



TECHNICAL COMPATIBILITY OF VERTICAL GREENING WITH BUILT HERITAGE

PhD student: Marie De Groeve

Supervisors: Tim De Kock (University of Antwerp) & Scott Allan Orr (University College of London)

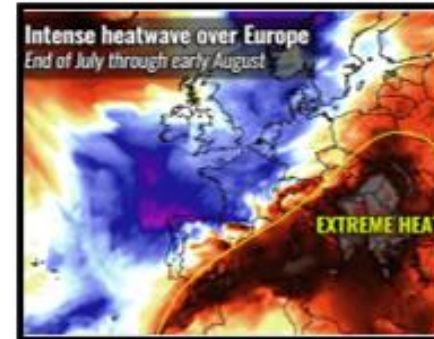
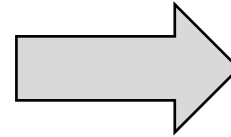


INTRODUCTION

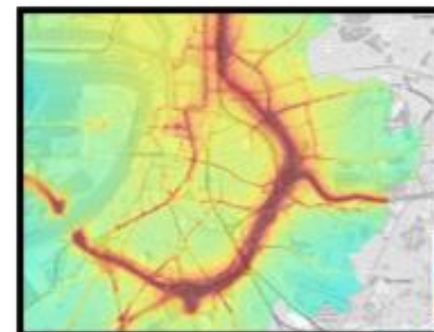
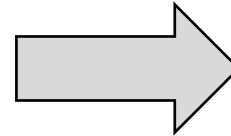
Climate stressors and the mitigation strategies in cities

