



Case plan city & region

Case work plan Climate Proof Cities

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1. Scope city & region

The case plan 'city & region' develops knowledge and insights that provide cities and regions the capability to adapt to climate change in general and the urban heat island (UHI) effect in particular.

1.1 Topics

The 'city & region' case plan looks into:

- [a] the extend of the urban/regional impact of the UHI;
- [b] the physical aspects of urban areas that contribute to the UHI;
- [c] the socio-economic aspects that aggravates the impact of the UHI;
- [d] the options available and conceivable to adapt cities and regions to the impacts of the UHI: including the coping range, resilience range, and failure range;
- [e] adaptation measures that cities and regions can implement in urban design, urban planning, and spatial planning;
- [f] effectiveness of combinations of such measures.

1.2 Areas

'City & region' refers to urban areas as we know them in the Netherlands:

- [a] city (municipality);
- [b] agglomeration (WGR+ region);
- [c] poly-centric urban area;
- [d] regional landscapes;
- [e] region (province).

The primary emphasis in the city & region case will be on the scale of the agglomeration/WGR+ region without disregarding other scales such as cities or provinces.

2. Cases

The regional case plan comprises three cases:

[b.1] Haaglanden region, [b.2] city of Amsterdam, [b.3] Brabant

2.1 Haaglanden region

Haaglanden is a so-called WGR+ region that includes the city of The Hague and its suburban neighbours. Policy, strategy and continuous development seem to converge on a joint region with Rotterdam: the Metropoolregio. As a result we may have to approach the WGR+ regions Haaglanden and Rotterdam as one in the near future.

Currently the Haaglanden region wants to evaluate its strategies regarding green areas: should it develop more urban parks, such as the Zuiderpark, or should it aim at preserving large green belts such as Midden-Delfland.

The development of the 'Hof van Delfland' is a key development in this. The Hof van Delfland is a network of green areas and landscapes between Den Haag, Delft Zoetermeer and Rotterdam.



fig: Hof van Delfland

Haaglanden asks in addition to look into the Westland horticulture cluster, and into the pre-war urban areas, the most compact and most impervious parts of The Hague. Work should contribute to the 2014 adaptation strategy for the Haaglanden region.

2.3 Province of Noord-Brabant

The Province of Noord-Brabant works actively to engage its five largest cities in climate actions. These five largest city are referred to as the B5: Breda, Tilburg, 's Hertogenbosch, Eindhoven and Helmond.

The Province of Noord-Brabant investigates the climate impact on the so-called Groene Woud: the large regional landscape between the cities 's Hertogenbosch, Tilburg and Eindhoven. The exchange with the surrounding cities and the potential buffer capacity make it an interesting case.

Urban Heat is a relative new topic in Noord-Brabant that requires a tailor-made approach to find understanding and support.



2.3 City of Amsterdam

The city of Amsterdam is involved in various international climate related projects. It expressed its interest in developing a typology related to urban heat islands. That typology is now being developed in the framework of the city & region case.

The typology combines factors related to the built environment and to the socio-economic conditions in the city. The same typology research will be conducted for the region Haaglanden and the Province of Noord-Brabant.

3. Phases

The regional case spans four main phases. Each phase will result in an appropriate deliverable such as journal article, expert meeting, seminar, web-site, book or brochure.

3.1 Diagnosis

The first phase deals with the diagnosis. A framework for an urban heat island typology is developed, jointly with the City of Amsterdam. This typological study is to be extended to the Haaglanden region and the Province of Noord-Brabant. It includes the components below:

Heat islands

establishing the extend of the urban heat island in the Haaglanden region, the Province of Noord-Brabant and the City of Amsterdam through weather data, AATSR and Landsat 5 imagery. Both the Urban Canopy Layer UHI and the Land Surface Temperature UHI will be investigated;

