cracks, outgrown vegetation in vacant buildings and under-bridge taken over by wildlife. Study of ecological succession in city and on artificial surface in particular is limited, brown roof is the example of colonization by pioneer species. (Hui, 2011)

Biodiversity is localized and can vary in neighborhoods due to different anthropogenic factors. The theory of Niche states that two species settle in the same area cannot have identical niches, the differentiation of niche is the premise of species coexistence. The risk of conservation is the changes on relative abundance and food hierarchy of an area; urban parrots in Amsterdam is considered a problematic alien species which compete with native species.
**Ecological processes**

Ecological processes are the interaction between biotic and abiotic elements that sustain ecosystem. Ecological processes are interlinked and can alter demographic structure and spatial distribution of vegetation and animals directly and indirectly. Thus, identifying the managing ecological processes most relevant on site can be a tool to enhance local biodiversity. (Bennett, Haslem, Cheal, Clarke et al, 2009) The table shows ecological process relevant to building design that are adopted in this thesis.

<table>
<thead>
<tr>
<th>Ecological process category</th>
<th>Impression in City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatic process</td>
<td>- Contextual&lt;br&gt;- Precipitation Temp. humidity&lt;br&gt;- Microclimate</td>
</tr>
<tr>
<td>Hydrological processes</td>
<td>- Surface and subsurface flow&lt;br&gt;- Artificial surface/ channels&lt;br&gt;- Water cycle</td>
</tr>
<tr>
<td>Biophysical habitat</td>
<td>- Native soil properties&lt;br&gt;- Growing medium/ substrate properties&lt;br&gt;- Addition of toxins/ pollutants</td>
</tr>
<tr>
<td>Interactions between organism</td>
<td>- Symbiosis (predation, herbivory, competition, parasitism, mutualism)</td>
</tr>
<tr>
<td>Movement of organism</td>
<td>- Movement in different scales &amp; timeframe&lt;br&gt;- Seasonal: migration, pollination&lt;br&gt;- Daily: food/ shelter seeking; social interaction</td>
</tr>
<tr>
<td>Natural disturbance</td>
<td>- Alterations to Biotope: New construction/ redevelopment&lt;br&gt;- Alteration to biodiversity: alien species, biased conservation measure&lt;br&gt;- Long term influence: human disturbance</td>
</tr>
</tbody>
</table>

Reinterpretation of (Bennett, Haslem, Cheal, Clarke et al, 2009)

**Biodiversity and building**

Animals that adapt and survive in cities are generalists which have higher tolerance to living conditions (Blair, 1996). Synurbization describes the phenomenon of animals colonizing cities and demonstrates the plasticity of animals under anthropogenic pressure. (Luniak, 2004) These urban species show different traits from their wild version. They occupy building and technical objects, profit from human-derived food source and adapt to human customs. They also show tameness towards people. Organisms in city can be classified into urban exploiters and urban adaptor with different relationships to building, either dependent or opportunistic. While Urban species depend on buildings for survival, a large group of organisms, such as invertebrates and plants utilize urban surfaces for shelters and resources. (Gunnell, Murphy and Williams, 2013) Most non-human organisms can be found on the building envelopes including roof, walls, overhangs while some species can be identified inside buildings.

By relationship with human

- Human
  - Synanthropic (Domestic)
  - Wild (Non-human)

By survival in city

- City
  - Exploiter (Adaptor)
  - Avoider (Non-human)
Artificial Ecosystem

Ecosystems in the biosphere are definable units containing both biotic and abiotic elements that work together as a whole. There can be in different scale: Micro (building) -> Messo (Sloterdijk) -> Biome (Amsterdam/NL). [Hart and Littlefield, 2011] Ecosystem is by nature an open system which suggests an interflow of energy and matter between ecosystems no matter the scale. Artificial ecosystem is a human made system of plants, animals, and people living in an area. In general, artificial ecosystem has lower species diversity, simple and often incomplete food chain and is not self-sufficient. Zoology is a classic example of artificial ecosystem by putting animals in a designated climate. Eco-design is an artificial ecosystem design as well as the premise is Eco-mimesis which built forms imitate nature’s processes, structure and function in the ecosystem.

Eco-Engineering

Eco-engineering refers to “environmental manipulation by man using small amounts of supplementary energy to control systems in which the main energy drives are coming from natural sources.” It is defined further as the engineering of new ecosystems designs that uses systems that are mainly self-organizing.
DEGREE OF CONTROL

Artificial ecosystem = imitate natural ecological processes, functions
Eco-Engineering = Nature dependence
“environmental manipulation using small amount of supplementary energy, main energy drives from nature”

Nature
open system

Eco-Design
open system
Managed climate
(?) self-organized

zoo/aviary
semi-closed system
Mediated climate
(–) movement
(–) interaction

Aquarium
closed system
controlled & monitored
(–) movement
(–) interaction

Artificial
- Lower species diversity
- Simple and incomplete food chain
- Not self-sufficient/regulatory
GREENING

Urban green & biodiversity

“Biotope city” is the idea behind urban greening strategy to regenerate nature in city. Theoretically, urban greening benefit biodiversity by improving connectivity between biotopes by establishing linear or stepping stone green infrastructures. Vegetated building surfaces is believed to have a similar impact in a smaller spatial context. (Mayrand and Clergeau, 2018)

Roof Ecology

Green roof refers to layered system with a waterproofing membrane, growing medium, a vegetation layer and an irrigation system. Green roof is classified into extensive and intensive type depending on the soil thickness. Green & blue roof is a variant in combination with water system and the addition of solar energy system results in bio solar green roof system.

Recent green roof development focus on biodiversity considerations. Mille Arbres in Paris is a realized “house of biodiversity”. The project features two layers of roof hosting thousands of trees. It is a biomimicry of forest ecology and is managed by the League of Protection of Birds. Finding natural analog in green roof design is a strategy to include entire plant community and create wider range of habitat for animals. In Switzerland, variation in substrate thickness is adopted as a method to mimic nature microhabitat. (Marinelli, 2006) “Grassy Hill Roof” developed by Rooflife Amsterdam is a lightweight undulating polystyrene form to deliver different media depth without the usual heavy weight load.
Wall Ecology

Despite the biodiversity potential, green roofs are disconnected patches elevated from ground which limited movement and formation of communities. [Francis, 2010]. The development of wallscape ecology can potentially form a 3-dimensional urban landscape with Green roofs. Green facades are for aesthetic purpose and involve climbing vegetation system. Living walls is a vertical extensive roof dominated by herbal plant. The biomimicry of green wall is stone walls and cliff in rocky habitat. Living wall system is detachable from building surface depending on the load bearing capacity of building is a limitation. Hydroponic technology can eliminate substrate layer and reduce weight of living wall. Façade modular system with prefabricated façade element is an expensive technical development. Modules are designed as pre-planted system with possible automatic watering system attached. Though the high construction and maintenance cost, it guarantees functionality in all seasons. It is also possible to achieve horizontal soil orientation within the module which allows more planting options such as perennials, shrubs and annuals. [Bouw natuur inclusief, 2019]

Managing the Green

Sustaining the greens is a challenge in green building which required proper water management and maintenance. Water cycle of building regarding rainwater collection/retention and water recycling strategy is developed alongside with greening strategy. In Sloterdijk Plot O, a smart irrigation system is designed as an integral plan with green space. Nature is dynamic whereas architecture is static, it is suggested that attention on zones and layering can overcome this systemic clash. (Mayrand and Clergeau, 2018) Human input is required in green management. There is an annual Trimming in Bosco Verticale; in The Valley in Amsterdam, a permanent gardener is assigned to take care of the greenery and the management cost is co-finance by the residents and companies.