CLIMATE STRESSORS

CLIMATE CHANGE



URBAN HEAT ISLAND



NATURE BASED SOLUTIONS



Ground based greening



Mobile vertical greening



Rain garden



Parks

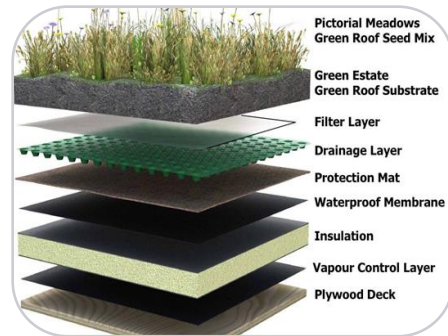


Street lines



Green roofs

HERITAGE IS MOSTLY LEFT OUT

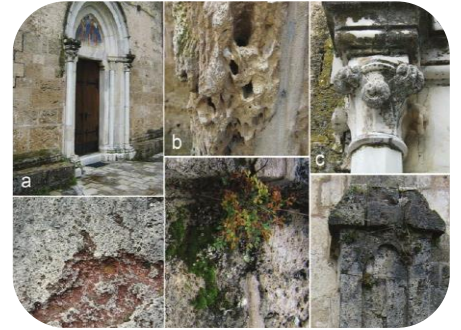


1
Structural
integrity

2
Impact on
materials

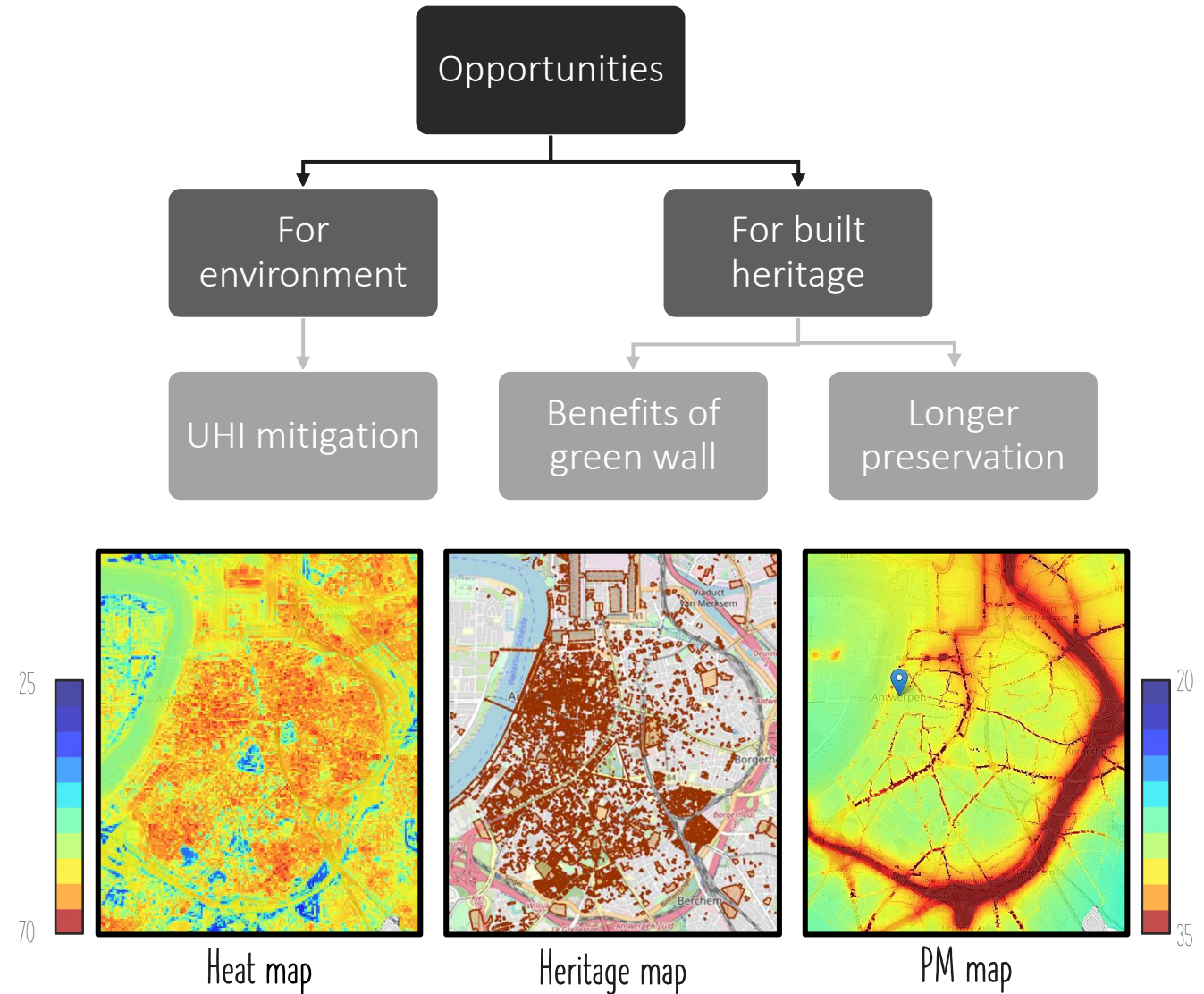
3
Limited space

4
Strict
conservation
rules





OPPORTUNITIES



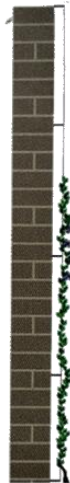


FOCUS AND METHODOLOGY

The technical compatibility of built heritage and green initiatives

RESEARCH FOCUS

- Technical compatibility of vertical green with built heritage
- Vertical greening, rooted in the ground
 - Attached by metal wires
 - Attaching themselves on vertical surface



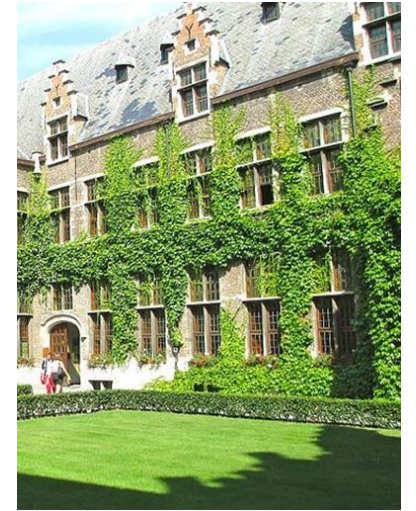
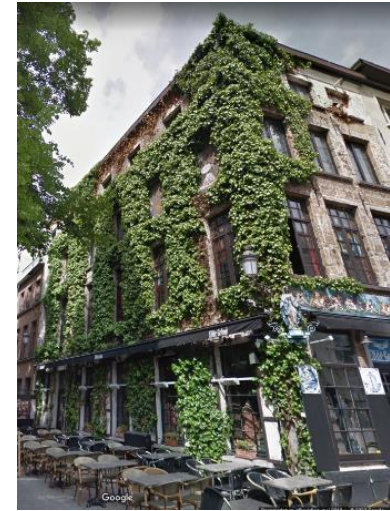
WHY GREEN WALLS

- Benefits:

- Easy to implement
- Not much maintenance
- Low cost
- Minimal footprint

- Cons:

