Research Through Designing as an academic practice

reflecting on process and criteria

Vilnius, 9th of October 2024, Jeroen de Vries

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

How to meet academic standards when applying landscape designing as a research strategy or method?

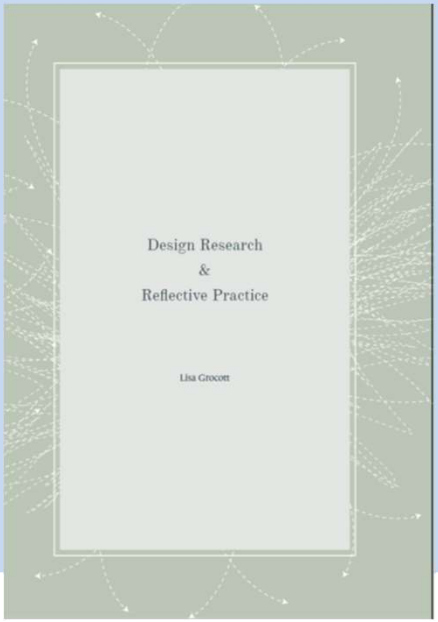
my motivation & inspiration

Co-ordinating research team Sustainable Food Production in Metropolitan Areas

HVHL University for Applied Sciences (NL)

Lisa Grocott's doctoral thesis Design Research RMIT (Melbourne)

- *Grocott, L. (2010) Design Research & Reflective Practice: the facility of Design-oriented research to translate practitioner insights into new understandings of design, Doctor of Philosophy, School of Architecture and Design, College of Design and Social Context RMIT University.*



LE:NOTRE Institute
Linking landscape education, research and innovative practice

Criteria for valid research

truth value

applicability

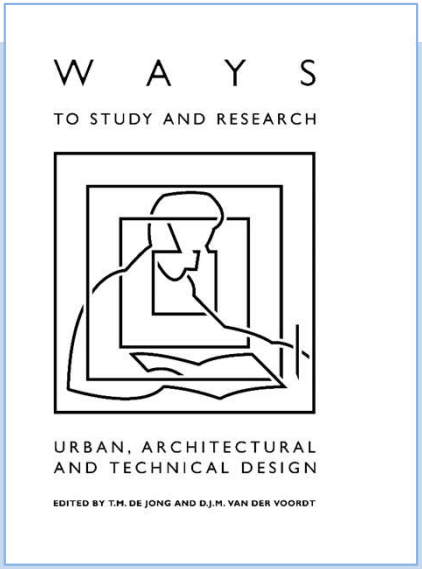
consistency

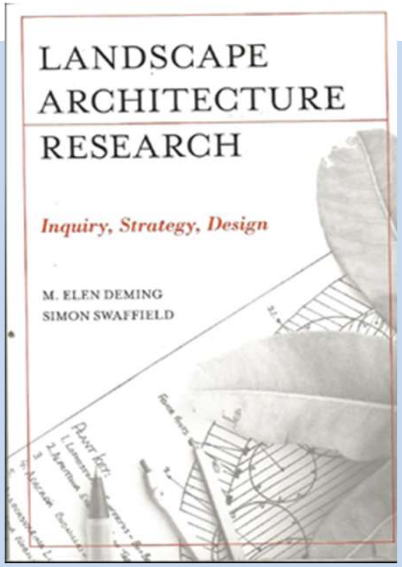
transparency

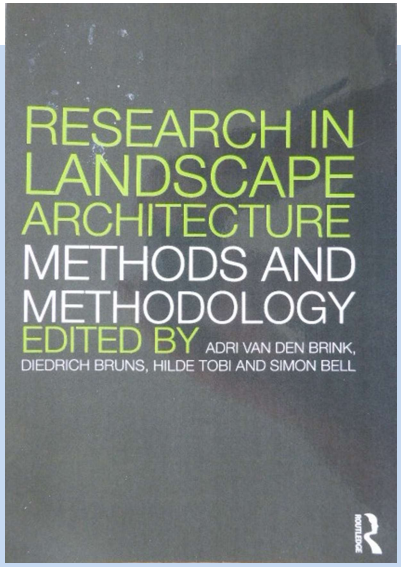
Nijhuis & Bobbink 2012, Yin 2018

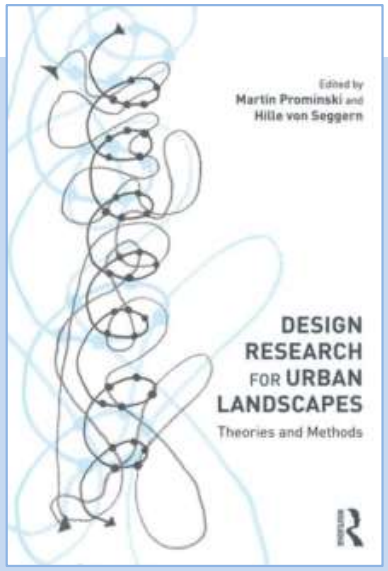
LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Key- references on Design Research in LA









- *Brink, A. van den, Bruns, D., Tobi, H., & Bell, S. (2017)* ***Research in landscape architecture: Methods and methodology.*** *Abingdon, United Kingdom: Routledge.*
- *De Jong, T.M. & D.J.M. van der Voordt, eds (2005)* ***Ways to study and research Urban, Architectural and Technical Design****. Amsterdam, IOP Press BV.*
- *Nijhuis, S. & I. Bobbink (2012)* ***Design-related research in landscape architecture****, in: Journal Design Research, Vol 210, No. 4, 2012 (p 239-257)*
- *Prominski, M. & von Seggern, H. (2019)* ***Design Research for Urban Landscapes: theories and methods*** *(2019), Abingdon, United Kingdom: Routledge.*
- Nijhuis, S. and J. de Vries(2018) Design as Research in Landscape Architecture.
https://www.researchgate.net/publication/343003939_Design_as_Research_in_Landscape_Architecture

Worldviews (paradigms) & knowledge development

positivism (or post-positivism)

social-constructivism

participatory/advocacy worldview

pragmatism

Lenzholzer et al. (2017)

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

positivism

experimentation and observations

empirical methods

quantitative support

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

social-constructivism

logical reasoning within a given social and political context

qualitative research methods

participatory/advocacy worldview

intertwined with politics and a political agenda

containing actions that may change the lives of participants, the related institutions and the life of the researcher

transformative science

Schneidewind et al. (2016)

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

pragmatism

different methods, for instance

- experimentation
- observation
- modelling
- …, combined in a practical manner,

using several ways of producing valid knowledge

Worldviews (paradigms) & knowledge development

positivism

social-constructivism

participatory/ transformative science

pragmatism

Lenzholzer et al. (2017) argue that design can relate to each of these worldviews.

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Design ≠ Research

Types of Design Research

Research ***for*** design

Research ***on*** design

Research ***about*** design

Research ***through*** design(ing)

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Research for design

- to inform or validate the design
- knowledge is acquired in a targeted manner as input for the design
- or components of the design are elaborated and evaluated

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Research on design

- plan analyses
- to study and organise operational design
- finding specific design concepts, principles or types as a foundation for future design.

Research about design

Understanding and identifying design processes through the observations, interviews, and other activities of designers for design didactics or for example the principles of the RTD process.

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Research *through* design(ing)

A form of research where designing and designs are applied as a research strategy to explore, identify, and map possibilities.

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

areas of research through designing

- **sustainable and nature based solutions**: water management, ecology and biodiversity, climate resiliency, energy, quality of life and social engagement
- structure and development of the **outdoor space**
- **meaning and usage possibilities** of the outdoor space for individuals and society
- design and implementation of **landscaping schemes**
- **civil-engineering design** and implementation of components of the outdoor space

Examples of research questions

How can coastal areas face sea-level rising and increasing storms?

How can we lay out rivers in cities to prevent flooding?

How does a city without car-mobility look like?

How can a city produce to a large extent its own food?

How can the form and functioning of the urban water system mitigate heat island effect?

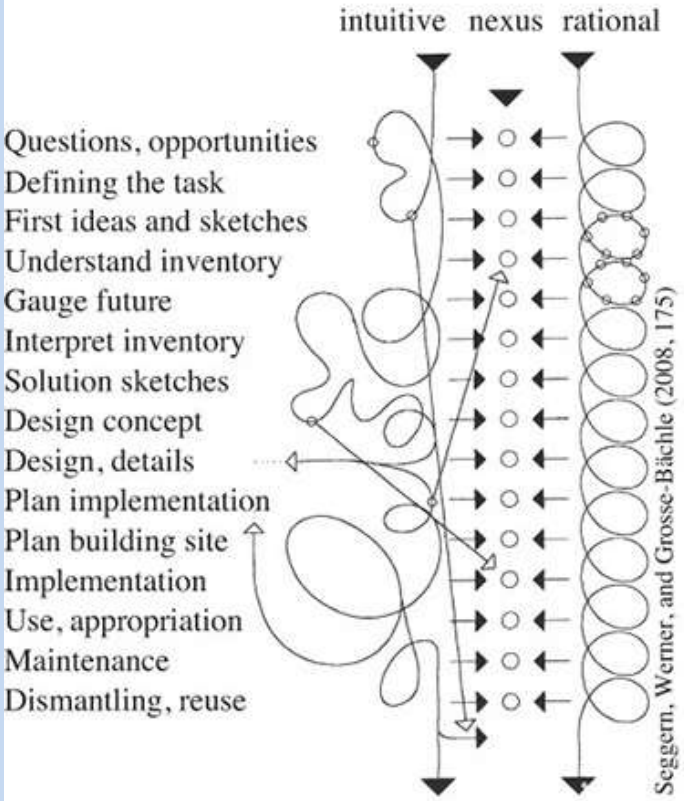
stages in design research

1. **Project analysis:** to get a grip on the problem field and the research question. For instance existing plans, designs, situations. Framing the research aim.
2. **Comparative analysis:** Various solutions within a defined question. To define driving factors, variables, criteria for stage 3 and 4.
3. **Experimental design study:** Sketching to explore possible types, principles for spatial, natural and social patterns and processes.
4. **Design study:** models, spatial and temporal representations. Drawing conclusions relating to the research questions.