Small Patch Hypothesis & Ecological value

The greening strategy of building envelope is based on the hypothesis that the ecological value of a cluster of disconnected small habitat is similar to a continuous habitat with the same total area. However, it is suggested that the effectiveness of greening building envelopes is ineffective due to limited habitat provision. Typical natural species require a habitat of 53.3 ha while urban species require a minimum area of 4.4 ha. (Mayrand and Clergeau, 2018) In many projects, the total green area is used to represent the ecological significance whereas the degree of fragmentation and the format of green typologies is often omitted. While size of green area is important, ecological value is also determined species native-ness, variation, type (trees/grass) and function. Biodiversity potential of green roof can be evaluated by: 1) species diversity and richness 2) substrate type and depth 3) plant species 4) connectivity 5) green area ratio 6) ecologically responsible. (Hui, 2011,)
**ANIMALS**

**Conservation Overview**

Conservation measures in city target on urban exploiters and adaptors most commonly bats, birds and bees. Conservation approach is either on protection and provision. Direct measures focus on behaviors of nesting and roosting and movement while indirect measures focus on food foraging, grooming and nesting material collection benefit from the greening strategies in previous chapter.

**Animal friendly building**

Collisions with glass windows, artificial lighting and urban acoustic are the major threats to avian species. Animal-friendly design strategy is widely used in legislation, product and building design to make our buildings less harmful for wildlife. Bird friendly building standard focus on window and façade design. Use of virtual barriers and signals is a common method to cope transparency and reflectiveness on glass façade. (Brown and Caputo, 2007) These design elements can be applied to both new buildings or retrofitted to enhance existing buildings and comparison is done regarding the effectiveness, cost, ease of application and lifespan of different element options. As an integral design principle, the 82-floor high Aqua tower in Chicago is considered to be safer to birds because of the undulating wave like balconies and fritted glass.

**Nesting in building**

Two types of nesting tool can be found in building depends the building-animal relationship (refer to 3.2) In a thesis titled Synanthropic Suburbia, the habitat potential of building component for depending species is explored. A range of building elements such as eaves and chimneys are transformed into multifunctional habitat elements. Nest box is commonly conceived as a tool to provide habitat for opportunistic insect, birds and bats. The appearance and placement in building are determined by design principles based on ecology studies. As a form of artificial nature, it is common in both new buildings and refurbishment of existing building. It can be applied as non-structural ready-made items, alternatively, there is a range of mass-produced habitat-integrated structural elements which can substitute standard bricks and blocks in buildings. Habitat elements can also be non-transferable customized design such as the habitat façade in Sloterdijk N1 N3.
**Cross-disciplinary development**

Animal habitat developments is also noticeable in the practice of gardening, art and material science. Scientists carried out various studies to optimize insulation and comfort of nest box environment in order to increase usage and mortality rate of occupants. Garden is a testing ground for new forms of nest box design, insect hotel is developed into a modular system with a supporting frame and nest infill and Buginn pollinator brick is a system of a concrete shell and replaceable nesting core. Examples in material innovation include green charcoal developed by Mumbai scientists as an alternative construction material that encourages lifeform by porosity.

Multifunctionality is a common trait in these developments. Common coupling of functions includes: education and exhibition purpose, urban furniture for leisure, habitat/planter product for aesthetics and to provide food in close proximity. While majority of developments are on nesting behaviors, there is limited advancement in other behaviors such as roosting and breeding.

1. material innovation 2. product 3. shelf & infill

**Animal Aided Design**

Animal aided design (AAD) is in essence a knowledge/evidence-based design principle that use a species’ life cycle to improve open space planning and conservation in urban landscape. By making animals integral part of the design process, the objective of an organized wilderness is to provide habitat requirements for a species to thrive in different stages and different living behaviors. The tool of AAD is species profile including biological data and connection with human. It is a method for wildlife recruitment in city and the conservation value depends on the target species. Developers can implement AAD to recruit species that are not native but popular to human occupants in their projects. (Weisser, Hauck, 2017) A conceptual design in USA integrated the whole life of butterfly into various building components, the building serves as a breeding ground, waystation and sanctuary for monarch butterfly. The connected roof & façade system provides food and shelter, terraces are used as stop over habitat and atrium can be used as semi-enclosed colonies that foster population growth.

**Responsible design: General design DO/DON’T**

- **Pollen**
  - Common herb types in Europe climate

- **March**
  - Nemesia
  - Basil
  - Borage

- **August**
  - Nest Behavior & requirement
  - 87% of bee species
  - Life cycle: 1 year
  - Active period: Spring & summer
  - Larvae development: Winter

- **Individual living**
  - Bee occupation: ~1 month
  - Egg occupation: 10 months

**Surface porosity in building?**

**Porosity & life**
OBSERVATIONS

Dual Track development

Nature inclusive design is generally recognized in two design direction, greening and animal design. Greening design is more advance and developed in terms of 1. Spatial Ratio 2. Quality 3. Tools. It is understood as the foundation in nature design and the linkage between human and non human users in buildings.

20 IDEAS FOR INTEGRATING NATURE INCLUSIVE DESIGN

- Nesting bricks for birds
- Bat boxes
- Insect hotels and bricks
- Green roofs
- Brown roofs
- Water roofs
- Green façades
- Façade gardens
- Flowers under the tree
- Green quay walls
- Sand martin and kingfisher nesting walls
- Wildernis walls
- Bee and butterfly paradise
### GREEN TOOLKIT

**Location**
- Roof
- Wall
- Volume

**Type**
- Extensive
- Intensive
- Landscapcy
- Greenwall
- Vertical module
- Horizontal module

**System**
- Biomimicry
- Plant
- Species
- Substrate

**Detachable**
- Brownfield
- Grassland
- Cliff
- Woodland
- Forest
- Moss
- Native
- Herbs
- Shrub
- Trees

**Integrated**
- Deep Soil Area
  - Native Soil
  - Soil mix
  - None
  - Large Tree (80 m³)
  - Medium Tree (40 m³)
  - Small Tree (15 m³)

**Biodiversity role**
- Connectivity
- Producer
- Provision

**Animal Function**
- Nesting material
- Food
- Habitat
- Social

**Human Function**
- Productive
- Aesthetic
- Community
- Social

---

**Easily justifiable**
- Direct human interest

**Privilege**
- Quantity & quality

**R&D Resource**
- Many possibilities available

**Promote biodiversity design**
- Serve better function for animals
- Programmatic linkage
- Negotiate spatial ratio for animals

