Design and Future of Urban Biodiversity

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Urban Biodiversity and Design: Erfurt, Germany
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Urban environments in the beginning of the 21st century: globalisation and unification

- Tremendous growth of urban areas and associated processes of *globalisation*

**Similar**
- *Urban design and planning structure*
- *Landscape architecture styles*
- *Plant material and construction materials*
Unification of urban environments: planning structure and architecture
Unification of urban environments: landscape architecture styles

**English Picturesque**

- Adopted not only in *Europe and English* colonies but is starting to be a generalised *western solution-cliché-symbol with simplified structure*: lawns with scattered groups and single trees
- Absolute *loss of original* picturesque meaning and spirituality
- Many local historical and natural landscapes were *sacrificed to imitate these styles*

Chatsworth, UK

Safa Park, Dubai

Arabian Desert
Global “Picturesque”
Unification of urban environments: landscape architecture styles

“Gardenesque”

• Approach of mid–end 19th century of using *colourful exotic planting*

• One of the most *powerful symbols of Western culture*
Global Victorian “Gardenesque”
Unification of urban environments: landscape architecture styles

**Formal (regular) style**

Vaux-le-Vicomte, France, 17th century

Singapore, 2005
Unification of urban environments: landscape architecture styles

Modernism

Park de La Villette

Ira Keller’s Garden, Portland, USA
Unification of urban environments: plant material

*Temperate climate in the Northern Hemisphere*

- Using *similar* coniferous and deciduous species for landscape design and in plant nurseries
- Combination of *native* and *non-native* species
Unification of urban environments: plant material

Tropical and subtropical climate around the globe

- Creation of the Western “tropical paradise”
- Started in Victorian England
- Botanical gardens and greenhouses - selection of the most ‘appropriate’ beautiful and unusual tropical and subtropical plants
- Creation of the “pool” of plants that would symbolise “tropical paradise”
Western “tropical paradise”

- Introduction of the same group of plants in tropical and subtropical resorts, parks and private gardens
- As a result, homogenisation of urban tropical landscape around the world by the end of the 20th century
- Unified design language
- Local, indigenous versions of natural plant communities are largely suppressed

Akaka Falls State Park (Hawaii).
Advertised “Wild” nature is all non-native!
Tropical ‘Paradise’: Identity Crisis and Lack of Cultural and Landscape Awareness
Unification of urban environments: influence of Western Culture: consumer oriented and non-sustainable

The most powerful cliché of western culture: “Mall”, “McDonalds”, “Christmas” and “White wedding”
Understanding of urban biodiversity today

• Not only a crucial part of urban ecosystem but an important ecological and cultural integrity player

• Native component of biodiversity (native flora and fauna) as one of the most important “tools” for urban ecological and cultural identity

• Because of the character of origin landscapes and differences in historical development, there are different approaches in understanding urban biodiversity and the way it reinforces design in Northern and Southern Hemisphere countries
Two views on understanding urban biodiversity

**Northern Hemisphere (Europe)**

- **Origin** of Western civilisation with its *established design language*
- Most common urban biotopes (forests, group of trees and shrubs, lawns and even wastelands) based mostly on *indigenous flora*
- Seed banks contain mostly *(indigenous plants)*
- The vast majority of *non-native species* pose *no threat to native plant communities*, only a small number (compared to the whole flora) are *(invasive)*

**Southern Hemisphere (New Zealand, Australia and South Africa)**

- **Englishness** of urban environment. Introduction of “familiar” plants from the “motherland”
- Hosts for *more exotic organisms than anywhere else on Earth* because of a climate, broad species niches and in some cases freedom from natural control agents
- Dramatic changes and *loss of native landscapes*
- *Protection and restoration of biodiversity* is task number one.
- New Zealand today has to use even the term “Native Biodiversity” or “Indigenous Biodiversity”
Urban biodiversity and design in New Zealand

• Englishness of the urban environment

• Suppression of native flora in the urban environment
New Zealand native-versus non-native: a losing battle

- New Zealand: **2500** native species
- **2500** casual and naturalised species
- More than **10%** of naturalised species are weeds
- **25 000** species in cultivation

*Lupinus spp.* Lupine from the USA is always on all calendars advertising New Zealand

One of the most popular “Victorian” palms *Phoenix canariensis* today is an invasive naturalised weed
Two views on urban biodiversity design

**Northern Hemisphere (Europe)**
- Reinforcing
- Reintroducing
- Designing with *natural* process
- Free as many spaces as possible for *increasing biodiversity* (use even very small biotopes) within the urban environment
- Relaxed and well-justified view on using *combination of native and non-native species* as a tool for increasing urban biodiversity

**Southern Hemisphere**
- Developing its own strategy with an emphasis on *increasing the planting or revegetation of indigenous plants*
- The clichés “living in harmony with nature” or “appreciation of nature” have to mean “*native flora and fauna*” and special efforts of direct planting of native plants
- Most of Northern Hemisphere approaches such as “*leave nature alone-going wild*” does not work: *soil banks in urban environments contain mostly exotic species.*
Existing approaches to research and design of urban biodiversity