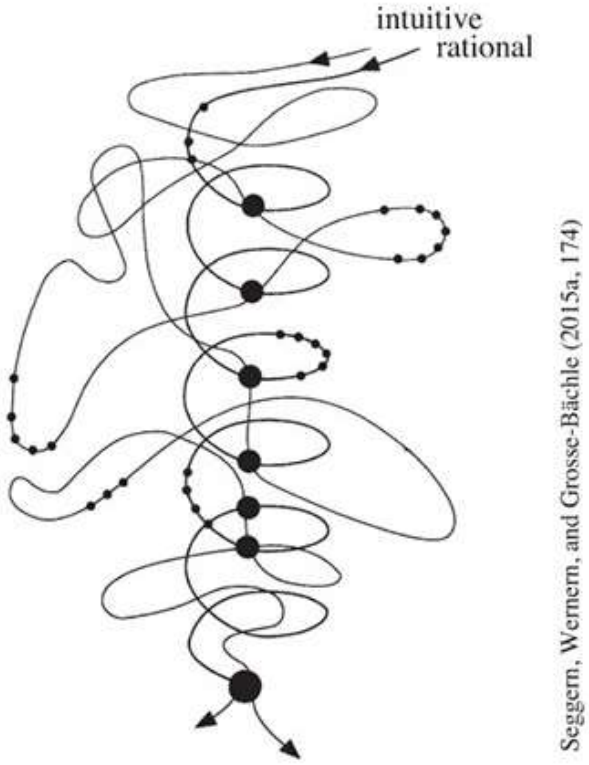
Nijhuis (2012)

Process of Design Research

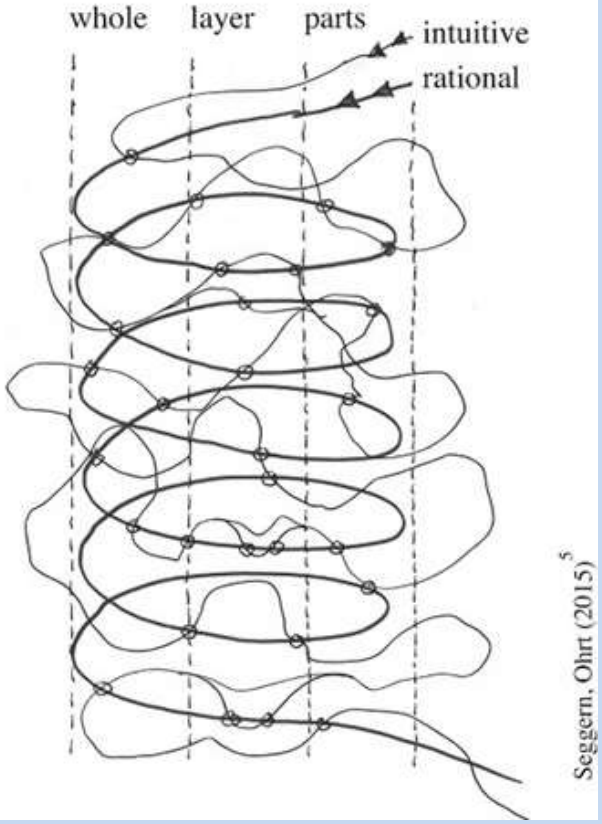
1. Designing as an iterative process



2. Designing as an iterative process the actual course of events



3. The process of Raumgeschehen and design research



Source: Seggern in: Prominski & Seggern (2019) p 16

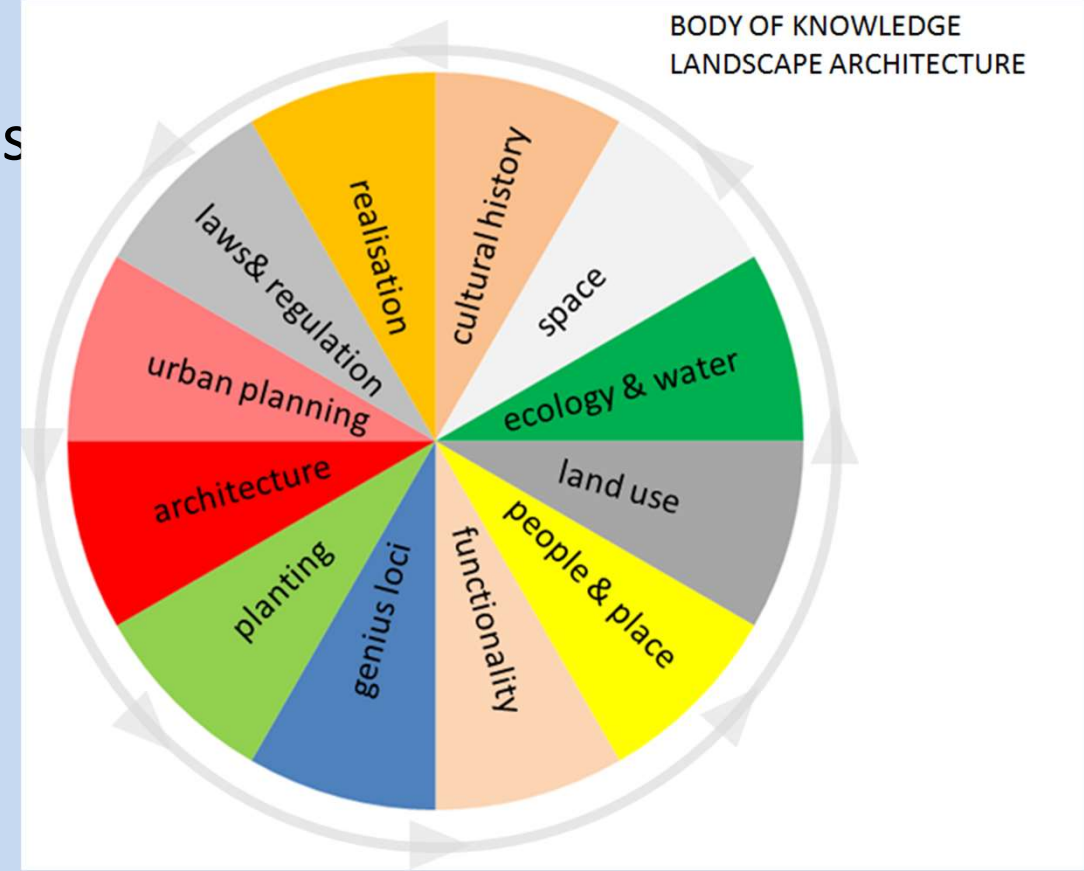
How to meet the criterium of truth value: internal validity, credibility

Does it work within the objective?

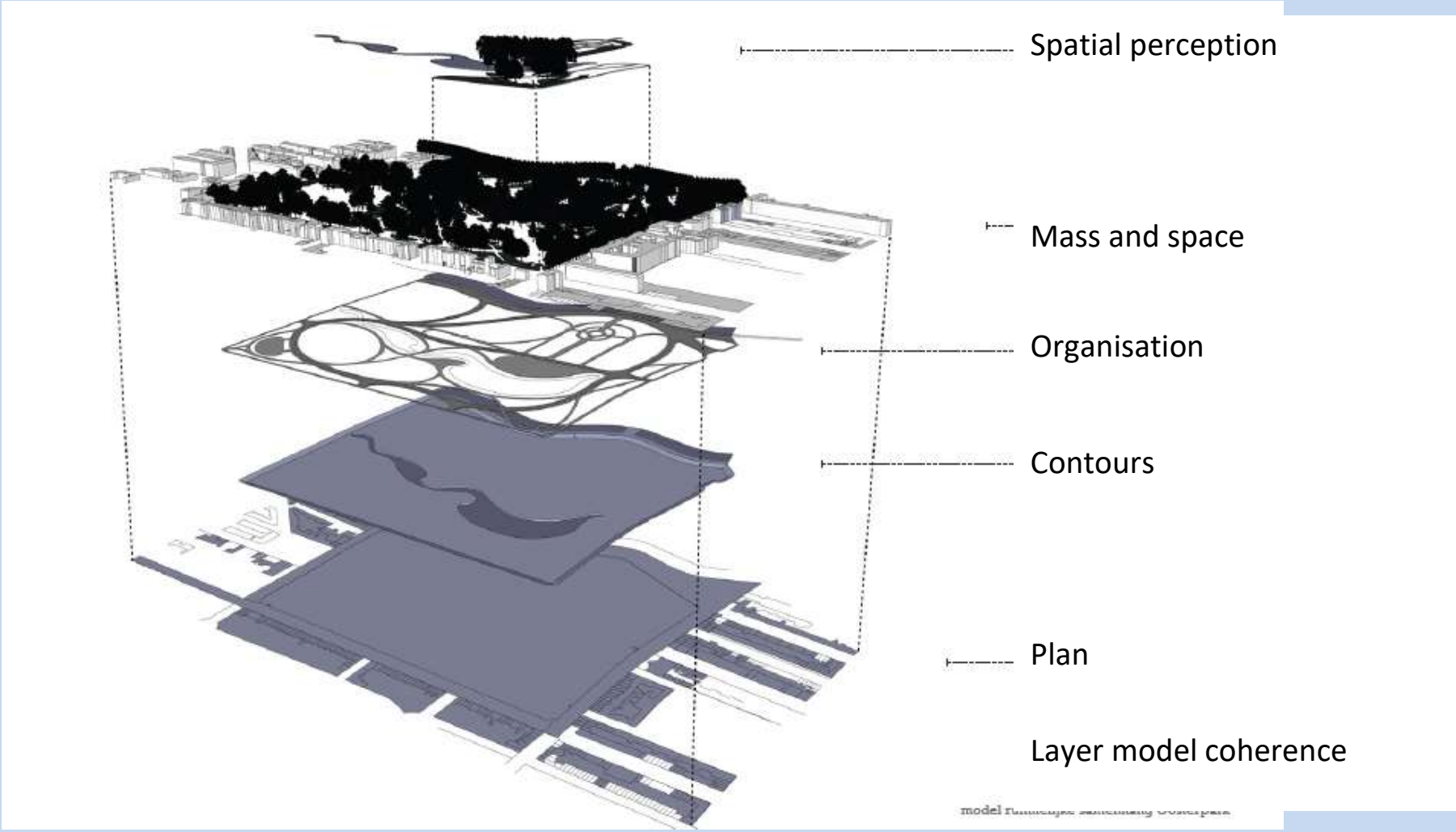
Body of knowledgde of lands architecture