---

**X Total area**

**V Quality/ niche**

**V Existing toolkit**

---

**Privilage quantity & quality**

---

**Many possibilities available**

---

**Easily justifiable**
- Direct human interest
GENERALISTS

Focus on composition & relationship
Not species specific, friendly environment for all
ANIMALS is a diverse complex community

Bee
- Family
- Role
- Daily range: 300m-3km
- Diet: Specialist to Generalist
- Sociality: Colonial to Solitary
- Characteristic: Aggressive to Tame
- Habitat area: Ground digger to Flexible
- Behaviors: Breeding, Nesting, Pollinating
- Product: Pollen, Honey, Wax

Birds
- Home range: 300-600m
- Diet: Bird of prey, Insectivore, Herivore
- Sociality: Individual to Group
- Occupation: Permanent to temporary
- Activity zone: Ground to Air
- Habitat: Roof, cavity, Nest box
- Behaviors: Nesting, Breeding, Roosting
- Product: Feeding, Commuting, Foraging

Characteristics study

Exploiter  Adaptor
Predators  Herbivores
native alien

Low incentive
weak linkage, productivity/ value to human
Time variable
life cycle and behaviors in different timeframes
Uncertainty
Little data on living behaviors in city

V Quantity
- Justification by enhancing efficiency
- new/ increased value
V Quality
- material, placement
- maintenance
- proximity area
V new tools
- behavior oriented
- new value
7 DESIGN CONSIDERATIONS

1. The Friendly barren
animal-friendly and articulated facade for building dependent species.

2. Placeholders
flexibility for nature to grow, self-organizing and ecological processes to occur

3. Interaction & Interdependence
Design relationship and draw connections

4. Opportunistic
Cross reference materials and reconceptualize building components

5. Multifunctionality
Extra function to conservation typologies for uncertainties and idle period

6. Hetero-
Variations in scale, type and function.

7. Human Acknowledgement
The quality and quantity of greenery is positively related to human involvement.

Quantitative and Qualitative considerations
A knowledge-based integral systemic approach with clear conservation goal describes the basic principle and an artificial ecosystem in building can be a design tool to enhance biodiversity. In addition to the basic protocols, radical moves can be carried out responsibly to (a) increase spatial ratio of conservation intervention (b) improve spatial quality for biodiversity (c) search new tools for biodiversity conservation.

1. The Barren – The basic form of a building should be animal-friendly with minimal hazard factor and responsibly articulated facade for building dependent species.

2. Placeholder – A formal framework for informality. The many unknown factors in ecological design make it impossible to control design outcome as we cannot control nature. While control can be implemented on in the beginning and on management, design should provide flexibility for nature to grow, ecological processes to occur and to an extent self-organizing.

3. Interaction/ Interdependence – Design relationship and draw connections. To make a viable artificial ecosystem, it is important to identify the symbiotic relationship of possible lifeforms and their movement in the area. i.e. do they live independently or as a system altogether? The natural-artificial system interaction should be covered.

4. Opportunistic – Cross reference and examine existing developments to maximize potentials within building capacity. This involves Reconceptualization, such as the implication of thickness and layering in façade, the possible application of relevant typologies eg. Roosting tower in buildings, or the hybrid typology of building components and habitat product.

5. Multifunctionality – As a follow up of the previous point, pairing an alternative function with conservation typologies in building can be strategic solution to uncertain occupation and seasonal idle period regarding animal life cycle. Inspirations can be drawn from various habitat/furniture or/education projects in other fields.

6. Hetero – Diversity and variation regarding scale, type and function. The building should include a range of microhabitats mimicking a mix of ecosystems with hierarchy and take care of different animal behaviors such as roosting and breeding.

7. Human acknowledgement – The quality and quantity of greenery is positively related to the level of human involvement. Benefits to human is the obvious justification in the cases of green balcony and terraces. Practically speaking, it is hard to change the human-dominated nature in city and human will remain as the primary occupants of buildings. Greenery/habitat box should be implemented in relation to human function.
BRAINSTORM / Surface Road map

Planning territory?

Movement and interaction on facade?
Infiltrating interior space?
human involvement?
BRAINSTORM / 
Multi- facade & multi scale intervention

How much space are you willing to give?

- Back facade
- Front facade

<table>
<thead>
<tr>
<th>Back facade</th>
<th>Front facade</th>
</tr>
</thead>
<tbody>
<tr>
<td>habitat zone 2m</td>
<td>habitat zone 0.5m</td>
</tr>
<tr>
<td>interaction zone 6m</td>
<td>interaction zone 2m</td>
</tr>
</tbody>
</table>

How much alternations?

1. Addition
2. Enlarge opening hanging elements
3. Enlarge opening interactive elements
4. Alter slab Support as habitat
RESEARCH/ NATURE & ARCHITECTURE

Dynamic
Ecology
Growth

Localized
Building Design

Static
Flexibilites
homogenized
THE CONTRADICTIONS

Global homogenization

Marina Alberti says in her book that cities are growing alike “telecoupling” which the world is sharing a set of organisms constantly evolving to deal with new tech. In that sense, it is possible to develop a global building standard for urban ecology design as regardless of geographical variables, the world is more or less addressing the same group of users.

Architecture <-> Evolution

We are not designing for biodiversity because that assumes animals and plants are static and their roles unchanged. Being over manipulative in design can result in miscalculation and wrongful assumptions. Hence, it is important to adjust the expectation when design for nature and harness the power of evolution in design. We should manage & monitor urban ecosystem evolution.

Evolutionarily Informed urban- nature planning

In contrast to the gardener approach, which is the normal practice of nature design, evolutionarily informed design philosophy adopts three principles that embrace the ever-changing characteristics of nature. In the book Darwin comes to town, it is said that “We should create spaces for them to settle and colonize naturally, rather than ‘create’ ecosystems and plant them as complete mixtures,” 1. No planning is the best planning. Natural assemble of greening which allows space to evolve from species abundantly grown in the city. 2. Always refer to the urban portfolio as non- native species may adapt better to the city. 3. Designed green pockets are safety net for species in the time of crisis.

1. Let- it- grow
2. Not necessarily Native
3. Designed nature as retreat

Relevant concept: Cryptogams
Challenge: How to make it aesthetically pleasing?

Bioreceptive material | the low maintainence green
Left: Green charcoal, India
Right: Poikilohydric Living Walls, UCL UK
1. PLANNING | urban ecology studies
Ecologist/ academia

% for different parties
Relationship of different parties
Location/orientation influence

2. SHELF | Aesthetic expression
Architects designers

Testing technology, geometrical & spatial idea
Change every 5 years

3. INFILL | product testing
NGOs/ public/ companies

Public participation & awareness
Knowledge & innovation
Change every 1-2 years

Phase of transformation
Wood frame

Infill module (wearing out)

Infill module (assessment result of research parties)

Inspection & evaluation

The experimental spirit
**Spatial Overcoat**

**In-between Territory to Negotiate Boundaries**

- Interiority and exteriority - climatic zone - inhabitable spaces

---

**Overcoat Reference 1: The Silos**

- New overcoat concept
- Openings on concrete surface
- Modular load bearing facade
- Inhabitable facade ~1.5 m depth

[Image of The Silos]

---

**Overcoat Reference 2: Pasona Urban Farm**

- 30% floor area dedicated to green
- Green double wall facade

https://www.dezeen.com/2013/09/12/pasona-urban-farm-by-kono-designs/

[Image of Pasona Urban Farm]
OPNENINGS, CAVITIES & SCALE

Typology correlation & Surface porosity

Relevance:
1. By formal similarities
2. By “landscape” formation. create cavity, holes, platform

Noticeable similarities between habitat design and facade typology?
Possibilities to alternate existing typologies to achieve nature inclusiveness?