- **Large scale** (master plan level) approach: urban biotope mapping, green Infrastructure, green spaces, landscape ecological urban planning, urban biosphere reserves, “Ecopolis”

- **Biodiversity** as an important part of designing sustainable urban landscapes
“Ecopolis” approach in Russia

• Based on Vladimir Vernadsky’s concept of the “noosphere” “under the influence of intellect and human labour biosphere changes into a new state - noosphere”.
• Ideological foundation: “socialism furnishes a foundation for promoting harmonised relationships between man and biosphere”
• Holistic multidisciplinary approach
• Main goal to create an optimal ecological and socio-psychological urban environment that can also incorporate urban biodiversity protection in urban areas.

Design with nature in Puschino - the “Ecopolis” case study
Existing approaches to research and design of urban biodiversity: intermediate scale

• Designing with biodiversity in mind as an important part of sustainable design practice at a **neighbourhood level** (microdistrict, subdivision, housing complexes)

• Urban biodiversity protection, reinforcing and designing as part of **whole sustainable practice** (“green buildings”, solar heating, water harvesting and water management, green roofs, retention ponds, swales, rain gardens, waste recycling and compost facilities)
UK: designing “anthropogenic nature-like” communities

- **Synthesis** of new plant communities that *never before existed* in urban sites and cannot be found in any flora
- Based on *understanding* plant community composition and dynamics
- Use of a *combination of native and non-native* species
- Highly influenced by *design considerations* (the appearance of a plant community)
- Part of sustainable approach
UK: design of “naturalistic herbaceous” plant communities for urban neighbourhoods: pictorial meadows

- **Mimics** the spatial and structural form of *semi-natural vegetation*
- ‘Utilises **visual and functional characteristics** that are absent in the native flora’
- Argument: importance to **balance** different value of biodiversity and attractiveness for humans
- **Seed mixes** of native and non-native bright coloured species
- **Wildlife-friendly** and cost-effective replacement for traditional *lawn*
USA
Low Impact Urban Design (LID)

Background
1. Fragmentation of landscapes and loss of natural habitats
2. Suburbanisation
3. Consumer’s society unsustainable life style
4. Big number of non-native plants using in urban landscape design
5. Lawns as a major part of the cultural American phenomena: associated problems of pollution, use of non-native plants and waste of energy and water

Key Strategies of LID
1. Conserve and restore vegetation and soils
2. Design site to minimise impervious surfaces
3. Manage stormwater
4. Provide maintenance and education
5. Main cities: Seattle (Washington), Portland (Oregon), Chicago and some places on the East Coast
Low Impact Urban Design (LID): stormwater devices

Seattle (WA, USA): swales

Use of native and non-native plants
USA Low Impact Urban Design: vegetated roofs

- Provides slower *release of runoff*, improves energy efficiency and extends roof life
- Provides *wildlife habitat* and recreational opportunity
- Urban biodiversity applications: *use of native and non-native species*
Urban biodiversity and design: New Zealand Low Impact Urban Design and Development (LIUDD)

- Apply different **sustainable devices** (similar to the USA): swales, rain gardens, green roofs, impervious surfaces. Compact development principles.
- The key goal is to **protect and enhance native urban biodiversity**
- (LIUDD) associated with specifically employing **native plants** and attracting native species of wildlife.
LIUDD principles in action: Waitangi Park, Wellington

- LIUDD principles: stormwater treatment and using native plants as highly visible and key drivers of the overall design
- Representation of rain gardens, wetlands, and coastal vegetation
- Designer: M.Wreight
New Zealand LIUDD practical applications: the manual

- How to Put Nature into Our Neighbourhood: Application of Low Impact Urban Design and Development (LIUDD) Principles, with a Biodiversity Focus, for New Zealand Developers and Homeowners
Demonstration Gardens in Christchurch Botanic Gardens “Design with Indigenous Plants”

- **Showcase** ways to appropriately apply native species in particular settings

- Gardens display at a **realistic scale** of private house situation

- How principles of **Low Impact Urban Design and Development** can be implemented into an **individual residential property to improve sustainability and biodiversity** and reduce costs at both a site, and wider regional scale.
Existing approaches to research and design of urban biodiversity design: intermediate scale

Australian vision “Ecopolis”

- Towards sustainability
- Urban biodiversity as an important part of sustainable landscapes
- “Ecopolis” - *sustainable approach to urban housing and landscapes*

*Christie Walk* in inner city of Adelaide: residential development that incorporates sustainable principles
Existing approaches to research and design of urban biodiversity design: small scale

- Reinforcing, reintroducing and designing biodiversity in small scale (parks, gardens, road sides, streets, brownfields, green roofs)

- Designing with nature and natural processes
Urban biodiversity and design approaches

Germany: “Go Spontaneous”

