



Green interventions for climate-proof cities

Dipl.Ing Wiebke Klemm, Landscape Architecture Group
Supervision: Prof. dr. ir. Adri van den Brink (LAR), Dr. Dipl.Ing Sanda Lenzholzer (LAR),
Dr. ir. Bert van Hove (MAQ/ ESS-CC)



Problem definition

Climate projections indicate: more heat waves in the Netherlands and other moderate climates
Consequences especially in urban areas because of the Urban Heat Island effect (UHI)
Worsening of the situation through prognosticated large expansion of the urban landscape and urban densification within existing cities
Expected results: significantly higher UHI and consequences for human health and thermal comfort

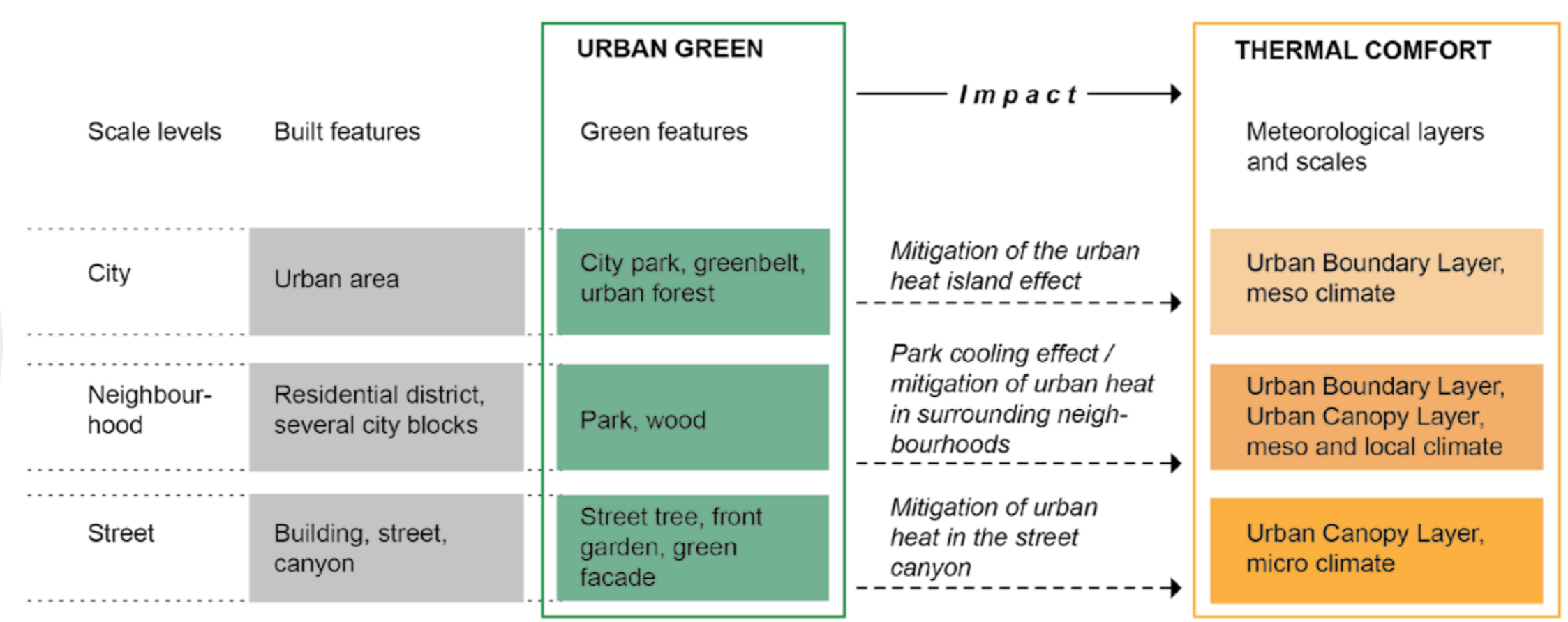


Figure 1: The relationship between the scale levels, urban green and thermal comfort (Adapted from Oke 1989/2006)

Impact of urban green on thermal comfort is evident, BUT:
1. at the different scale levels there is little scientific insight into the magnitude and the effect range of the cooling effect of urban green.
2. little is known about how people perceive and value urban green during warm summer periods.
3. urban designers lack knowledge on how to optimally design urban green to improve thermal comfort.

Objective

- The main objective is to examine and define climate-responsive design principles for urban green at various scale levels in order to improve thermal comfort during hot summer periods.
1. What is the impact of different types of urban green at the various scale levels on thermal comfort?
 2. What are the climate-regulating design aspects of urban green, such as size of parks, height structure and distribution of vegetation, at the various scale levels?
 3. Which climate-responsive design principles for urban green can be derived for the various scale levels, to improve thermal comfort in the (re-)design of existing and new urban areas?

Method

Phase I - Multi-scale approach including microclimate observations and human perception research to generate scientific knowledge on the impact of urban green on thermal comfort and its climate-regulating design aspects (planning 2011-2013)

Phase II - Translating, testing and adjusting the results of phase I into climate-responsive design principles for urban green (= guidelines for urban planners and landscape architects) by means of a 'research-by-design' approach, e.g. site-specific design workshops in CPC municipalities, model simulations (planning 2013-2014)

CITY		<ol style="list-style-type: none"> 1. Examine the magnitudes of the PCI's within cities, 2. Insight into residents' long-term preferences of urban (green) places for outdoor activities on warm summer days, <p>3 cases: Cities of Rotterdam, Utrecht and Arnhem, Planning: summer 2011</p>
NEIGHBOURHOOD		<ol style="list-style-type: none"> 1. Examine the magnitude of the PCI of parks and their effect range into the surrounding neighbourhoods (PET/PMV) 2. Insight into residents' momentary perception of thermal comfort in different microclimates within parks (ASV) 3. Insight into residents' long-term preferences of sub-spaces within parks and into the surrounding neighbourhoods <p>3 cases: 3 parks (located in Rotterdam, Utrecht and Arnhem); definitive locations/ parks to be determined, Planning: summer 2012/13</p>
STREET		<ol style="list-style-type: none"> 1. Examine the magnitude and cooling range of green street elements (PET/PMV) 2. Insight into residents' momentary perception of thermal comfort in different microclimates within streets (ASV) 3. Insight into residents' preferences of green street elements and places for outdoor activities on warm summer days <p>3 cases: 3 streets; one is located in Arnhem (Ingenieur JP van Muijlwijkstraat), others to be determined, Planning: summer 2011/2012</p>