Brainstorm/
Reinterpretation of double facade
The Bee refuge

Flow of matters, how about flow of organisms?
How far can bee go?

Microclimate
Refuge
Breeding/overwinter

Accessibility & Connection
Closed off
Visual connection
Care provision

Control/Building supply

[Let it grow]
[monitor/managed]
MODERN HUMAN-ANIMAL INTERACTION

Animal encounters typologies & interactions

Animal encounters in modern city can be categorized into two types, spontaneous and managed. The most common interaction with animals are in the "void", including various softscapes and hardscapes where resources and shelters are available. Surprisingly, bird feeding & bird viewing are one of the favorite family activities during weekend as comparing to visiting the zoo which serve an educational purpose instead.

![Feeding and viewing illustration]

animal encounter typologies (management)
1. Zoo
2. Refuges
3. Rehabilitation centers
4. Education center

animal encounter typologies (spontaneous)
1. softscape (Urban green)
2. hardscape (plaza)
3. Sheltered residue area

Encounters in buildings

Animal encounters in buildings are unintentional and sometime accidental as animals are opportunistics and would sometimes show up in buildings in the most unexpected ways. The 3 levels of interaction are:

Lv.1 invisible | avoid | Antisocial
Lv. 2 visible | allow | beneficiaries
Lv. 3 Mixing | sharing

Separated

Outdoor

Optimize Comfort

Multiply Opportunities

Increase Incentive

Intentional not accidental

Same territory

Potential action to strengthen the connection

Optimize Comfort

Multiply Opportunities

Increase Incentive

Intentional not accidental
Biophilia Hypothesis
Kellert’s typologies of human attitudes towards nature

1. utilitarian
2. naturalistic
3. Ecologistic-scientific
4. Aesthetic
5. Symbolic
6. Humanistic
7. Moralistic
8. Dominionistic
9. Negativistic

Precautionary Principles
Biophilia is learnt & Experimental. It is not for the love for nature [emotional affiliation] but learnt from the practice of infusing responsibilities for nature. It is for common ethics, not immediate needs and actions are taken for unforeseen value.

Appreciation & Preference for nature

Short run = Likability + Familiarity
Long run = ethical + knowledge

* Program strategy: social/ cultural consideration

Nature connectiveness
Theoretical linkage: Behavioral science & cognitive psychology
Failed attempt = Top down regulation cannot change behaviors
Bottom up

Ideal scenarios:
1. Generate collective demand
2. Coordinate shifting behaviors
3. Strengthen the norms

* Possible strategy: Direct physical sensory exposure to integrate non human objectivity and need into calibrated human-oriented design outcome
RESEARCH DESIGN/ 2030 DE KNIP

Tower typology
2030 scenarios
Concept development
Building physics
Operation
Program
Scenarios
**TOWER TYPOLOGY**

Characteristics:
- Repetitive floor plan
- Column beams + core structural system
- Simple ventilating facade

---

**UNDERUSED POTENTIAL**

Unobstructed view

Atrium = Anti-social hub

---

**BREAKING THE RHYTHM**

What if?

A park next door

Green yoga suite

Green house meeting room
50/50 BUILDING?
A Public/ private hybrid

Public territory in building becoming more common recent years, while most cases open up building by floors as recognized by the podium typology, other cases have public access only by occasions with strict control. Imagine 50% of the building belongs to the public, what are the possible ways of division?

2030 scenario
1. The line between leisure & work, work and home, public and private blur further
2. New economy for nature as cost externalization is not possible anymore
3. Well being focus: car free & focus on walking
Speculation I

1. The line between leisure & work, work and home, public and private blur further
   single tenant -> multi tenant -> subscription
   transitional role -> Anyone can be a scientist

Speculation II

2. New economy for nature as cost externalization is not possible anymore

Facade service subscription

Stakeholder

1. Owner
   An organizing system to address:
   A. Aesthetic & management issue of nestbox
   B. One-off integration to building surface
   C. Animal unfriendly facade

2. Members
3. Animals
4. Ecologist

Brainstorm/
Multic平lity in different scales

Program | Operation

Brainstorm/
Facade service subscription

Owner

Facade service

Initial design

Monitor + Maintenance

Replacement/adjustment

End of life strategy

Affiliation

Members

Animals

Urban ecologist

Data
TYPOLOGY INSPIRATION

PARKLET
Reclaiming space for the public. The "parklet" phenomenon started in the United States and became a trend globally especially in the time of pandemic when everyone is thirsty for outdoor space. Parkets are small scale interventions that come in the forms of benches, planters, playground with simple wood construction. They are taking over parking lots as extension of pedestrian street, shops and cafes. They are often low cost construction, with ambiguous ownership.

Relevance: Full-scale prototype/ changeable design/ social participation

CO-MANAGE/ OPERATE
One of the big drawbacks in implementing green design is perhaps the high cost and the follow up action. Very often, an external party such as a gardener are required. How about outsourcing the cost/ responsibilities to the users? In Pasona Urban Farm by Kono Designs, the employees also have the responsibilities to manage the urban farm while enjoying the greenery in workplace.

HACK-ABLE BUILDING
Examples like public occupation of Torre De Davi, an informal vertical community organized in a vacant office building; Flexible use in Lincoln 1111 carpark and Gensler research study on Hackable-city, demonstrate building flexibilities in different authority levels. Between formal and informal, permanent and flexible, perhaps a managed public occupation system would be an option to address the issue of building vacancy.

Relevance: Program plug-in / Independent operation / resource utilization

WALKABLE CITY
With growing attention on well-being, there are more vertical structures put up in city for the sole purpose of walking and lookout. Referencing to this trendy typology, can external staircase also be one of these spectacular? Perhaps, walking experience on building surfaces will become a trend in 2030, who knows?

A COMMON GROUND

Rethink the way of cohabitation
INTERVENTION | SW facade

180mm concrete wall
80mm isolation
40mm cavity
30mm natural stone

Envelope as a climatic strategy.
Thickness and gaps provide natural ventilation, passive and active solar shading + break up air flow reduce wind acceleration
The shelf, The wall, The box
outdoor, inbetween, indoor
playground, housing, nursery

The shelf
built in situ balcony

Inhabitable wall
Prefabricated facade unit

Nurture box
modular cabin system

1. Front facade
Removal of facade & concrete secondary support

2. Reinforcement
Addition of timber beams

3. Install new facade modules

4. Addition of balcony structure

5. Cladding & railings

6. Install interior module
extension to the interior
MANAGED PUBLIC OCCUPATION

Original

Hacking 1
 Addition of public path

Hacking 2
 Eating vacancy

1. Public facade  2. Public space  3. Private back

Working block

FORMAL | work startup research
FLEXIBLE | PUBLIC

SPECTACULAR WALKING EXPERIENCE
OUTSIDE-IN EXPERIENCE
The addition of public pathway determines the access point to inside while allowing flexibility in internal configuration. In that way, public program can appear in different forms in different floors depending on the community composition at the time.
VERTICAL URBANISM
Program reference

Vertical Village of multi users
Niche community, atypical working group in local context, commuters

! CHANGE OF COMMUNITY OVER TIME !