Validation by peers / supervisor

Deliberate production of knowledge: related to a research aim



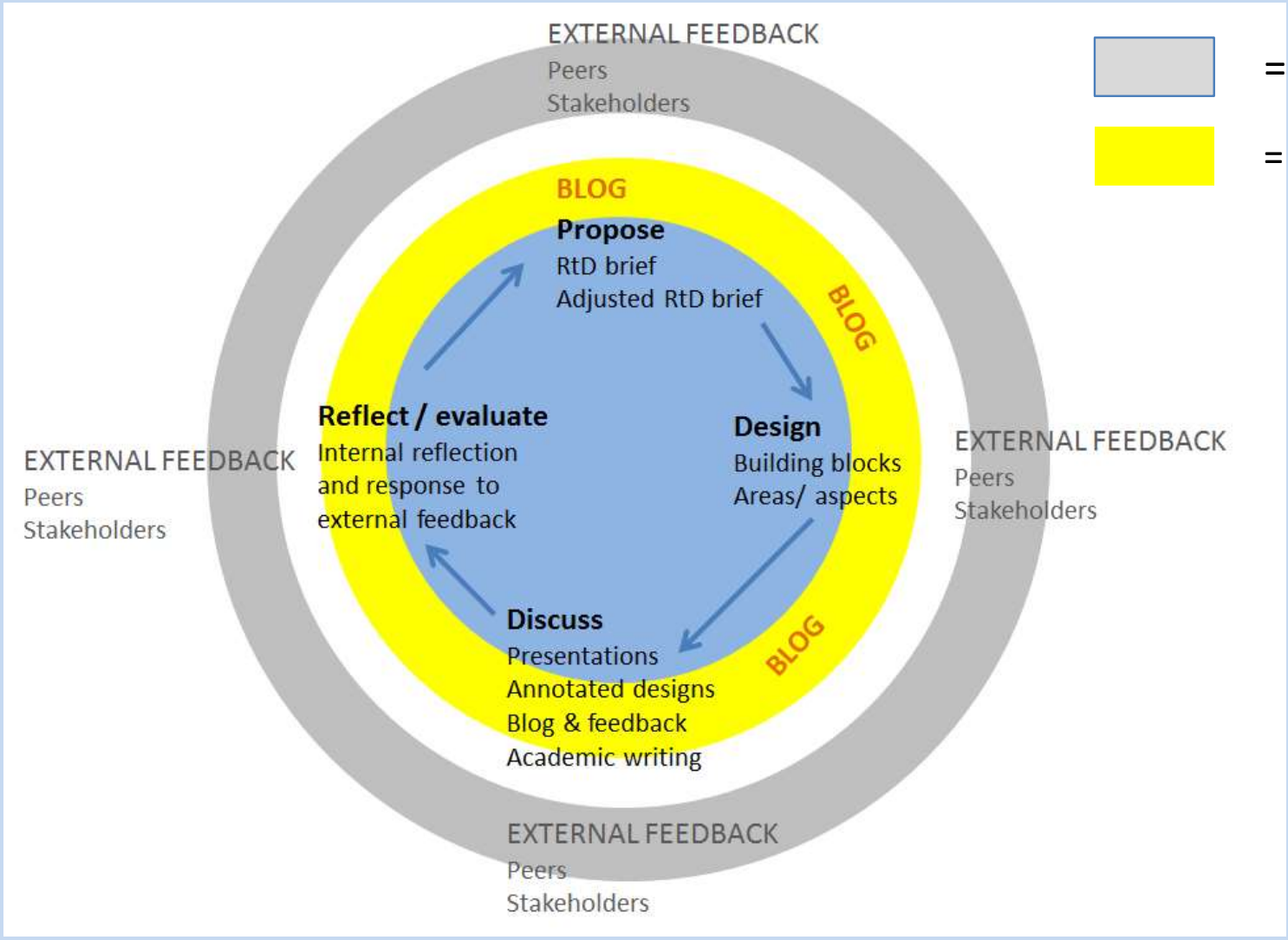
landscape design methods



- Source, Gozeling et al, 2013, student work minor project analysis, VHL

LE:NOTRE Institute
Linking landscape education, research and innovative practice

How to meet the criterium of applicability: external validity



How to meet the criterium of applicability: generalisability

- Principles valid for comparable areas
- Design strategies – for themes, cities, regions
- Design concepts – for specific themes and areas
- Design guidelines – for projects

How to meet the criterium of consistency: relialibility, stability

- Tested by experts, use of protocols

- Solution may vary, but the principles are stable with a logical framework for consistency

Source photo: http://climatelier.net/projects/research/realcool-really-cooling-water-bodies-in-cities/

Transparancy: intersubjective

It is not about truth, it gives a possible solution

The researcher provides insight in the design thinking process & argumentation:

- Process or log books
- Coding and tagging
- Combining sketches and drawings with text

Steps in the research cycle

- Defining the theoretical framework
- Developing a typology of urban food production
- Setting up the local urban food calculator: consumption and production
- Sketching for the typology, references for typologies
- Making preliminary designs for areas
- Going through the research cycle: testing and validating, summarising, developing a scenario and design guidelines.

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Conclusion: overview of the criteria

• truth value	• internal validity	• body of knowledge LA
	• credibility	• validation by peers /supervisor
• applicability	• external validity	• validation by experts and stakeholders
	• generalisability	• principles valid for comparable areas
• consistency	• reliability	• tested by experts, protocols
	• stability	• solution is unique, logical framework for consistency
• transparency	• objectivity	• intersubjective, it is not true but a possible solution

Nijhuis & Bobbink 2012, Yin 2018

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Conclusion: Criteria for RTD

Arts and Humanities Research Council (UK)

- the submitted work must make a recognisable contribution to knowledge and understanding
- it must demonstrate a critical knowledge of the research methods appropriate to the field of study
- it must be subject to an oral examination by appropriate assessors

https://ahrc.ukri.org/funding/research/researchfundingguide/

References

- Brink, Adri van den, et al. (eds). (2016) **Research in Landscape Architecture: methods and methodology**, London, UK: Routledge
- Cross, N. (2007) **Designerly Ways of Knowing**, Basel, CH: Birkhäuser.
- De Jong, T.M. & D.J.M. van der Voordt, eds (2005) **Ways to study and research Urban, Architectural and Technical Design.** Amsterdam, the Netherlands, IOP Press BV.
- Deming, E and S. Swaffield (2012) **Landscape Architecture Research**, John Wiley & Sons, 2011 ISBN: 978-0-470-56417-2 (p 205-222)
- Grocott, L. (2010). **Design Research & Reflective Practice: the facility of Design-oriented research to translate practitioner insights into new understandings of design**, Doctor of Philosophy, School of Architecture and Design, College of Design and Social Context RMIT University. Melbourne, Australia
- Nijhuis, S. & I. Bobbink (2012) **Design-related research in landscape architecture**, in: Journal Design Research, Vol 210, No. 4, 2012 (p 239-257).
- Prominski, M. (2016) **Design guidelines**, in Brink, Adri van den, et al. (eds). (2016) Research in Landscape Architecture: methods and methodology, London: Routledge, p 194.
- Prominski, M. & Seggern, H. (2019) **Design Research for Urban Landscapes**. London, UK: Routledge; (p16, p41).
- Schneidewind, Uwe, Mandy Singer-Brodowski, Karoline Augenstein, and Franziska Stelzer (2016) **Pledge for a Transformative Science: A Conceptual Framework.** Wuppertal Papers 191. Wuppertal, DE: Institute for Climate, Environment and Energy.
- Yin, R.K. (2018) **Case study research: Design and methods**. (6th ed.) London, UK: Sage.

Thank you for your attention

Wishing you success with practice-led knowlegde production by landscape design

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Additional slides with some examples

