

Business Model pilot testing

Validating our framework, demonstrating results

Maíra Finizola e Silva, University of Antwerp



Testing of the Business Model concept



ACROSS THE 2 SEAS

Role of pilot testing









Is the conceptual idea valid?

Are the valuation methods appropriate? Are the BM results realistic?

How can results be interpreted?

How can we showcase the results?



Ecosystem services included in Business Model





Oversight of NSCiti2S research

- Collaboration with Master students
- General research question: which benefits can be created by implementing more green infrastructure ?



RE SMART CITIE

Oversight of NSCiti2S research

	WATER RETENTION & INFILTRATION	MICRO CLIMATE REGULATION	CARBON SEQUESTATION	HABITAT FOR BIODIVERSITY	EDUCATION & AWARENESS	PHYSICAL & MENTAL HEALTH	SOCIAL COHESION
ANTWERP ZUIDRAND							
BRUGES							
KAPELLE							
THE HAGUE							
SOUTHEND							

Cambridge & City of Lille pilots will feed into further testing & refinement of the Business Model



2 Seas Mers Zeeën

	WATER RETENTION & INFILTRATION	MICRO CLIMATE REGULATION	CARBON SEQUESTATION	HABITAT FOR BIODIVERSITY	EDUCATION & AWARENESS	PHYSICAL & MENTAL HEALTH	SOCIAL COHESION
ANTWERP ZUIDRAND						V	
BRUGES							
KAPELLE							
THE HAGUE							
SOUTHEND							





Rainwater flows towards our sewage system (costs)



Green elements have the capacity to absorb and infiltrate precipitation

- Reduced stormwater run-off leads to reduced flood risks
- Replenishing groundwater levels

Captured water can be re-used



Method

- Overview different types of green infrastructure & amount
- Retention coefficient, different types of GI have different retention coefficients
- Besides infiltration, water retention in e.g. water buffers





Grey scenario / Before

The Hague





Green scenario / After

10.732 m3/year (55% of the total amount of rainfall on project area) 11.256 m3/year (58% of the total amount of rainfall on project area)





A REAL PROPERTY AND A REAL

The Hague

Grey scenario / Before

No Urban Water Buffer

Green scenario / After

Urban Water Buffer of 35.000 m³

- 8.133 m³/year runoff water from inside the park (which was not absorbed by the vegetation)
- 26.867 m³/year additional capacity to store runoff water from adjacent roofs and streets



The Hague

Difference between Grey and Green scenario

Capacity for +- 35.500m³ avoided runoff each year*

= 14,20 Olympic swimming pools each year





<u>Antwerp</u> Zuidrand



Grey scenario / Before

25.423 m³/year (94% of the total amount of rainfall on project area)



Green scenario / After

23.828 m³/year (88% of the total amount of rainfall on project area) + 10.303 m³/year (unabsorbed precipitation from the park and surrounding streets)

Antwerp Zuidrand

Difference between Grey and Green scenario

8.708 m³ avoided runoff each year

= 3,5 Olympic swimming pools each year





Micro climate regulation

	WATER RETENTION & INFILTRATION	MICRO CLIMATE REGULATION	CARBON SEQUESTATION	HABITAT FOR BIODIVERSITY	EDUCATION & AWARENESS	PHYSICAL & MENTAL HEALTH	SOCIAL COHESION
ANTWERP ZUIDRAND			V				
BRUGES			V				
KAPELLE	V		V				
THE HAGUE	V						
SOUTHEND							













Micro climate regulation

Method (Ziter et al. 2019)

- Temperature anomaly during a hot summer day
- Comparing a scenario with and without green
 infrastructure