PROMOTE DIY, INNOVATION
alternative aid to urban ecology development

Storage space    Making space    Showcase space
BEE GARDEN
135 sqm | semi-outdoor

BUTTERFLY SANCTUARY
180 sqm | indoor

AMBIGUOUS TRANSITION & CONTINUOUS FLOW

FUNCTIONAL DIVISION & LAYERING OF SPACE

Endless possibility of public program
I. Human dominated facade

II. Integrated facade

Facade as room/ shelf display

Benefit
Nature: texturized facade
Human: flexibility, extra space

Benefit
Nature: stopover spot

Benefit
Nature: Housing
Human: window

Benefit
Nature: To interior
Human: semi insulated condition
HIKING EXPERIENCE
Building facade as a public pathway
Design/ECO-Landscape

Reflection
Positioning
Changing perspective
Design Toolbox
Application
ECO-landscape
Operation
Program
System for flexibilities
Experience
Dear hikers,

Please bring your umbrella on rainy day as you may get really wet.

Job offering:
1. Green manager
2. Bird feeder

Experience:
1. Bird house without bird
2. Open insect farm
3. Beehive ownership scheme

ECO- RATING

USERs

CO WORKING SPACE + VERTICAL FREE SPACE!

Ecological + Co-Working

Funding
Creation
Management

Oh yeah
RESEARCH & DESIGN

My research questions are strategies to improve role of building in improving local biodiversity. The intention is to reflect on the capacity of a building in promoting biodiversity and reexamine human nature relationship in Amsterdam Sloterdijk. It is an investigation of biodiversity design, interspecies relationship and the transformation potential of De Knip. The research findings inform the design process and is translated into the vision of transforming De Knip into a hybrid typology, a co-working space with a vertical landscape park.

A Vertical landscape

Design practice is constantly re-examining the meaning of architecture. From nature’s point of view, building is a landscape, an obstacle, a home. What does a vertical landscape mean for human also? The project is a personal enquiry of connection between nature, human & building and the vision of the project is to make nature a more integral part of the design.

Design framework

The design is an accumulation sets of design considerations and ground rules, added by each small research. The ecological potentials and limitations of different surfaces and areas area identified regarding orientation and height. It also informs my choice of materials and compositions including materials in favour to nature, regarding scales and distances that promote animal occupation and interactions.

Biodiversity positioning

Designer cannot control nature and relationships, the best we can do is to consider the interest of nature in design and set some levels of goals. The biodiversity strategies of this project is in a scale from animal friendly design, avoid the don’ts, to increase probabilities. Nature cannot be controlled but can be nurtured. Designs effort can be made to reduce harm. In urban scale, replacing fertilizer and pesticide with bio-based products are small acts that can reduce urban stressors. Having refuges in the building is another way of providing support the ambition is to design a harmless rock, hopefully it can be a playground or a sanctuary for nature.

The research reflects on urban ecology in a broader sense. Besides designing buildings in favour to nature, what kind of circumstantial aids can be offered to urban ecology? Quite the contrary to nature, human behaviours can be articulated. Urban ecology is a subject of uncertainty in need of a physical testing ground. From the internet, you can find NGOs running their projects, innovative people who has ideas but supporting facilities, curious people who are eager to learn and contribute but lacking a channel to show their compassion. In addition, urban ecology as a big theme has many branches such as the bio-tech bio material or ecological projects etc. Therefore, the design ambition is to visualize urban ecology thoroughly, a biodiversity instrument that is a tool that works for nature, an ambassador of urban ecology and host a physical platform for knowledge exchange, innovation and social engagement. Urban ecology development can accelerate and flourish with a bottom up engagement system. Its not the garden, it’s the gardening that counts.

Biodiversity is also about diversity of humankind. There are indifferent people, but there are also loving people and passionate professional. The goal of the design is to mediate the different stakeholders, drawing the dots by encourageing knowledge sharing and interaction.
This is not only an urban ecology design but also a design for Sloterdijk area. The goal of the design is a mutual beneficial solution that mediate interest of different priorities, a nature inclusive design doubles as a neighbourhood upgrade.
Buildings tend to take a more passive role in nature design, reacting to building regulation and norms. The goal of the project is to turn buildings into an active device that MAKE CHANGES HAPPEN! Design to change everyday action by engaging people and making nature visible. Promote scientific development by becoming part of the experiment to accelerate conservation.
MULTI LEVEL NATURE INTEGRATION

1. NATURE DESIGN
   changing perspective
design toolbox
Application

2. ECO- LANDSCAPE
   Private- public typology
   Multi layer space
   System for flexibilities

3. ECO- EXPERIENCE
CHANGING PERSPECTIVE

Anthropomorphism (n.).
Animals like human users, and built environment as landscape

Zoomorphism (n.)
Human move like animal, interact like animals
Building users
(full version)

Animals are of no difference to human, perhaps a little bit more complex and unpredictable.
SLOTERDIJK ANIMAL USERS

LOW COMMUNITY
Below 50m

- Solitary Bee
- Honey Bee
- Butterfly
- Cricket

HIGH COMMUNITY
Above 50m

- House Sparrow
- Nightingale
- Great Tit
- Wood Pigeon
- Falcon
- Bat
- Swift
- Grey Heron
- ???
MOVING COMMUNITY

Regular user
inhabitants

Seasonal user
swift/ migrating birds

Visitors
nearby inhabitants
MORE THAN JUST NESTBOX
Daily routine | activity

<table>
<thead>
<tr>
<th>Housing</th>
<th>Activity</th>
<th>Support</th>
</tr>
</thead>
</table>

![Illustrations of housing, activity, and support elements](image-url)
### Solitary Bee

#### Occupation Type
- **Value**
  - **Materialization**
    - 25 trips before nesting
    - 1:80 bee/hive

#### Flying Time
- **Lifespan**: 1 Year
- **Distance**: 300m - 1km

#### Reproduction/Year
- **Occupation Type**

#### Design Considerations
- (-) Direct sunlight
- (-) Moist

#### Herbs
- rosemary, borage, sage, thyme, chive, lemon, balm, mint

#### Fruits
- strawberry, kale, raspberry

#### Wildflower/Shrub
- lavender, pussy willow, abelia, mahon

### Honey Bee

#### Occupation Type
- **Value**
  - **Materialization**
    - 2 Year
    - 1:80 bee/hive

#### Flying Time
- **Lifespan**: 3-4 Year
- **Distance**: 3km

#### Reproduction/Year
- **Occupation Type**

#### Design Considerations
- (-) Direct sunlight
- (-) Moist
- (+) Pattern/color for navigation
- (+) All-year round stewardship