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

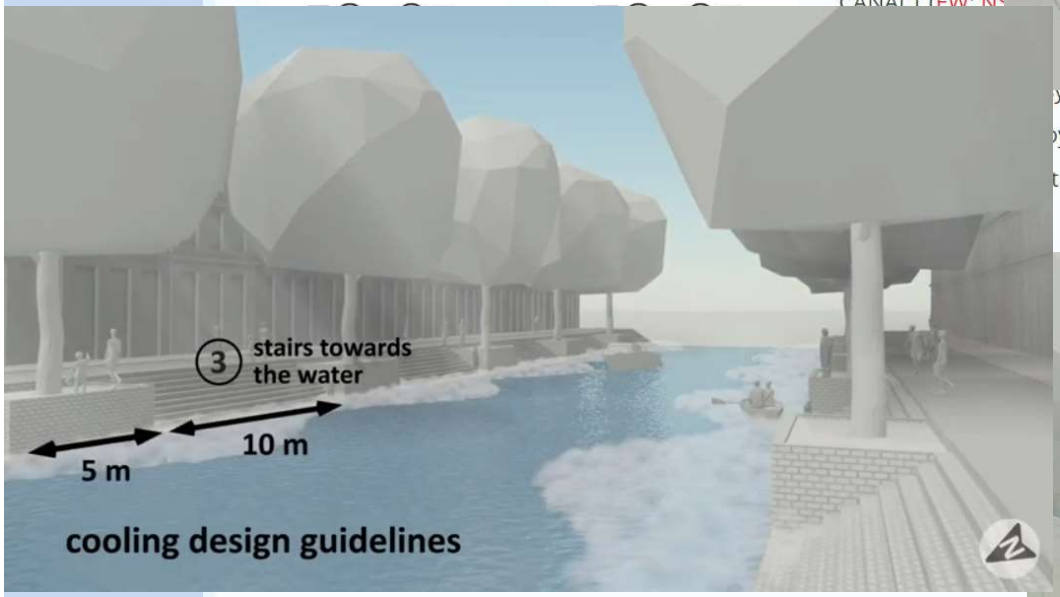
CLIMATELIER

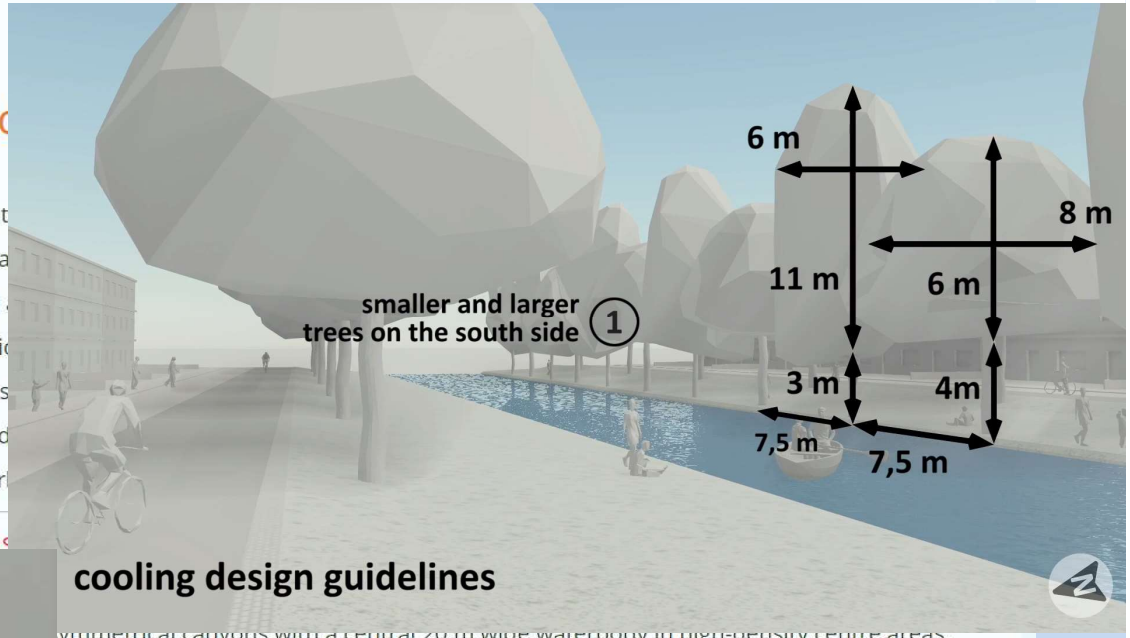
Home | Projects | People | Publications

REALCOOL- Really cooling water boc

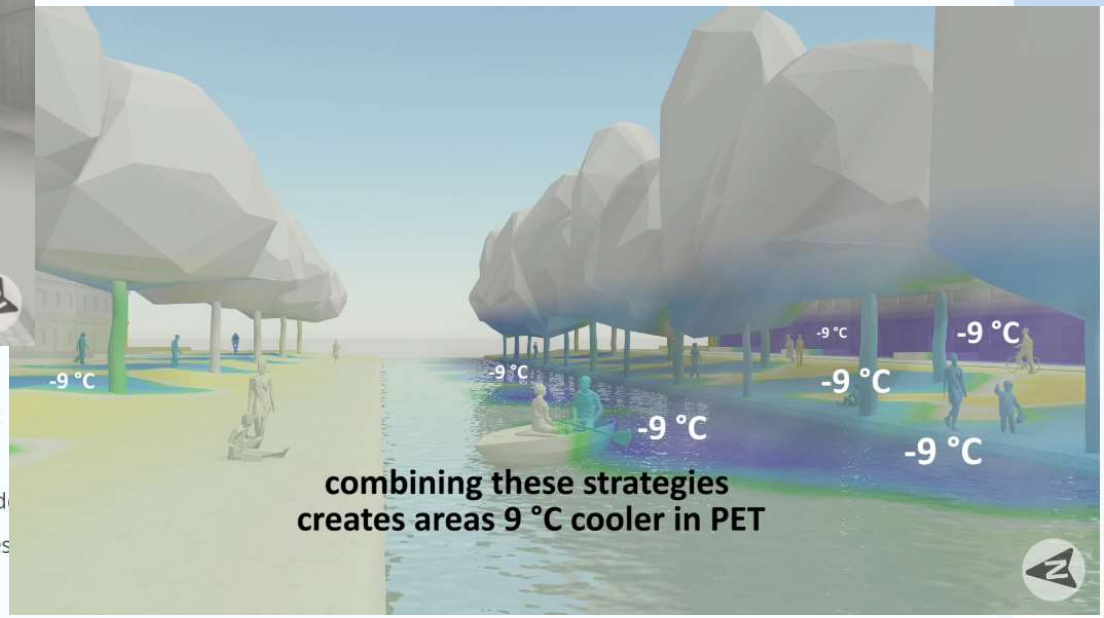
2016-2018, funded by the NWO and Taskforce for Applied Research SIA research programme Research through Design (project number 14589) and the AMS Institute; Project leaders: Sanda Lenzholzer, Jeroen Kluck, team members: João Cortesão, Lisette Klok, Cor Jacobs, Jochen Mülder (Lenné3D), representatives from OKRA, de

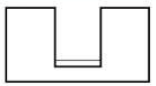
Small urban wat
but recent resea
limited and can
natural ventilati
combine these s
project explored
around small ur

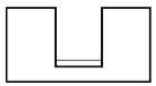




ymmetrical canyons with a central 20 m wide waterbody in high-density centre areas.
y high quays with lined-up trees. Predominant uses in water: recreational and
traffic; boat houses. Predominant surrounding uses: motorised and pedestrian traffic;




CANAL 3
EW ORIENTATION


CANAL 3
NS ORIENTATION

CANAL3 (EW; NS)

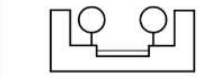
Average 10 m wid
Predominant uses
commercial.

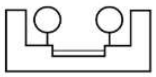
http://climatelier.net/projects/research/realcool-really-cooling-water-bodies-in-cities/

REALCOOL- Really cooling water bodies in cities

2016-2018, funded by the NWO and Taskforce for Applied Research SIA research programme Research through Design (project number 14589) and the AMS Institute; Project leaders: Sanda Lenzholzer, Jeroen Kluck, team members: João Cortesão, Lisette Klok, Cor Jacobs, Jochen Mülder (Lenné3D), representatives from OKRA, de

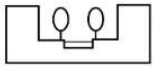
Small urban water bodies, such as ponds or canals, are commonly believed to solve urban heat problems but recent research shows that the cooling effect of large urban water bodies on hot summer days is quite limited and can actually induce a night-time warming effect. However, shading, vaporising water and proper natural ventilation might help to keep urban water bodies and their surroundings cooler. But how to combine these strategies in urban design? The 'Really cooling water bodies in cities' (REALCOOL) research project explored the most effective combinations of shading, water vaporisation and natural ventilation around small urban water bodies. Optimal cooling strategies were developed for common urban water





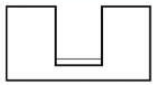
CANAL1 (EW; NS)

Average 40 m wide symmetrical canyons with a central 20 m wide waterbody in high-density centre areas. Waterbody flanked by high quays with lined-up trees. Predominant uses in water: recreational and transportation boat traffic; boat houses. Predominant surrounding uses: motorised and pedestrian traffic; mix-use.



CANAL2 (EW; NS)

Average 25 m wide symmetrical canyons with a central 9 m wide waterbody in high-density centre areas. Waterbody flanked by low quays with lined-up trees. Predominant uses in water: recreational boat traffic. Predominant surrounding uses: motorised and pedestrian traffic; mix-use.



CANAL3 (EW; NS)

Average 10 m wide waterbodies in high-density centre areas. Waterbody flanked directly by buildings. Predominant uses in water: recreational boat traffic. Predominant surrounding uses: residential and/or commercial.

Providing representations that inform reviewers

Source photo: http://climatelier.net/projects/research/realcool-really-cooling-water-bodies-in-cities/

Aspects of landscape design thinking

Project-driven	*Situated thinking*	Reflecting upon previous experience and applying relevant precedents with acknowledging and negotiating the unique considerations particular to the legal, political, cultural, functional, economic and ecological contexts determined by each project brief.
	Integrated thinking	Synthesising competing agencies, dynamic constraints and conflicting agendas when working with a diversity of actors, deploying a range of methods and operating across various professional domains.
Form-driven	*Visual thinking*	To generate, craft, propose, and interpret rhetorical and representational form making.
	Material thinking	To assess, speculate and produce properties of planting and hard landscaping with respect to the aesthetic, functional, and environmental implications of design decisions.
Ideas-driven	*Conceptual thinking*	To think in a generative rather than in a reductive manner, allowing a poetic, speculative approach that supports imaginative, unexpected propositions.
	Strategic thinking	To assess a situation and project forward enabling the problem to be framed and defined as a consequence of potential solutions being proposed.

JdV1

PROGRAMME SCHEME RESEARCH THROUGH DESIGN for LOCAL FOOD PRODUCTION

PREPARING /COLLECTING /DEFINING

FRAMING THE RESEARCH DOMAIN

Problem field local food

RESEARCH QUESTIONS LOCAL FOOD

RESEARCH QUESTIONS RESEARCH BY DESIGN METHOD

Problem field methods

LITERATURE AND REFERENCES:
- Typology of urban agriculture
- Production and consumption data
- Reference projects
- Research methods & Design methods
- Design values and expertise

WRITING THE RtD BRIEFS WITH RESEARCH TASKS

DESIGNING

EXPLORATIVE DESIGN OF AN AREA:
- Framing the research programme, adapting research questions, adjusting the design briefs

DESIGNING OF THE TYPOLOGIES:
- Defining the structure, setting the framework, exploring the variety, testing the composition of crops/products

DESIGNING OF THE CASE STUDY AREAS:
- Elderhof, Presikhaaf, etcetera

DESIGNING OF ASPECTS OR ELEMENTS:
- E.g. Edible green amenities, connections, and what else comes up in the case study

DISCUSSING / WRITING

BLOG

Project: situation/context; integration
Form: visual, material, functional, ecological
Ideas: concepts, strategies

REFLECTION
external/internal

1. Design process
2. Design results
3. Research strategy, methods,
4. Implication for studio-based research by design

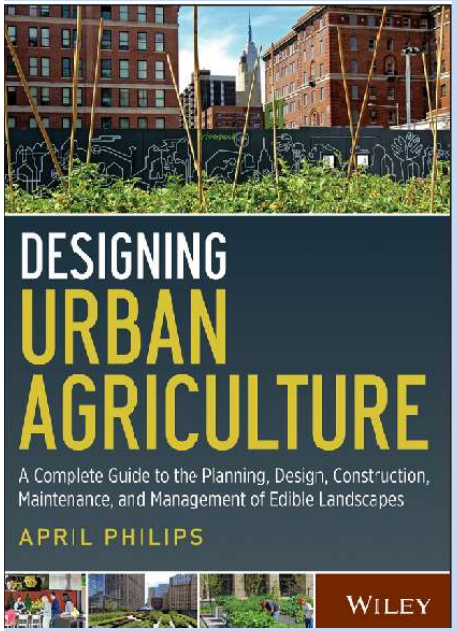
CONCLUDING:
- **Local food production**
- **Research methods**
- **Studio based research through design**

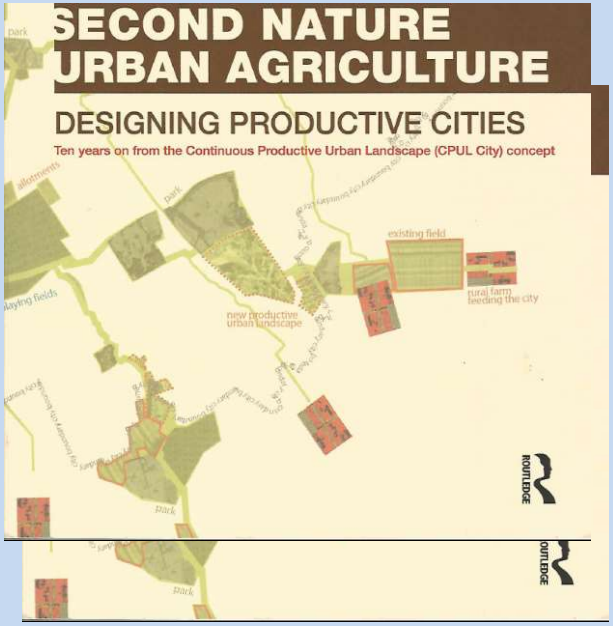
JdV1

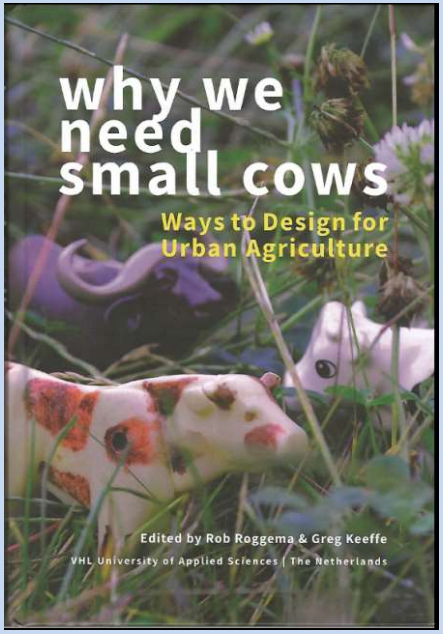
Er moet nog in:
Back talk o the design
Internal reflection
External feedback