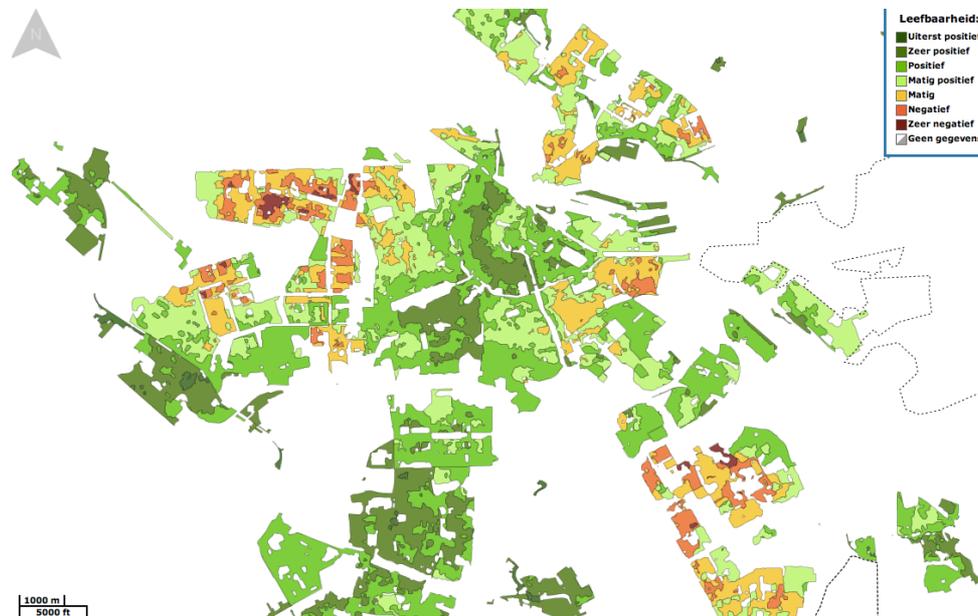
- [a] Urban Canopy Layer UHI daytime;
- [b] Urban Canopy Layer UHI nighttime;
- [c] Land Surface Temperature UHI daytime.

Factors built environment

- [a] electricity use as an indicator for the summertime anthropogenic heat;
- [b] solar radiation, taking shadows in account;
- [c] sky view factor / building surface area;
- [d] wind / average building height;
- [e] vegetation index;
- [f] albedo;
- [g] building density / building mass.

Neighbourhood & homes

- [a] leefbaarometer;
- [b] transaction value homes;
- [c] energy labels;
- [d] heating energy.



inhabitants & visitors

- [a] population density;
- [b] vulnerable age groups;
- [c] event zones;
- [d] health.

The project return back insights that can be used by models that are developed in work package 1.

3.2 Adaptation through mixed pixels

The second phase deals with unraveling the principles behind the typologies. Much of our observation here will be included in 'mixed pixels', in tiles of 100 x 100 meters. What is happening in these pixels? Which land uses, densities and functions can be observed. What are good functional mixes and which mixes causes cities and regions to heat up?

Much can be achieved by changing the mix of the pixel. Applying the right mix on a urban or regional scale will be the first part of the city & region adaptation strategy.

In parallel we will analyse the socio-spatial challenges and transformations that the metropolitan areas will undergo in the next decades in Holland and Noord-Brabant.

3.3 Adaptation through design & planning

The third phase deals measures that go beyond 'mixing'. If changing the functional mix is not an option, then improving the performance of existing functions becomes crucial.

How can we increase the albedo of buildings or optimise the evapotranspiration in urban areas?

Which measures have already been developed to adapt cities and regions to the challenges of Urban Heat Islands, and where are solutions still lacking?

These questions requires an exploration of best practices, and the development of measures for regional climate challenges that lack such best practices.

3.4 Pilot experimentation

Finally the city & region case plan aims to experiment with both the best practices and the newly developed solutions and strategies through design an planning for specific regional development areas.

These pilot areas will be chosen together with the hotspots. Validation should take place by means of the climate modelling developed in work package 1.

4. Data in relation to scales

The regional case will make extensively use of remote sensing data. Satellite imagery will be used for larger areas such as the Randstad and the Brabantstad. Satellite imagery will be used in addition to the use of datasets such as AHN2, GIS, surface measurements, public records.