#### Herbs
- rosemary, borage, sage, thyme, chive, lemon, balm, mint

#### Fruits
- strawberry, kale, raspberry

#### Wildflower/Shrub
- lavender, pussy willow, abelia, mahon
Butterfly

- **Flying Time**: 
- **Lifespan**: 1 Year
- **Distance**: 
- **Reproduction/ year**: 

- **Nesting/ breeding can occur in all seasons**

- **Protection**: 
- **Host Plant**: Narrow selection: Milk weed
  (+) need a host plant
  (+) cool & dry winter

- **Materialization**: 
  - **Service life**: >5 Year
  - **Freedom in size and shape**: 
  - **Wood/ concrete**: 

House Sparrow

- **Active Time**: 
- **Lifespan**: 2–5 Year
- **Distance**: 
- **Reproduction/ year**: 

- **Nesting/ breeding**: Overwinter
- **Foraging/ foraging/ foraging/ foraging**: 

- **Occupation Type**: 
  - **Value**: 
  - **Service life**: >5 Year
  - **Stable resource supply**: 
  - **10–20 pairs colony**: 
  - **Freedom in size and shape**: 
  - **Concrete**: 

- **Materialization**: 
  - **Service life**: >5 Year
  - **Stable resource supply**: 
  - **10–20 pairs colony**: 
  - **Concrete**: 

- **Protection**: 
  - **Host Plant**: 
  - **Materialization**: 
  - **Service life**: >5 Year
CHALLENGES

Birds can lose 80% of weight in winter?

Most bee houses need relocation in winter?

Only 10% of butterfly babies can survive?

ANNUAL SCHEDULE

Monitor

Maintenance

Support

MONITOR MAINENANCE SUPPORT!
Although conventional nature inclusive design stress on the role of greening, there are mountains but there are also rocks and caves. Every building has an identity. It’s a tower of many surface but not bird because its white, there are many trees but how about a proper housing? As you change the perspective, it becomes a norm and a design criteria which you can evaluate your building.
CHANGING PERSPECTIVE I : PLAN AS RADAR

BUILT ENVIRONMENT TYPOLOGY

topography
Green & blue
Stressor

you will start see your plans in radar according to the home range of different animals, and analyse your area differently knowing the meaning to them like the quality of green and the stressors.
What animals are there on south-west orientation?

You also see the city like a layer cake, vertical territory of different species and that's the edge of tall building as a vertical landscape.
BUILDING ANALYSIS
PROBLEM & POTENTIALS

Obstacle
- Height 82m
+ Glass ratio <25%

Landscape
- Flat facade
- Airtight design
+ Roof
+ Modularity

Artificial nature
- Lack of green
+ Ground potential
+ Roof potential

Nestbox
- Disturbance
+ Surface area
+ Roof

Green
Surface
Beginning with the 7 considerations, here are the 7 levels of goal for biodiversity design in building. These goals are non mutually exclusive while progressive which can be applied to different projects regarding to the site, program, budget etc.
LEVEL SELECT

Lv. 0
Friendly barren

Lv. 1
Playground

Lv. 2
Green

Lv. 3
Habitat

Lv. 4
Support

Lv. 5
Research

Lv. 6
Education

Lv. 7
Supply

* Remark: animals are not guaranteed*
All nature inclusive design should begin with feasibility evaluation. I think to start designing, you should ask yourself some question, do you want animals to appear in your building, if it’s a no, that’s fine, just design a visible rock that doesn’t kill. If yes you like animals like I do, then, what level of goal you want to achieve? A building can be a playground, a green box, habitat and more if you imagine. All nature design should start with a feasibility evaluation and setting boundary. How much you are willing to offer, just the outside, or you allow them to enter deep in?

DESIGN SEQUENCE

1. Evaluation
   - Data collection
     - Site
       - green & blue
     - Stressor
   - Strategy
     - Possible to outsource green

2. Identity
   - Building
     - Orientation
     - Height
   - Intense ecological zone below 50 m

3. Design scope
   - Stay out
   - Let them in
   - Animal zone accessibility
   - Nature + Nurture

Yes, animal please!
| Animal? | V | X |
|----------------------|----------------------|
| System               | Add on               | Integrated |
| Biomimicry           | Visible flat rock    |            |
| Glazing              |                      |            |
| Color                |                      |            |
| Material             | Eco Friendly         | Non-toxic  |
| Deterring Device     | Louver               | Sticker    | Scent |
| Biodiversity role    | None                 |            |
| Animal Function      | Navigation           |            |
| Human Function       | Sunshading           | Aesthetic  | Community |

<table>
<thead>
<tr>
<th>Location</th>
<th></th>
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<tbody>
<tr>
<td>Type</td>
<td>Extensive</td>
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<tr>
<td></td>
<td>Intensive</td>
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<tr>
<td></td>
<td>Green facade</td>
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<table>
<thead>
<tr>
<th>System</th>
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<tbody>
<tr>
<td>Biomimicry</td>
<td>Brownfield</td>
<td>Grassland</td>
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<tr>
<td>Plant</td>
<td>Native</td>
<td>Non-native</td>
</tr>
<tr>
<td>Species</td>
<td>Moss</td>
<td>Grass</td>
</tr>
<tr>
<td>Substrate</td>
<td>Native Soil Substrate</td>
<td>Soil mix</td>
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<tr>
<td></td>
<td>80 m³</td>
<td>40 m³</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Biodiversity role</th>
<th>Connectivity</th>
<th>Producer</th>
<th>Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Function</td>
<td>Nesting material</td>
<td>Food</td>
<td>Habitat</td>
</tr>
<tr>
<td>Human Function</td>
<td>Productive</td>
<td>Aesthetic</td>
<td>Community</td>
</tr>
</tbody>
</table>
The "shelf" strategy is experimented in the project. Imagine the facade to be a giant shelf containing various inhabitable facade module. Each type of facade module is a shelf for different infills serving various users from inside out.
Green is not the only attraction for animals, there are also different tools that can make a facade attractive.

**OBJECTIVE**

- Texture
- Food
- Opening
- One-way glass

**SECURITY**

- Distance

**NAVIGATION**

- Material
- Clustering
- Variation

**TOOLS**

- Texture
- Food
- Opening
- One-way glass

**COLOR**

- Generalist approach: midtone

**DISTANCING**

- High probability

**PROBABILITY BOOSTER**

- Greening is not the only way to make your building attractive, there are other tools that can boost your probability. Giving animals a sense of security and navigation by strategies like establishing physical distance between human and animals or by material, considering colour preference of animals, clustering of houses for colony formation are possible ways to boost chance. These strategies are elaborated in the design.
MUTUAL BENEFICIAL NURSURY DEVICE
Unlock building potential
A zoo without fences is a 5 star home. Just a little twist, human dominated typology can be a mutual beneficial nursing device, something for human satisfaction with biodiversity value. In the Eco landscape, there are some atypical ecological program, an open insect farm in where people can sponsor an egg witness the life cycle and at the end supply pollinator for the area. An open bird Sanctuary that can be used as research capsule for animal behavioural study, provide shelter place for extreme environment and also for public education. It’s a triple win situation so think about it.