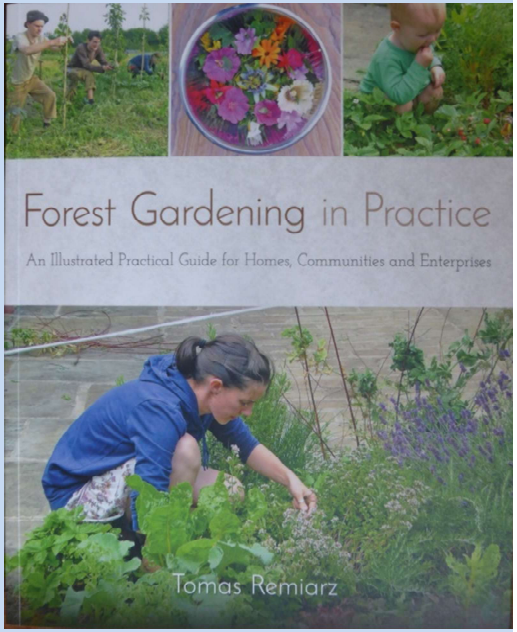
Jeroen de Vries; 8-8-2016

Key publications urban agriculture









Philips

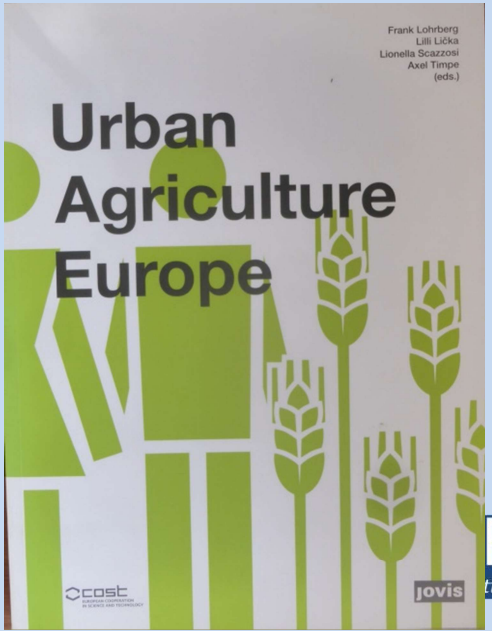
Bohn &Viljoen

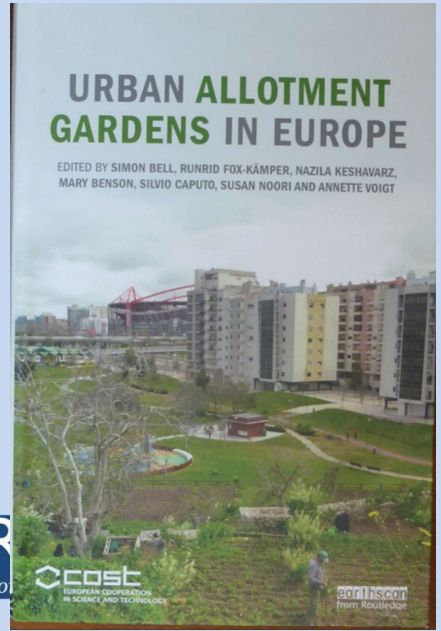
Roggema&Keefe

Remiarz

COST Action Urban Agriculture

COST Action Allotment Gardens





Questions for production: LUFC

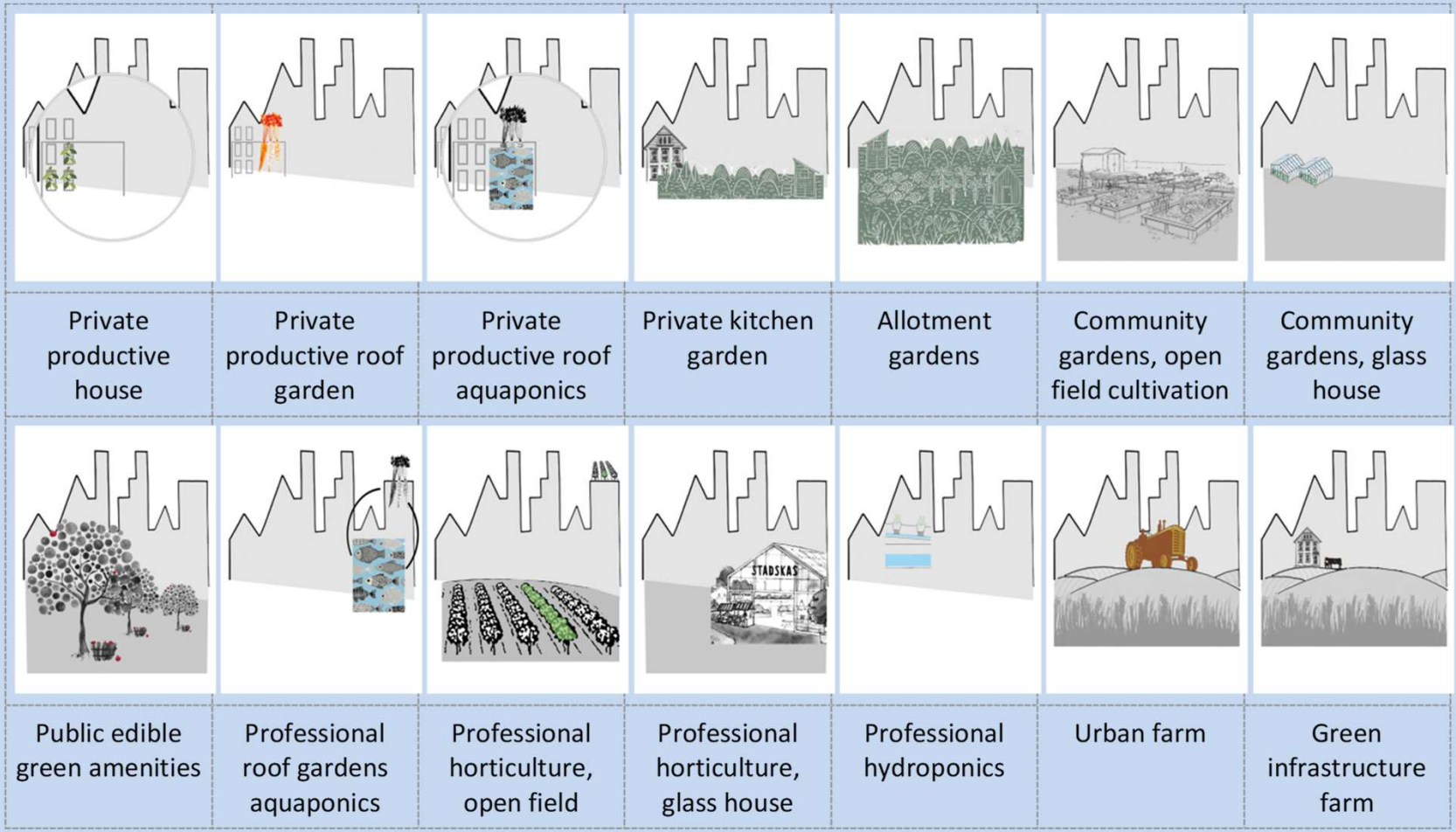
1. Which types of urban agriculture elements can be planned? – key literature
2. What kind of crops and animal produce can these provide? – professional assessment, general percentage of crop types, reference projects
3. What is the average yield of the crops and produce?

   - Literature cbs/bionext/louisbolk institute

4. What surface of each types of urban agriculture can be programmed in the area? – reference projects, GIS-analysis
5. What is the total potential production of local food per year in the area? – Local Urban Food Calculator **(LUFC – Excel file)**

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Spatial and functional types



Philips (2013), Bohn & Viljoen (2014), Roggema & Keeffe (2014) ,
de Graaf (2012), Roggema (2015), Hommel, Streng & Verheij (2014),
Kors & Floor (2014)

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Spatial and functional types

Type of urban agriculture	Organisation	Approximate production area per unit	Main crops and animal produce
Productive house (indoor) private	Private	10 to 20 m^2 per house	mostly vegetables, herbs and fruits
Productive roof (flat) private	Private	20 to 50 m^2 per house	mostly vegetables, herbs and fruits
Productive roof (flat), aquaponics	Private	20 to 50 m^2 per house	vegetables and fish
Kitchen gardens	Private	50 to 300 m^2 per house	potatoes, vegetables, herbs and fruits
Allotment gardens	Private	complex 5,000 to 20,000 m^2	potatoes, vegetables, herbs and fruits
Community gardens, conventional	Collective	400 to 10,000 m m^2	potatoes, vegetables, herbs and fruits
Community gardens, glass house	Collective	200 to 5,000 m m^2	vegetables, herbs and fruits
Edible green amenities	Public	400 to 10,000 m m^2	fruits, nuts
Roofgardens aquaponics	Professional	500 to 1,500 m m^2	vegetables and fish
Professional horticulture, conventional	Professional	5,000 to 40,000 m m^2	potatoes, vegetables, herbs and fruits
Professional horticulture, glass house	Professional	5,000 to 10,000 m m^2	vegetables, herbs and fruits
Professional hydroponics	Professional	5,000 to 10,000 m m^2	vegetables, herbs and fruits
Urban farm	Professional	300,000 to 800,000 m^2	combination of meat, potatoes, vegetables
Green infrastructure farm	Professional	300,000 to 1,200,000 m^2	combination of meat, wheat, vegetables