- Spontaneous in this case means vegetation which "occurs by chance, without conscious design intent"
- The way of reinforcing of natural plant communities processes (succession)
- **New approach in planting design:** “make spontaneous vegetation more attractive” and “alternative to ornamental plantings in the city” (Kuhn, 2006)
- Very important point: increase *diversity of species*
- Use of *native or combination of native and non-native species*
- Big potentials for redesign of wastelands and industrial zones

Spontaneous vegetation sites in Erfurt
Urban biodiversity and design approaches: UK “Go wild”

• “Go wild” (Kew Botanic Gardens exhibits, 2003)
• Leave nature “alone”
• Do not be too tidy
• Minimise traditional lawn areas and planting native (and some non-native) plants that attract wildlife: butterflies, insects and birds

Kew Botanic Gardens “GO WILD” exhibit aiming to show ways of increasing wildlife biodiversity
Urban biodiversity and design in the USA: “Prairie Style” in the Midwest

**Traditions**

- Ossian Cole Simonds and Jen Jensen: *“Prairie Style”* (Midwest of the USA)
- J. Nassauer’s *‘messy ecosystems’* approach, introduction of native prairie and wet meadow plants for mid-west urban neighbourhoods

*“Eco” of “Prairie Style”: Millennium Park, Chicago*
Reference to Chicago’s transformation from flat and marshy origins to a bold and powerful city. Use of native prairie plants and some non-native perennials
USA “Going native”: attract wildlife in your private garden

- Designing for *wildlife*
- Introducing *native and non-native plants* in the *front and backyards* of private gardens, buildings, streets and highways
- Influenced by *Lady Bird Johnson National Wildflower Centre* in Texas
- National Wildlife Federation *“inspires Americans to protect wildlife for our children's future”*
Bartholdy Park, Washington DC

*Eco-friendly!* “Gardening practices that help wildlife, like reducing the use of chemicals, conserving energy and water, and composting also help to improve air, water and soil quality”.

Wildlife habitats exhibit
US: native plants as symbols of aboriginal landscapes

- United States Botanic Garden, Washington, DC
- National Garden (Regional Garden)
- Native flora of the Mid-Atlantic region to showcase plants of ornamental and naturalistic settings
- Design: inspiration from native plant communities by positioning plants in appropriate soils and moisture zones: “GOING NATIVE”
US Xeric landscapes

- Main aim – to conserve water and move away from unsustainable lawns and other "classical" features of water consuming temperate gardening traditions
- Using draught tolerant native desert plants
- Part of new sustainable approach

Private gardens, Tucson, Arizona
Urban biodiversity and design: New Zealand Plant Signature

• Represented *abstraction from an actual plant community*

• Do not mean just a simple *mimicking* of natural plant communities and their fragments

• New plant composition that offers some “*essence of the place***”
Urban biodiversity and design in New Zealand: Plant Signature

• Promote an *ecological aesthetic* which celebrates the *distinctiveness* of local flora as well as satisfy the desire for *visual and horticultural interest* in street, parks and gardens
Australian vision of plant signatures

- Design with *native plants* as important for increasing *indigenous biodiversity and most importantly* in association with *national identity*

Symbolic planting of native plants next to the Art Gallery of New South Wales, Sydney
Summary: current vision

- Still **very few good examples** of urban design with biodiversity in mind around the globe
- Still **learning** about urban biodiversity and how to “marry” this knowledge with design qualities and principles (colour, texture, form, balance, contrast, harmony and variety)
Urban biodiversity and design: future

• Better understanding of urban biodiversity, its peculiarities and potentials (composition, dynamics and aesthetical potentials)

• Better understanding of current human needs

Boyce Thompson Arboretum, Arizona, USA
Urban biodiversity and design: future

- Biodiversity of native plants as an important tool for saving *local identity* (contribution to “sense of place”)
- Shifting public appreciations towards “weedy”, “untidy”, “messy” or “meager” plant communities by experience and learning

Kew Botanic Gardens, UK

Campus of Wellington Polytechnic
Urban biodiversity and design: future

• Need to learn more about **ecological process** and using it for **economical benefits (decreasing cost)** from ecologically friendly **biodiverse** urban ecosystems

New project in Dubai, UAE and realisation methods
Urban biodiversity and design: future

- **Shifting** towards a more complex ecological approach (including designing for wildlife) in design of urban landscapes (example “the Lizard Garden” in Auckland)
- Cooperation of ecologists, architects and landscape architects in designing ecologically based biodiverse urban landscapes
Urban biodiversity and design: future

**Education opportunities:**
- For general public
- For professionals
- For university students
- Role of *botanical gardens* and even *flower shows* and *garden competitions* in the promotion of urban biodiversity practices
Promoting of urban biodiversity practices: Ellerslie Flower Show, Auckland, New Zealand

“The Rain Garden”, 2007
Towards biodiverse urban landscapes!

• Our main message to the community: designing with biodiversity in mind is not just a new “ecological fashion” in landscape architecture. It is the **survival ecological strategy** aimed at saving the planet.