	Randstad	Haaglanden	Brabant	Amsterdam
Satellite imagery				
LST	X	X	X	X
vegetation index	X	X	X	X
albedo	X	X	X	X
AHN-2				
building mass		X	X	X
sky view factor		X	X	X
GIS				
building mass		X	X	X
wind	X	X	X	X
vegetation		X	X	X
pavement		X	X	X
sky view factor		X	X	X
population density		X	X	X
energy use		X	?	X
Aerial				
WUR airplane		X		
Surface				
air temperature				X
randstadrail		X		
Humans				
health		X	X	X
liveability		X	X	X
demographics		X	X	X

5. Stakeholder involvement

In the matrix below the four regional cases are presented that will be central in the research. Indicated in bold are the related 'hot spots' or other stakeholders.

City	City region	Poly-centric urban area	Green area	Province
	Haaglanden		Hof van Delfland	
Amsterdam				
		B5: Breda, Tilburg, 's Hertogenbosch, Eindhoven, Helmond	Groene Woud	Provincie Noord-Brabant

6. Activities

In the matrix below the activities are presented that will take place in the framework of the city & region case plan in 2012.

2012	stakeholder	activity
jan - oct	Amsterdam	Urban Heat Island typology: case Amsterdam, final report in October 2012
jan - april	Province Noord-Brabant	Cool Brabant, preparation of symposium on climate change actions in Brabant, symposium on 26 april 2012
may - december	Haaglanden region Province Noord-Brabant	Urban Heat Island typology: case Haaglanden & B5, final report in Januari 2013
november - >	Province Noord-Brabant	Adaptation through mixed pixels

7. Projects in the work plan

	Projects	Contact persons	Researchers
	City & Region case	Frank vd Hoeven	
1.2	Model development for the meso scale	Bert van Hove	
2.4	Urban Typologies	Frank vd Hoeven Andy vd Dobbelsteen	Alex Wandl Nico Tillie
3.1	Green infrastructure for climate-proof cities	Ingrid Duchhart	
3.6	Design: Neighbourhood to city	Andy vd Dobbelsteen	Laura Kleerekoper
3.7	City to region	Frank van der Hoeven	Leyre Echevarria Icaza Alex Wandl
5.1	Assessment of the effectiveness of adaptation measures and strategies on the Urban Climate System in an interactive process between stakeholders and scientists	Eddy Moors	Annemarie Groot
5.2	Integration frameworks	Peter Bosch	

Indicated in bold are the included projects, the other projects are associated.

7.1 Cooperation between projects

The core of the regional case is located in Projects 1.2 and 3.7.

[a] Strong links are required between the 1.2 and 3.7 projects. Project 3.7 will benefit from regional climate data input. 1.2 may benefit from specific parameters that are to be developed in 2.4 and 3.7.

[b] There is a range of projects that will deliver useful components to the metropolitan case without 'expecting much in return': Projects 2.4, 3.1, 3.6. From time to time the partners in 1.2, 3.7 need to be updated on the highlights produced by these projects.

[c] Project 3.7 itself delivers to Projects 5.1 and 5.2.

7.2 Meeting frequency

The metropolitan case will not implement a formal structure, board or council. Instead we work with temporary task forces. Most of the associated project or already firmly included in a work package or another case.

Regional case meeting - every six months

Expert meeting (workshop) - every six months

Project meeting - every month

7.3 Relations with other projects

The researchers in the regional case would ideally participate in regional planning processes that require the input of climate adaptation.

This means that we would like researchers to participate in the planning of strategic projects that will test, verify and evaluate adaptation regional measures.

8. Time planning

Each of the described phases will take more or less one year.

month	task
2012	Diagnosis
March	'design' typology study, case Amsterdam
April	symposium Cool Brabant
June	first results typology study
October	final report typology study, case Amsterdam
December	final report typology study, case Haaglanden, Brabant
2012	Cause and effect
2013	Adaptation through mixed pixels / design & planning
2014	Pilot experimentation