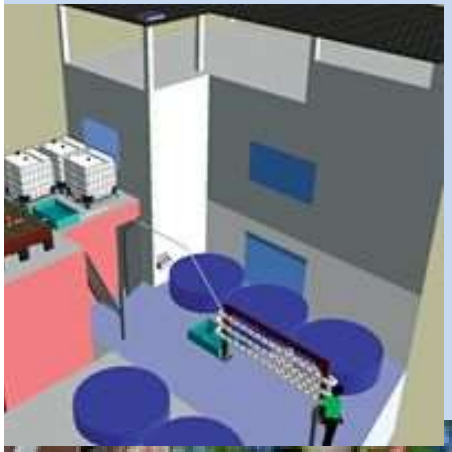
Spatial and functional types

2. Private roof garden

RE Institute
ion, research and innovative practice

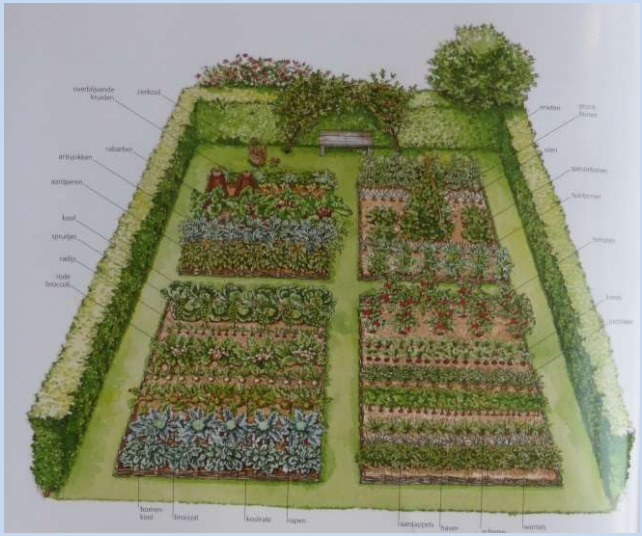
Spatial and functional types

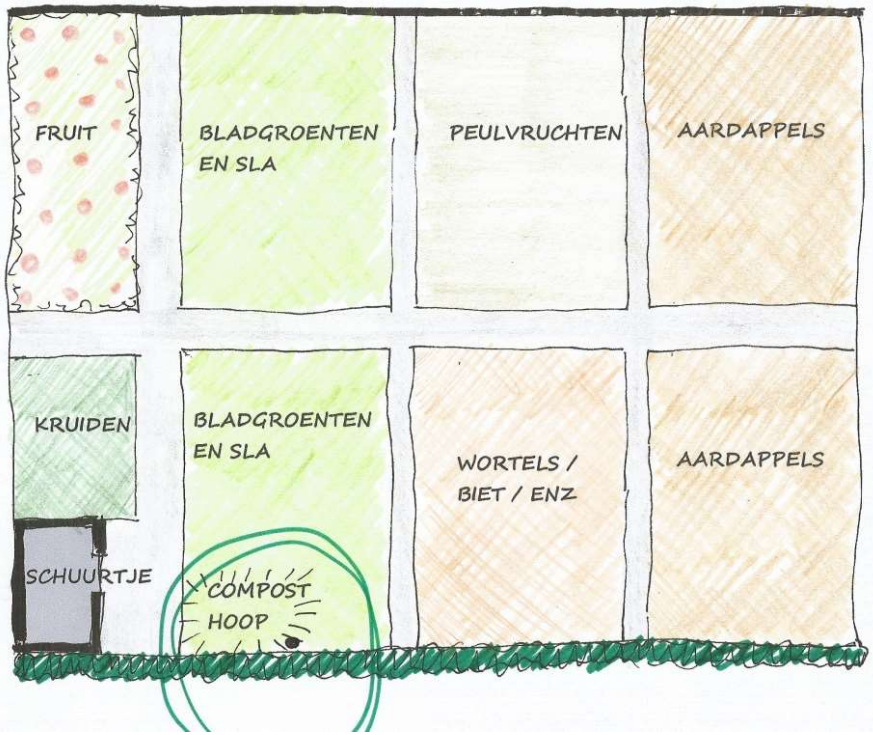
3. Private roof hydroponics



Spatial and functional types

4. private kitchen garden





Uitgangspunten:
- *Biologisch tuinieren*
- *Maximale oppervlakte voedingsgewassen, geen bloemen*
- *Driejarige vruchtwisseling in blokken*

Bron: Schilthuis, 2016

Data voor opbrengsten:
Vries, J. de (2016) Local Urban Food Calculator

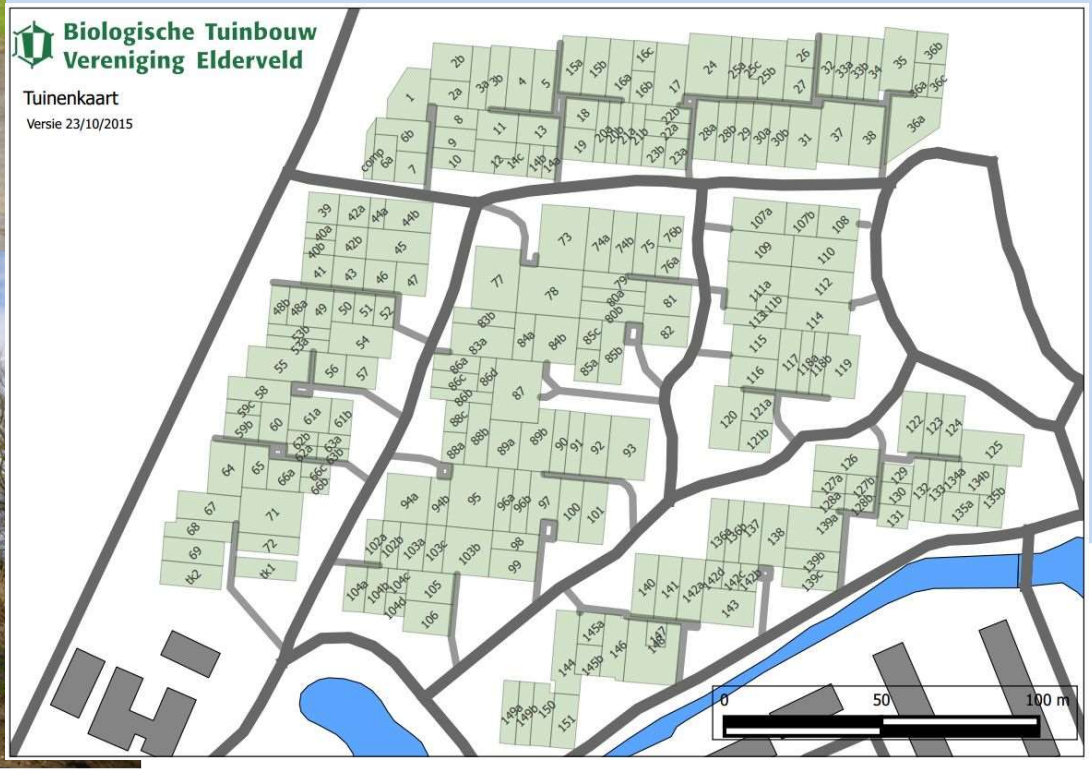
Keuzes:
- *handmatig bewerkt*
- *vast vak met kruiden en kleinfruit bij ingang*
- *hoofdpaden breder voor kruiwagen*
- *traditioneel dieet - veel aardappelen*
- *relatief veel kruiden*

Opbrengsten in kg per jaar

groenten	*510 kg*
peulvruchten	*48 kg*
aardappels	*203 kg*
fruit	*42 kg*
kruiden	*18 kg*

Spatial and functional types

5. Allotment gardens

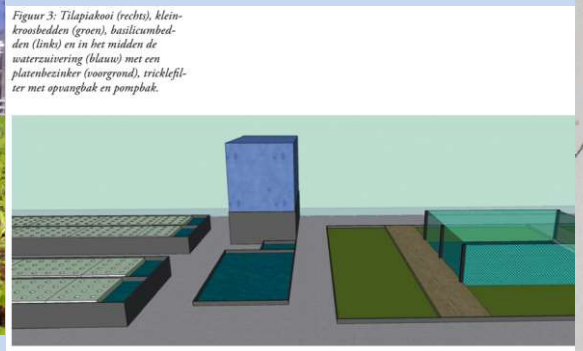


Typology of sust local food production 10
Professional horticulture, open field

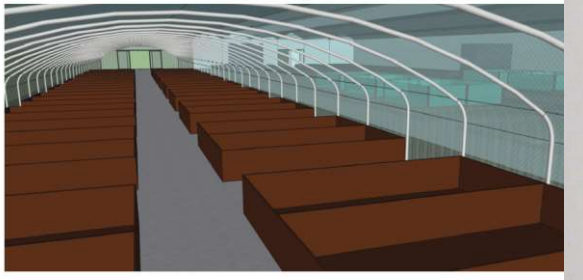
Typology of sust local food production, 12 Orchards and fruit picking

Spatial and functional types

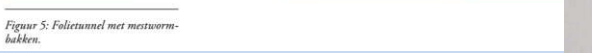
14.*professional hydroponics – fish farm*



Figuur 3: Tilapiakooi (rechts), kleinkroosbedden (groen), basilicumbedden (links) en in het midden de waterzuivering (blauw) met een platenbezinker (voorgrond), tricklefilter met opvangbak en pompbak.

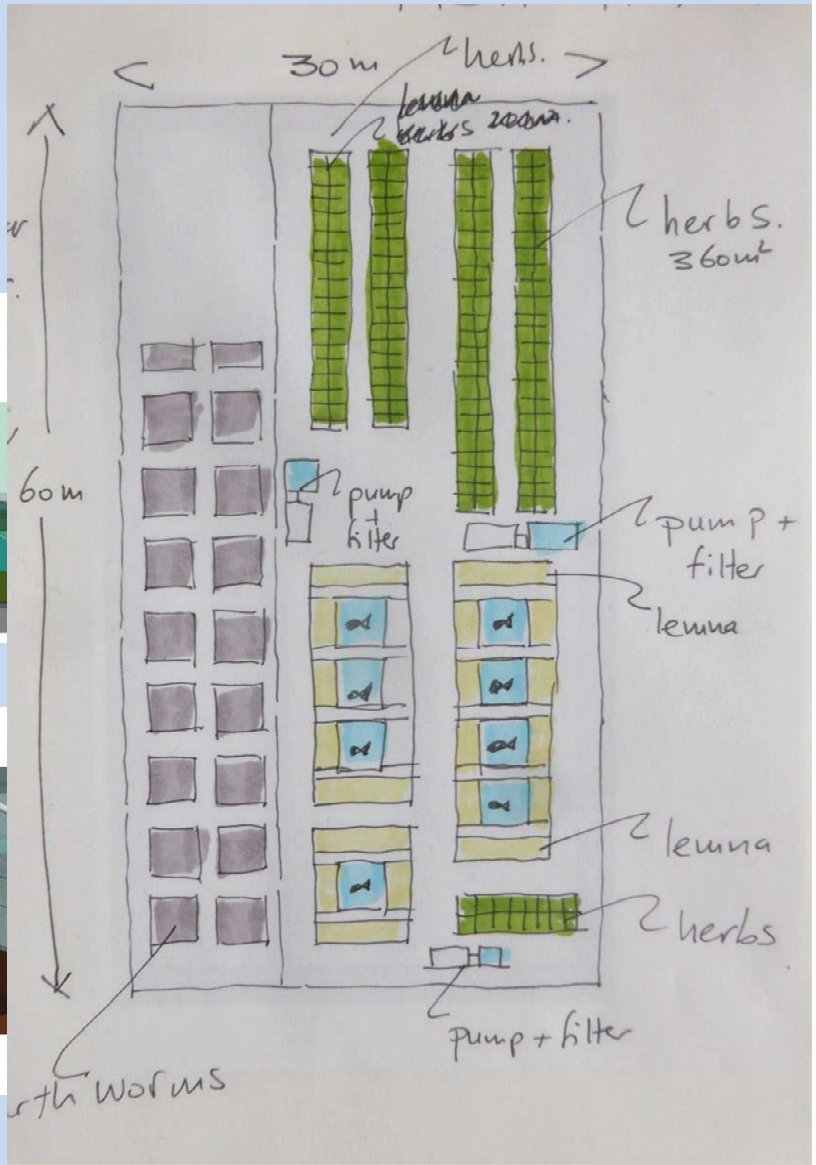


Figuur 4: Waterzuivering met basilicumbedden op de achtergrond.



Figuur 5: Folietunnel met mestwormbakken.