TYPOLOGY INNOVATION
beneficial human dominated typology in De Knip

OPEN INSECT FARM

OPEN BIRD SANCTUARY

human satisfaction + :)))
biodiversity value
APPLICATION

OPPORTUNISTIC DESIGN

DE KNIP MODULE x80
6x3m

8 People

or

2 house sparrow colony

or

4 people, 15 birds?
The renewal of 80 windows module is an opportunistic design aim to capture full potential of the surface. It is a fully integral process design in different scales. It is an experiment itself and experimenting different material and products. In first glance this façade looks unreal, like an assorted color palette of patches with funky openings. Indeed, the new image of the building is to provoke imagination, countering the regular environment. It is a fun design of multi functions and for multi interests.

I. MULTI SCALE EXPERIMENTS

II. MATCHING INTEREST

Nature Design: The Assorted Facade
Design to & for Experiments | Evidence-Based Design

Infill

Clustering

Module

Scientific Research

Evaluation

Planning

Cluster

Module

Infill

FLEXIBLE

life span: 1 year

INTEGRATED

life span: >5-25 years

Bird nest box

Roosting sheet

Tracking device

Bee nest

Insect breeder

Beehive

New product

Eco Identity

Urban Identity

Database
1. **ICON**
   **THE BAT CROWN & THE YELLOW LINE**

The new black crown and art work of the building double as a bat colony and swift nestbox to maximize design potentials. The yellow pathway is appealing to human, it is a mid tone color that is attractive to the general group. The choice of metal mesh is for sense of security for human and animals as they cover up the legs and movement.

**SECURITY**
- Tool
- Non-toxic
- Mid-tone color preference
- Hazard free Glazing
- Eco-friendly material

Mesh panel made with recycled metal
Glazing sticker
Mesh to reduce vision of movement

+80m High community
2. HUMAN SENSORY JOURNEY
MATERIAL EXPERIENCE - NAVIGATION - PROVISION - SUPPORT

The Assorted façade give users a sense of nature and represents the different zones of the public park, visitors can easily navigate themselves along the long walk. The gradient transition of color palette resembles a sediment stone appearance and reflects color preference of different animals. It is a testing ground for materials regarding application and people acceptance. There are provisional materials such as bioreceptive panels, scrap material hinting porosity and some innovative building materials which are hazard free to nature.

<table>
<thead>
<tr>
<th>Material Innovation</th>
<th>Social Value</th>
<th>Environmental Value</th>
<th>Biodiversity Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocomposite panel</td>
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<tr>
<td>Cork panel</td>
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<tr>
<td>Scrap wood</td>
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<td>Bioreceptive panel</td>
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<tr>
<td>Scrap material</td>
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</table>

*Bat house color for NL weather

Lv. 0 Friendly barren
Lv. 1 Playground
Lv. 2 Green
Lv. 3 Habitat
Lv. 4 Support
Lv. 5 Research
Lv. 6 Education
Lv. 7 Supply
DISTANCING & POINT OF INTERVENTION
28 NATURE INTEGRATED MODULES OF 6 TYPES

Referencing to clearance dimension of tree crown and natural habitat with consideration of human movement in De Knip, 28 of the 80 facade modules are replaced with nature integrated design of 6 types targeting different groups of users. The point of intervention are based on probability of animal appearance regarding sense of security.
Imagine facade design as a host for human and animal, for engagement and to experiment product designs.

1. +15m Solitary bee
2. +10m Honey bee farm
3. +65m Showcase space
4. +70m Bat theatre
5. +40m Insect machine
6. +25m Butterfly nursery
3. CLUSTER IDENTITY: BIRD COLONY
PROTOTYPE 1 | MISC. HABITAT WALL | WINDOW TYPOLOGY

Cluster identity of the building is defined by program also by the clustering of animal community that result in different interaction with human user. In the low community zone, the bird nest box integrated façade in a cluster of 6 modules provide miscellaneous living conditions for birds. It experiments with different products, colors and openings.

APPLICATION OF NESTBOX PRODUCT + CUSTOM MADE BIRD CAPSULE
Variations among the different modules
Trackers added

LOCATION: 9-11F
NUMBER: 6
THICKNESS: 450mm
PROGRAM: SANCTUARY
SYSTEM: FLEXIBLE INFILL
SOCIAL ENGAGEMENT: YES
MAINTENANCE PLAN: YES
VARIATION: YES
SCALABILITY: YES
REPLICABILITY: YES

1. Prefabricated timber frame panel with wood fiber insulation
2. CNC Plywood waffle
3. Front panel

Application of nestbox product + custom made bird capsule
Variations among the different modules
Trackers added
Another prototype is the open facade typology façade in insect cluster. The interior program is a garden double as a solitary bee refuge. It is a social engagement design that address seasonal changes and maintenance issue. The public can DIY their own version of nestbox infill.
ECO- LANDSCAPE
URBAN ECOLOGY PARK + CO WORKING HUB
PUBLIC SPACE SHORTAGE + FUTURE WORK CULTURE

Regular users  Flexible users  Visitors
I. Eco- enthusiasts  II. Local community  III. Tourist

Sloterdijk The new residential hub
80% residential

The transformation of De Knip embraces human diversity, encourages movement and interaction and allows changes overtime. It is a new mixed use typology of a vertical park and coworking hub double as an urban ecology center that promote research and public education. Sloterdijk in 2030 will be densified into residential district in 7 areas bringing an influx of different communities. While animals are facing habitat fragmentation problem, there is a public space shortage problem as well. The limited public space options include streets, pocket parks and small terraces that are exclusive for residents. The opening up of the public is a negotiation between public and private, work and leisure. With COVID this year, we can imagine a more flexible working style down to individual scale, this model can be a norm for the rising moving communities.
NEW ICON
A SENSORY JOURNEY OF CURIOUSITY

The building fits the location criteria of a public building/community center for its accessibility and visibility and inviting appearance. Despite the future multiple developments in the area, the tower will remain visible to the public with an unobstructed view of its façade from train station.

10 mins from station, and you won’t be disappointed

We have more trees inside than on the street

Some Instagram moments
1. membership system subscription

2. Public domain
   Free
   0700-2000
   Extended hour on some days

MEMBERSHIP PACKAGE

VIP 1+2+3
Flexer 1+2
Preview [free!]

The concept of the tower is a condensed city offering multi experience spatially and programmatically operate in different scale in one building.
The concept of the tower is a condensed city offering multi experience spatially and programmatically operate in different scale in one building.
ONE OPEN STREET

12.8km outdoor route | all-year-round outdoor experience
2.5m continuous balcony | Social activities

Sensory experience

1. 250x400 LVL beam
2. 300x400 damp treated CLT beam
3. Resysta outdoor flooring
4. Metal mesh panel
5. Steel handrail
6. Aluminium plate

A far
A view of De Bretten

Up close
A touch of nature

Above
the iconic bat crown

A warm start and a warm end
ECOLOGICAL EXPERIENCE ALONG THE WALL

Behind the Eco wall is a range of diverse experience of semi outdoor and indoor condition arranged in zones serving education and research purpose. The bottom part is managed and programmed as urban ecology center while the upper part is unmanaged, unprogrammed flexible space for showcase and interaction.