URBAN HEAT ISLAND PROFILE









Grey scenario / Before

-0,15°C

Kapelle



Green scenario / After

-0,24°C



Micro climate regulation

Kapelle







Southend





Micro climate regulation



Grey scenario / Before

 $-0^{\circ}C$

Southend



Green scenario / After

-0,66°C





Southend Difference between Grey and Green scenario





	WATER RETENTION & INFILTRATION	MICRO CLIMATE REGULATION	CARBON SEQUESTATION	HABITAT FOR BIODIVERSITY	EDUCATION & AWARENESS	PHYSICAL & MENTAL HEALTH	SOCIAL COHESION
ANTWERP ZUIDRAND	V		V	V			
BRUGES	V						
KAPELLE							
THE HAGUE					V		
SOUTHEND							



- Carbon sequestration = atmospheric carbon dioxide taken up plants through photosynthesis
- Sequestrated carbon dioxide is stored as carbon in biomass
- More green infrastructure = more carbon sequestration



Method

- Aboveground carbon sequestration
 - Focus on woody vegetation
 - Tree growth estimations
 - Tree/shrub species & size: field

March Managements Man Arch March Mar

- Belowground
 - % non-sealed soil
 - Soil sampling: bulk density and carbon concentration up to 30 cm depth
 - literature-based estimation of carbon sequestration rates



Grey scenario / Before

223 ton C (2060)

Kapelle



Green scenario / After

260 ton C (2060)



Kapelle

Grey scenario / Before

Green scenario / After



Kapelle

Difference between Grey and Green scenario

135 ton C02 (2060)

= emission of 38,5 households

= emission of 20% of the households in the project area is sequestered







Grey scenario / Before

580 ton C (2060)

Bruges



Green scenario / After

450 ton C (2060)





2 Seas Mers Zeeën

	WATER RETENTION & INFILTRATION	MICRO CLIMATE REGULATION	CARBON SEQUESTATION	HABITAT FOR BIODIVERSITY	EDUCATION & AWARENESS	PHYSICAL & MENTAL HEALTH	SOCIAL COHESION
ANTWERP ZUIDRAND	V		V				
BRUGES	V						
KAPELLE							
THE HAGUE					V		
SOUTHEND							



- Biodiversity plays a vital role in ecosystem functioning
- Green infrastructure features can improve and expand the habitat for biodiversity
- Method
- *1. The average structural diversity:* based on vegetation layers, not species
- 2. Potential habitat for target species: the presence of certain natural elements determines whether a species is likely to appear in the area or not





Grey scenario / Before

Bruges



Green scenario / After

Structural diversity of 2,9 / 6



Structural diversity of 4,6 / 6



Bruges

Potential habitat for target

species

Grey scenario / Before





Green scenario / After







Antwerp Zuidrand



Grey scenario / Before

Green scenario / After

Structural diversity of 1,9 / 7

142% Improvement

Structural diversity of 4,5 / 7





Antwerp Zuidrand

Potential habitat for target

species

Grey scenario / Before





Green scenario / After





Cultural ecosystem services





	WATER RETENTION & INFILTRATION	MICRO CLIMATE REGULATION	CARBON SEQUESTATION	HABITAT FOR BIODIVERSITY	EDUCATION & AWARENESS	PHYSICAL & MENTAL HEALTH	SOCIAL COHESION
ANTWERP ZUIDRAND							
BRUGES							
KAPELLE							
THE HAGUE	V	V					
SOUTHEND							





----5

Cultural ecosystem services

- **Cultural Ecosystem Services** (CES) are the non-material benefits people obtain from nature such as recreation, aesthetic appreciation, physical and mental health, etc.
 - Mostly intangible and difficult to measure / quantify

Method

• Surveys





Cultural ecosystem services

The Hague

Grey scenario / Before

- Fences surrounding the park negatively influences the accessibility and connectivity of the park with the neighbourhood.
- There are no kind of educational projects to raise the awareness

Green scenario / After

- Collaborating with the neighbourhood to fulfil their needs
- Attractive and pleasant places for social activities
- Planned educational projects about GI and the UWB
- Fences removes, sport area included, playground, new walking ways, etc.



ACROSS THE 2 SEAS