Nutrihof



Spatial and functional types

16. *Urban farm*

Spatial and functional types
17 *Green infrastructure farm*

Average division of crops

PERCENTAGE OF SURFACE ALLOCATED FOR THE PRODUCTION OF TYPES OF FOOD														
Type of production area	Potatoes	Vegetables (no pulse)	Pulse	Fruits	Herbs	Grain	Beef	Porc	Poultry	Fish	Cheese	Dairy (milk,yoghurt)	Eggs	Acces& Facilities
Productive house (indoor) private		70%	10%		20%									0%
Productive roof (flat) private		25%	5%	5%	5%									60%
Orchard				80%										20%
Kitchen gardens	20%	35%	10%	20%	5%									10%
Allotment gardens	20%	30%	10%	20%	5%									15%
Community gardens, conventional	20%	40%	5%	15%	5%								5%	10%
Community gardens, green house		55%	5%	25%	5%									10%
Edible green amenities				10%										90%
Roofgardens aquaponics, professional		25%	5%							30%				40%
Professional horticulture, conventional	20%	40%	5%	20%	5%									10%
Professional horticulture, glass house		50%	5%	30%	5%									10%
Professional hydroponics (with fish)					20%					2,0%				78%
Urban farm	15%			5%		20%	10%	5%	5%		5%	20%	10%	5%
Green infrastructure farm						10%	20%	15%	5%		5%	30%	5%	5%

LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Yields per type of crop

organic production in NL

Overview of yields and produce of organic crops and animal produce per hectare and m2			
Diet category	Crop or product	kg/m2	Comments
		Organic	
Potatoes		2,9	the same for all spatial types
Grain		0,7	the same for all spatial types
Pulse		1,5	the same for all spatial types
Vegetables open field	OUTDOOR	5	the same for all spatial types
Vegetable greenhouse	GREEN HOUSE	30	the same for all spatial types
Fruits		4	farms, orchards, edible green
Fruits		2	roof gardens, kitchen gardens
Fruits		8	greenhouses, tunnels (professional horticulture)
Herbs		1,5	open field cultivation
Beef	Beef	0,07	pasture in urban farm or green infra farm
Pork	Pork	0,57	urban farm or green infra farm, outdoor
Poultry	Poultry	0,11	urban farm combination indoor/outdoor incl corn fodder
Fish	Fish	5,56	organic hydroponics, with lemna minor, worms, tilapia
Cheese	Cheese	0,15	1/10 of milk production per ha
Dairy	Dairy (milk, yoghurt,etc)	1,50	2 cows per hectare, each 7500 litres (kg) per year
Eggs	Eggs	0,34	urban farm combination indoor/outdoor incl corn fodder

The references of all yields / produce can be found in the LUFC

Diet (PBL)

Conversion diet kilos per year

	Type of food	grams per person per day	kilos per person per year
1	Potatoes	88	32
2	Grain (pasta and bread)	196	72
3	Vegetables (excluding pulse)	145	53
4	Pulse	20	7
5	Fruits	40	15
6	Herbs	10	4
7	Beef	17	6
8	Pork	57	21
9	Poultry	20	7
10	Fish	12	4
11	Cheese	20	7
12	Dairy (excl cheese)	285	104
13	Eggs	11	4

Excluded are: rice, beverages, sauces, sugar, sweets, other fats than butter.

LENOTRE Institute
Linking landscape education, research and innovative practice

What surface of each types of UA can be programmed in the area?

Available space for:

1. Private gardens – kitchen gardens
2. Flat roofs private
3. Flat roofs industry / communal
4. Public green space
5. Unbuilt terrain – private, temporary, local authorities
6. Agricultural areas

First test cases: 2 areas

Presikhaaf

Modernism

Apartment buildings

Elderhof

1980's

Terraced houses

Small gardens

presikhaaf

First test cases: 2 areas

flat roofs

larger spaces

fine maze structure of private gardens

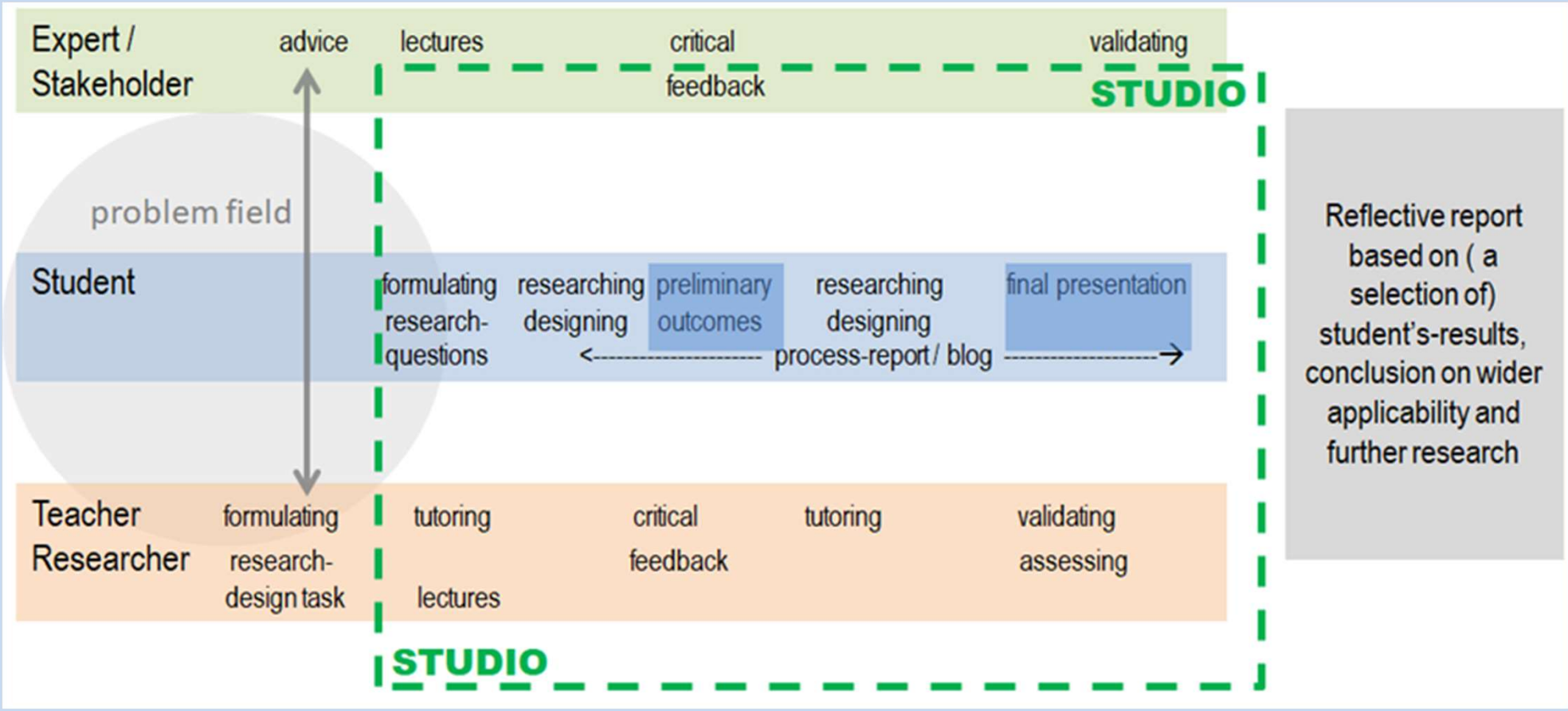
park area with allotment gardens. .

JdV

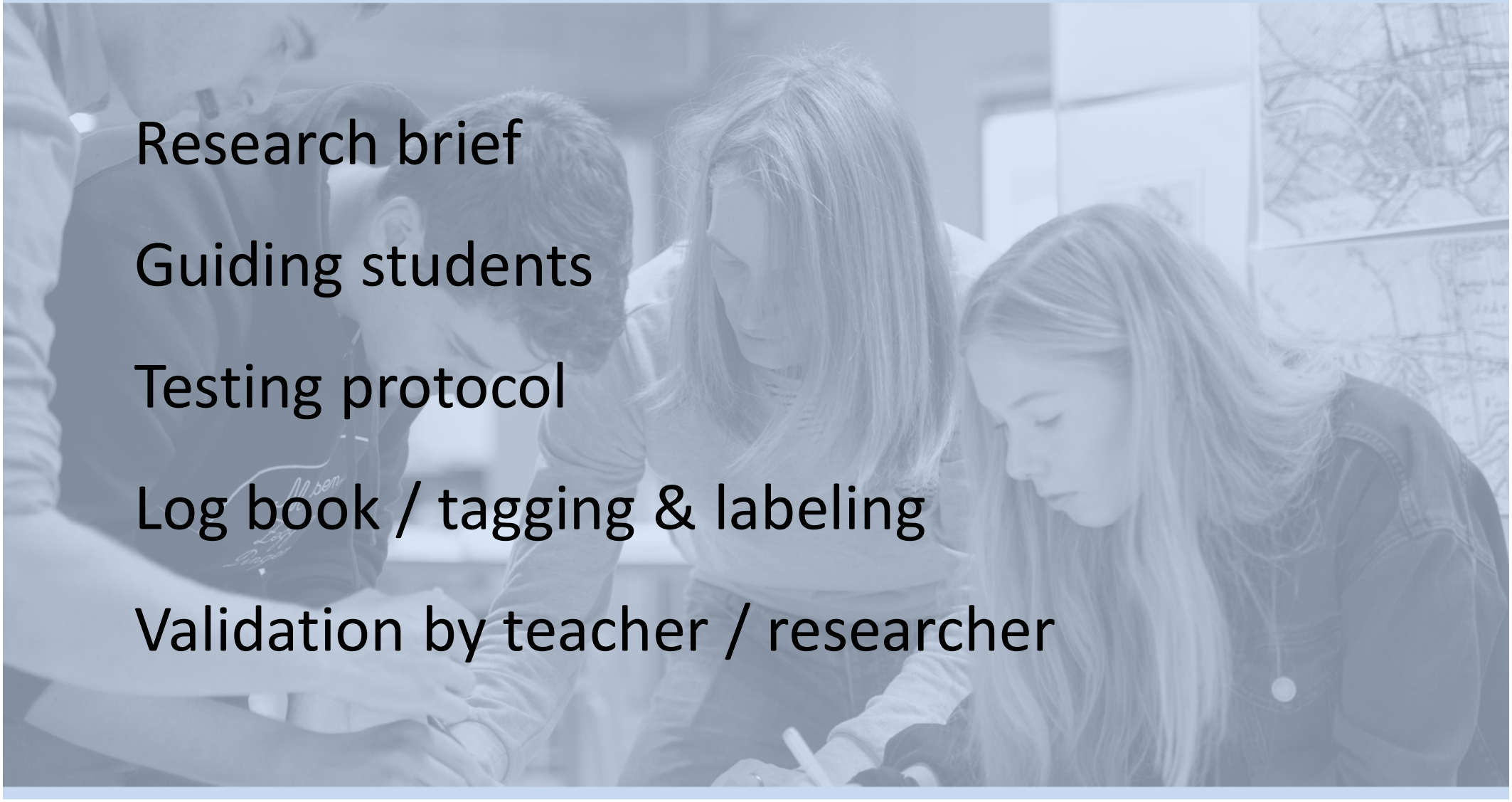
Applying RTD in design studios

Photo: Ben ter Mull, HVHL University of Applied Sciences

Integrating RTD in a landscape studio



What is different from a regular studio?