- Takes time to fully grow
- Choice of plants is more limited



RESEARCH FOCUS

- Impact on microclimate & degradation on historic building materials

Green on heritage buildings



Effect on environmental parameters



Effect of changes on historic building materials

- Degradation types:



Salt crystallization



Frost damage



Biodeterioration

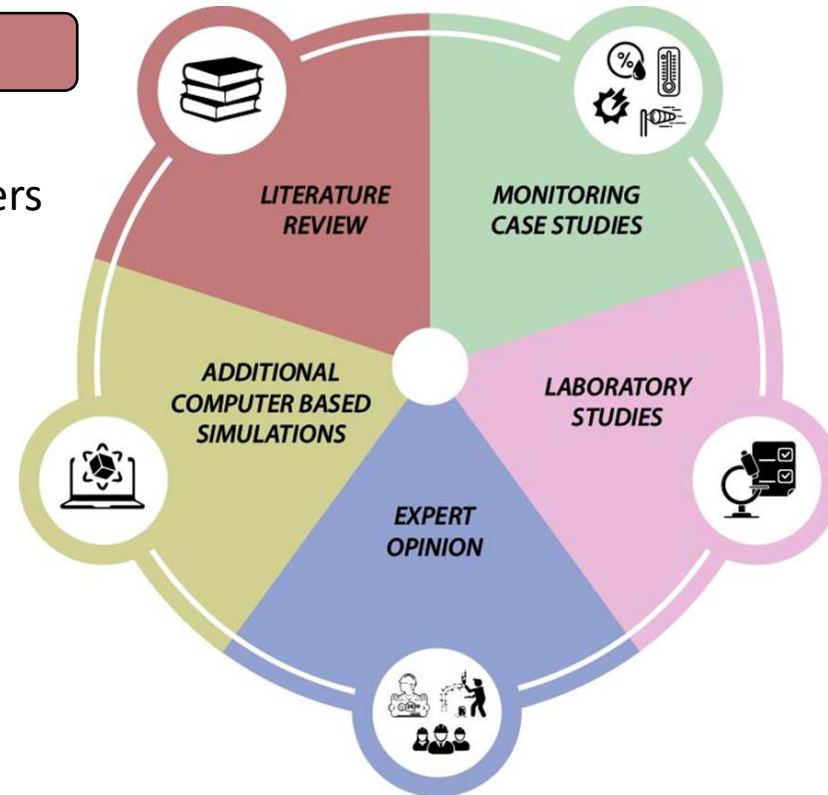


Pollutant dispersion

METHODOLOGY

Literature review

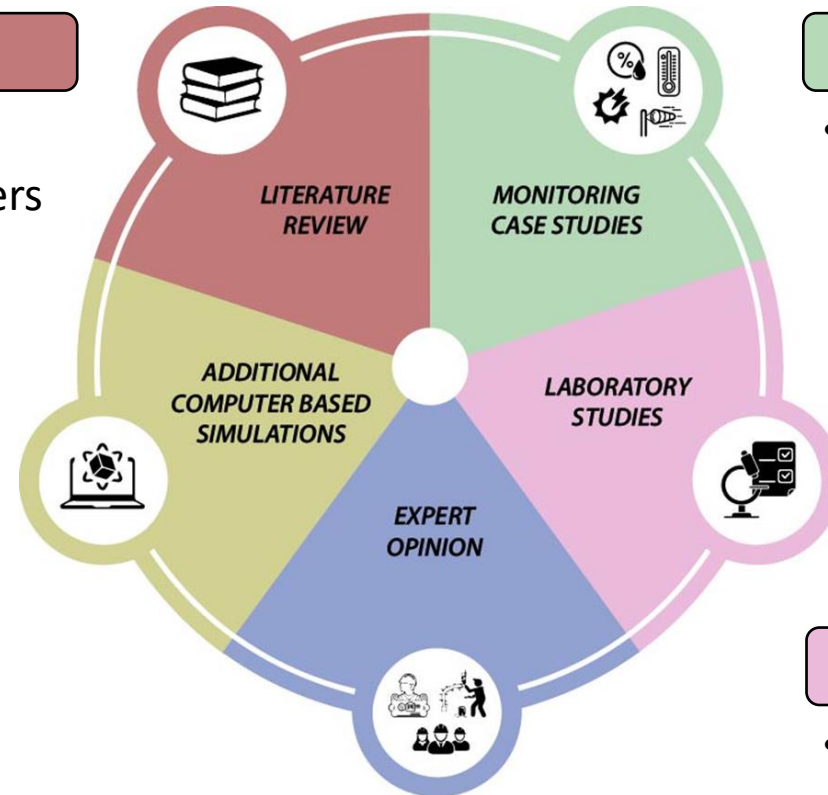
- Search for most important parameters



METHODOLOGY

Literature review

- Search for most important parameters



Monitoring case studies

- Case studies in Antwerp (Belgium)
 - Air & surface temperature, RH, PM, solar radiation