- Bat theatre
- Material library
- Open insect museum
- Open bird sanctuary
- DIY bee garden

FLEXIBLE SPACE!
display | showcase

BAT center

BIRD museum | library | sanctuary

INSECT farm

BEE garden
WORKING HUB FOR MULTI COMMUNITY

Membership zone

Niche

Machine rental upon request :)  

Material lab

FAB LAB

design & make your plot!

Individual

Shared

ok, we all need people

Generic
SHARING CIRCULATION & SEPARATION

The relationship between public and private layer. There is an entrance from the back to the public domain in every floor; the public domain is a breakout zone and alternative for the members. There is limited access to the elevator on certain floor; the public layer will otherwise work as an independent system. The transformation breaks the repetition of a tower typology, altering the floor ecosystem by enabling an alternative circulation. For public, it is about the in and out experience and for members, movement and interaction between floors are encouraged.
**COMPONENTS FOR FLEXIBILITIES & CHANGES**

ECO-landscape has a two-fold meaning. Apart from the ecological experience, CO-also refers to co-working, co-funding, co-creating and co-management of the building. High degree of control and responsibilities are given to users in this model by a system of flexibilities. While the addition of public façade and balcony is fixed construction, the public domain is modular assembly which is easily changeable. With essential hardware provided, the public domain is a clean space for users to make their place. Planters and furnitures can be added by co-sponsorship.

<table>
<thead>
<tr>
<th>FIXED - VARIABLES - ADDITIONS</th>
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<table>
<thead>
<tr>
<th>COMPONENTS FOR FLEXIBILITIES &amp; CHANGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MODULAR ASSEMBLY</td>
</tr>
<tr>
<td>2. DOOR MODULE</td>
</tr>
<tr>
<td>Security card reader</td>
</tr>
<tr>
<td>glass panel door</td>
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</tbody>
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<table>
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<tr>
<th>UPGRADABLE ITEMS</th>
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</thead>
<tbody>
<tr>
<td>Planters/ furnitures</td>
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<table>
<thead>
<tr>
<th>VARIABLES</th>
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| ADDITION & UPGRADES |
A BUILDING THAT EVOLVES
This system allows a building to evolve in different scales. The back of the building can change according to demographic change, the public domain can expand or demolish, and the interior can be enhanced with collective effort.

ECOLOGICAL SUCCESSION, MAN-MADE

2030

2047

ADDITION & UPGRADES

CHANGEABLE COMPONENTS
Typology: pop up office/exhibition

modular assembly
furniture fit-out

PROJECT
2/f chair
HELP
SPONSER $$$
It’s stormy!

Ah. that’s something

It’s warm inside

I wish I can be a bird

hmm. People are doing cool stuff inside

Sh.. go away

How are you doing today, birdy?

SCENARIO 1: OPEN BIRD SANCTUARY
PROTOTYPE 1 | MISCELLANEOUS HABITAT WALL | WINDOW TYPOLOGY
INDOOR PUBLIC DOMAIN

SCENARIO 2: BEE GARDEN
PROTOTYPE 2 | INSECT ENGAGEMENT WALL | OPEN FACADE
SEMI OUTDOOR PUBLIC DOMAIN

It’s winter time

Nice Art

It’s winter time

Food!

What’s wrong with it?

ok.

Hi, I’m from 8/f
A HAPPY LANDSCAPE

From passive to active, full potential of a vertical landscape is explored. The three typologies proposed here, an open bird sanctuary, butterfly machine and bee wall not only provide homes, supply pollinator for the area and support animals during seasonal challenges, they also serve as an education and research device.

1. The Friendly barren
2. Placeholders
3. Inter-
4. Opportunistic
5. Multifunctionality
6. Hetero-
7. Human Acknowledgement
ECOLOGICAL LIFESTYLE

Infusing responsibilities and human acknowledgement foster better connection between human and nature, design & scientific research.

UPCOMING EVENT

Every two weeks
“Let it fly”

Janurary
“Move it baby”

CURRENT JOB LISTING

Bird tracker

Green manager

The invisible manager want to become one of us?

Reward: Satisfaction

CONCLUSION

The thesis proposes a systemic change in addressing nature inclusiveness in architecture. It shows a spectrum of possible influence on design when considering nature as a potential user. Topics regarding urban ecology in building design is rather new, the value of this study is to encourage discussion and imagination. I believe enabling imagination is also a way to change attitude, progress thinking and ultimately lead to behavioural changes.

The thesis is a self reflection of different possibilities in building practice. For example, the project proposes a bottom up approach in building management, addressing the theme of co-fund, co-build, co-create, co-design. While greening of a building is often given to users so as furniture and configuration of space, what would happen if architects only design a robust background rather than an articulated foreground for users? Concerning the constantly changing working culture and unpredictable public health crisis, the project provokes discussions regarding social resilience in work space and the boundary of publicness of a building.

1. Nature inclusive design become a norm
2. Nature connectiveness by human acknowledgement
3. Co-ownership of building
WHAT'S NEXT?

NATURE INCLUSIVE BUILDING DATABASE
Towards a systematic approach keeping track of multi-disciplinary progress

#evaluation #system #opensource

ECO- DATABASE

NAME: DE KNIF
FUNCTION: HYBRID COWORKING SPACE
OWNER: PUBLIC / PRIVATE
LOCATION: AMSTERDAM, NETHERLANDS

HEIGHT: 82.5m
ORIENTATION: SOUTH WEST
YEAR OF CONSTRUCTION: 2030

PRODUCT USED:
click for detailed list

INNOVATION:
2x bat roosting module
(scalable, replication)
contact for further details.

REMARKS: (last edited 01/07/2030)
- people are ok with moss growing facade
- honey bee wall is not really working
- bird: green window is more attractive than red

(last edited 01/07/2030)

Extract components in different scales and reinterprete in your own way!

ONE OF THE MANY SOLUTIONS

#natureinclusivedesign #imagination

Minimal effort

$$$

CAPTURING POTENTIALS

For instance...

<table>
<thead>
<tr>
<th>Program</th>
<th>Potential</th>
<th>Implication</th>
<th>Ecological potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>cinema</td>
<td>Solid wall</td>
<td>unused surface area</td>
<td>animal habitat?</td>
</tr>
<tr>
<td></td>
<td>byproduct heat</td>
<td>free thermal support</td>
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</tbody>
</table>

MASS CUSTOMIZATION

#evolution #reference

Version 1.0  Version 2.0  Version 3.0  ???

Application
- Housing?
- Office?
- School?

Animal habitat?
REFERENCE

- Ibid.
- Ibid.
- Ibid.
- Hui, S. (2011). Biodiversity assessment of green roofs for green building design. Hong Kong: Technological and Higher Education Institute of Hong Kong.11