Research brief

Guiding students

Testing protocol

Log book / tagging & labeling

Validation by teacher / researcher

Formulating structured RtD briefs

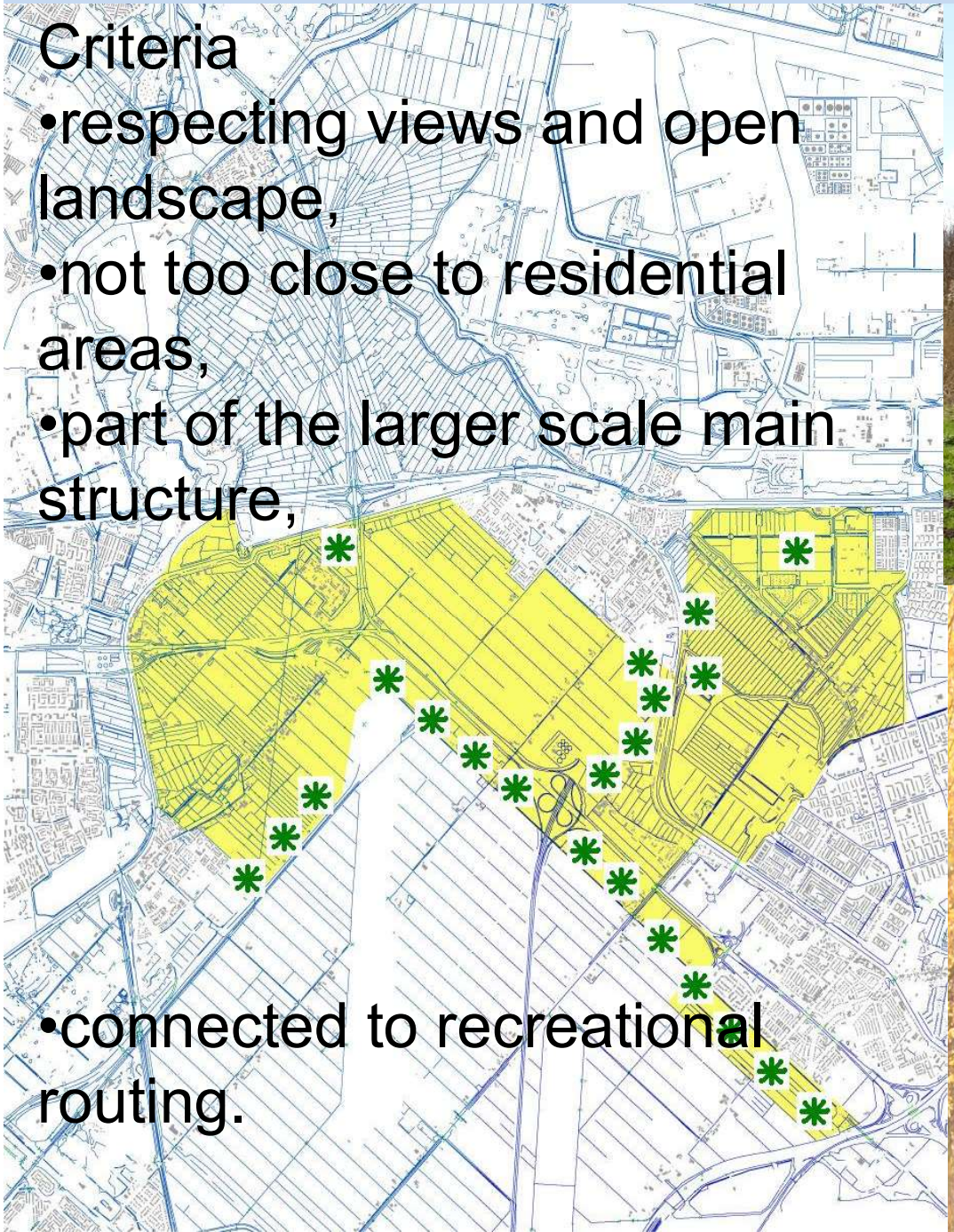
a. Research context
b. Design task
c. Starting points / scenario
d. Research questions
e. Proposed research activities
f. Results:
   - Annotated design drawings
   - Blog on internal dialogue of the designer
   - Reflection paper
g. References

Transparancy: labelling the internal dialogue of the designer

1. Framework of RtD Brief / Scenario
2. Strategy
3. Concept
4. Context
    a. Social (liveability, perception, leisure)
    b. Legal / regulations
    c. Use / functional
    d. Ecological (water, nature, environment)
    e. Economic (production, efficiency)
5. Situation
    a. Integration in the site
    b. Perception
    c. Materials
6. Design process

Ecological Infrastructure Haarlemmermeer

Criteria
- respecting views and open landscape,
- not too close to residential areas,
- part of the larger scale main structure,
- connected to recreational routing.

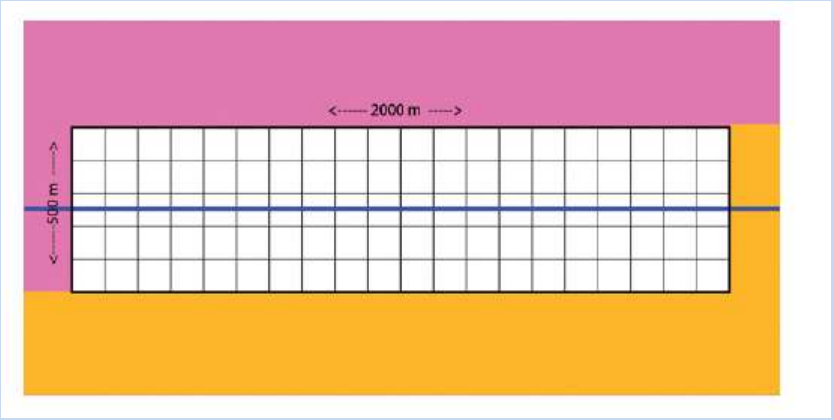


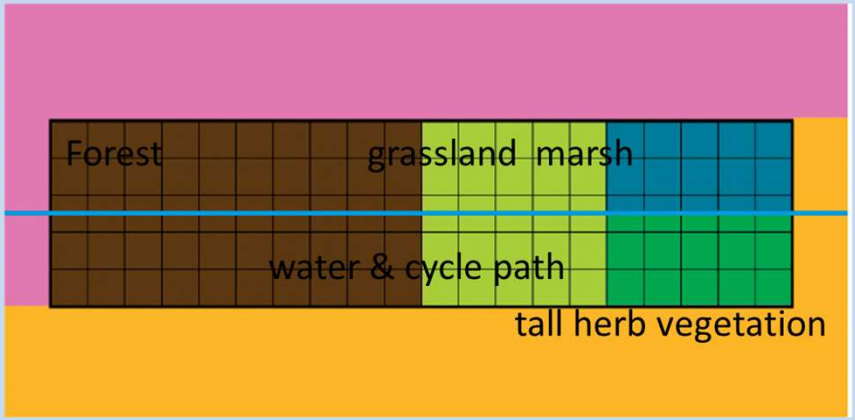
Method research scale and design

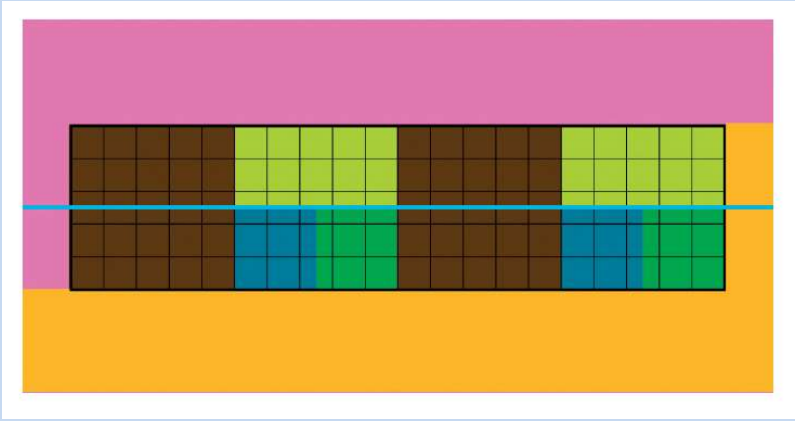
- Definition of validity, definition of biodiversity for case study
- Selecting a exemplary zone
- Making spatial models
  - Patches / partial habitats (forest, tall herb vegetation, grassland, open water)
  - Surface areas according to defined semi-natural landscape in Manual for Nature Targets (Handboek Natuurdoeltypen)
  - Minimum size of one partial habitat = 0.5 ha.
- Selecting evualation species (indicators present in region)
- Evaluation interviews with experts:
  - birds (R. Kwak, Alterra), butterflies (K.Veling, Vlinderstichting), mammals (B.Wansink, Zoogdiervereniging VZZ) and reptiles and amphibians (F.Huenen RavonVZZ)
- Adaptation of the optimal model

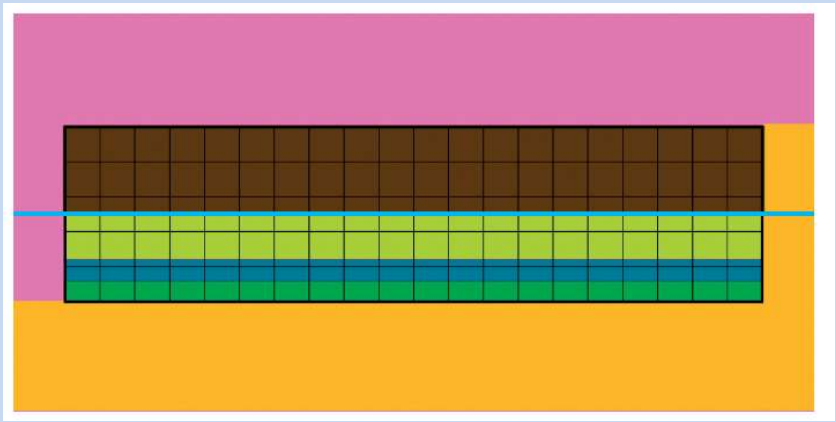
LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

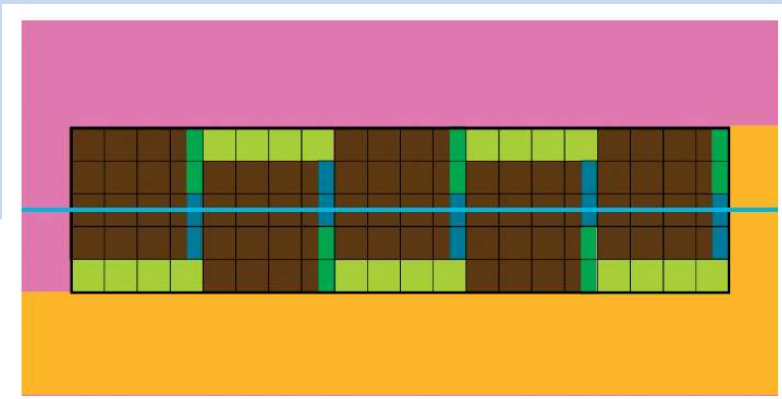
Various spatial models for the ecological zone











LE:NOTRE *Institute*
Linking landscape education, research and innovative practice

Result a concept for the patchwork of habitats

- Strip model is the optimal model
- Sequence of partial habitats should be forest, water, marsh, tall herb, grass land
- South orientation and form of fringes that provide shelter (wind)
- Water as a barrier for recreation disturbance