Laboratory studies

- More controlled environment

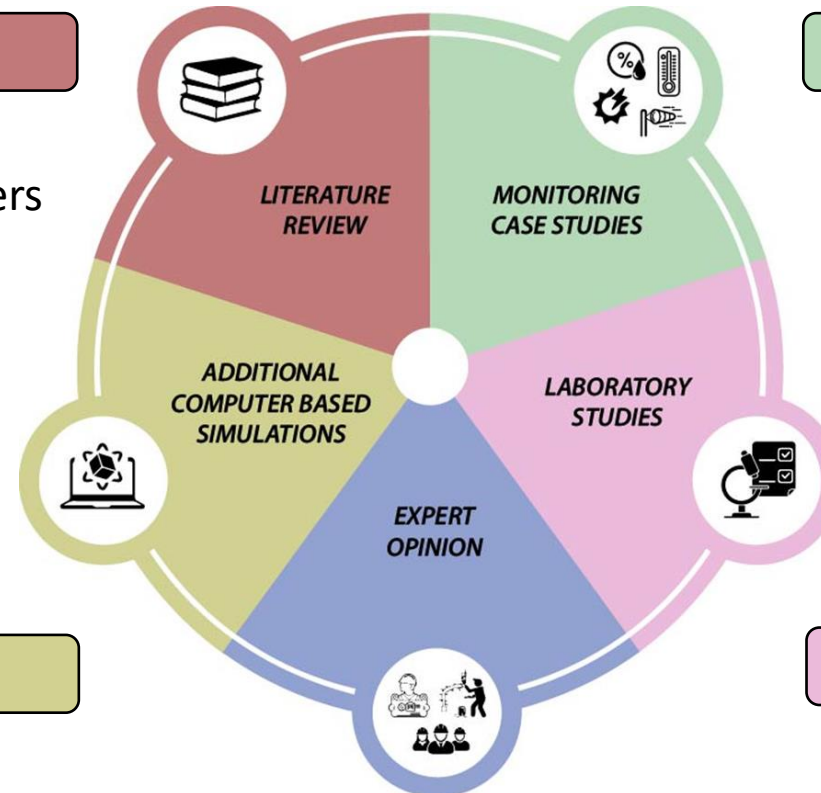
METHODOLOGY

Literature review

- Search for most important parameters

Additional simulations

- Opportunities
 - Future oriented
 - Different wall compositions
 - Different materials



Monitoring case studies

- Case studies in Antwerp (Belgium)
 - Air & surface temperature, RH, PM, solar radiation

Laboratory studies

- More controlled environment

METHODOLOGY

Literature review

- Search for most important parameters

Additional simulations

- Opportunities
 - Future oriented
 - Different wall compositions
 - Different materials

Expert opinions

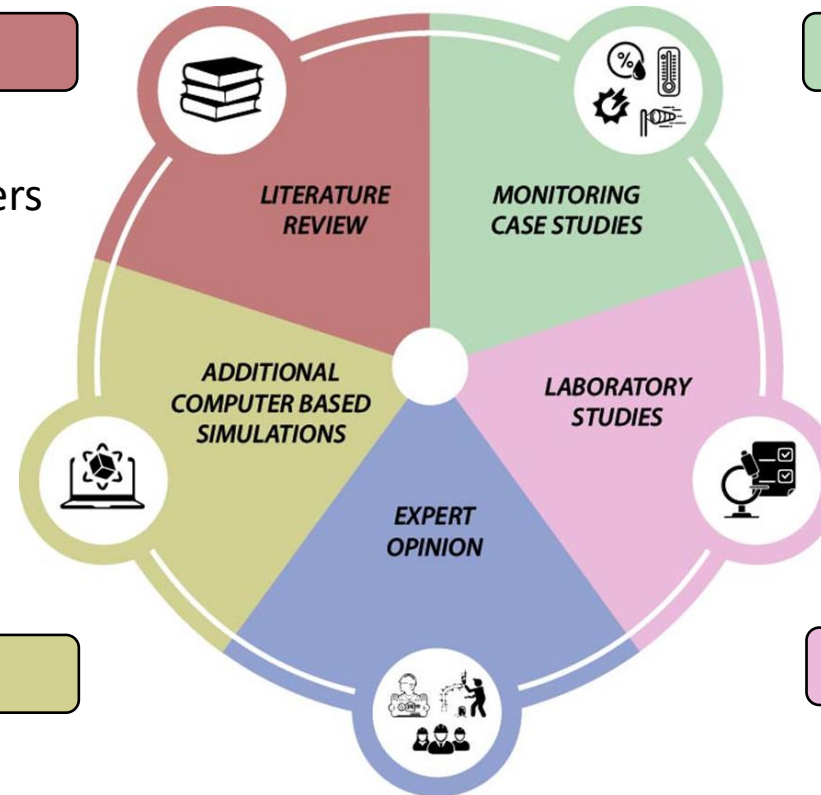
- Enrich research in practical view

Monitoring case studies

- Case studies in Antwerp (Belgium)
 - Air & surface temperature, RH, PM, solar radiation

Laboratory studies

- More controlled environment





GLOBAL AIM

GLOBAL AIM

Knowing the real impact of vertical green on historic building materials

More contribution of built heritage in mitigation strategies in the future

Search for a contribution without compromising heritage and its associated values

A photograph of a woman with long brown hair, smiling, standing in front of a dark wall completely covered in lush green ivy. She is wearing a light-colored, short-sleeved button-down shirt. The ivy has many small yellow flowers. The background is a solid black rectangle.

THANK YOU FOR LISTENING

Marie De Groeve -
marie.degroeve@uantwerpen.be

Supervisors:
Tim De Kock (University of Antwerp)
Scott Allan Orr (University College of London)



SOURCES

- Groentool. (z.d.), *Gebiedsanalyse*. Geraadpleegd op 16 mei 2022, <https://groentool.antwerpen.be/analysis.xhtml?zoomLevel=13&mapCenterLat=51.036064370295435&mapCenterLng=4.167938232421875&clearShapes=true>
- Onroerend erfgoed. (z.d.), Geoportaal, Geraadpleegd op 15 april 2022, <https://geo.onroenderfgoed.be/#zoom=10&lat=6639473.157172923&lon=462444.02742662176>
- Korosec M. , (2021, 27th of July), *Parts of southern Europe will be baking with around 40-45°C as the most intense heatwave of summer 2021 is on the way this week*, Severe Weather Europe, geraadpleegd op 16 November 2021, <https://www.severe-weather.eu/europe-weather/most-intense-heatwave-summer-2021-forecast-mk/>
- Go Smart Bricks, (z.d.), Urban heat island – 7 things you should know, geraadpleegd op 16 mei 2022, <https://gosmartbricks.com/urban-heat-island/>
- Energiguide, (z.d.), What is a green roofs?, geraadpleegd op 15 April 2022, <https://www.energuide.be/en/questions-answers/what-is-a-green-roof/670/>
- Stupar M., Ljaljevic G., Subakov Simic G., Jelickic A. Vukojevic J., Sabovljevic M., 2014 (8 of August), *A sub-aerial biofilms investigation and new approach in biocide application in cultural heritage conservation: Holy Virgin Church (Gradac Monastery, Serbia)*, Indoor and Built Environment, Vol, 23 (4) 584-593, <https://doi.org/10.1177%2F1420326X12466753>
- Steenmeijer Architecten, (z.d.), *Koninklijk Atheneum*, geraadpleegd op 15 April 2022, <https://www.steenmeijer.be/koninklijk-atheneum-antw>
- Z.a., 2016, 15 February, *Controlling and preventing efflorescence in Toronto*, geraadpleegd op 15 April 2022, <https://www.turnbullmasonry.com/controlling-and-preventing-efflorescence-in-toronto/>
- Stonehenge Masonry Company, (z.d.), *Spalled brickwork due to freeze thaw cycles*, geraadpleegd op 15 april 2022, http://stonehengemasonry.ca/water-problems/img_1653/
- Medicinal plants expertise, (z.d.), *Important study of the bryological flora at an archaeological site*, geraadpleegd op 15 april 2022, <https://botanicmedicinal.com/biodeterioration-bryophytes-historical-site-chellah-moroccoarchaeological/>
- 123RF, (z.d.), *Close-old yellow brick wall weathered patina black and white*, geraadpleegd op 15 april 2022, https://fr.123rf.com/photo_35047664_close-old-yellow-brick-wall-weathered-patina-black-and-white-.html