



HOE KAN WATER IN DE STAD BIJDAGEN AAN VERKOELING?

REALCOOL | REALLY COOLING WATER BODIES IN CITIES



WAGENINGEN
UNIVERSITY & RESEARCH



Amsterdam University
of Applied Sciences

BACKGROUND

it has been assumed that urban water bodies necessarily have a cooling effect but, during warm summer periods, this cooling effect is limited over day and actually often originates night time warming

(Huang et al, 2006, Hathway and Sharples, 2012; Steeneveld et al., 2014; Heusinkveld et al., 2014, Theeuwes et al., 2013; van Hove et al., 2015)



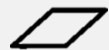
OBJECTIVE

to create design prototypes of the most cooling combinations of shading, water vaporisation and ventilation around urban water bodies



PROTOTYPES

animated 3D scenes depicting layout and biometeorological effects / conceptual frameworks, not prescriptive tools



observe the animated scenes



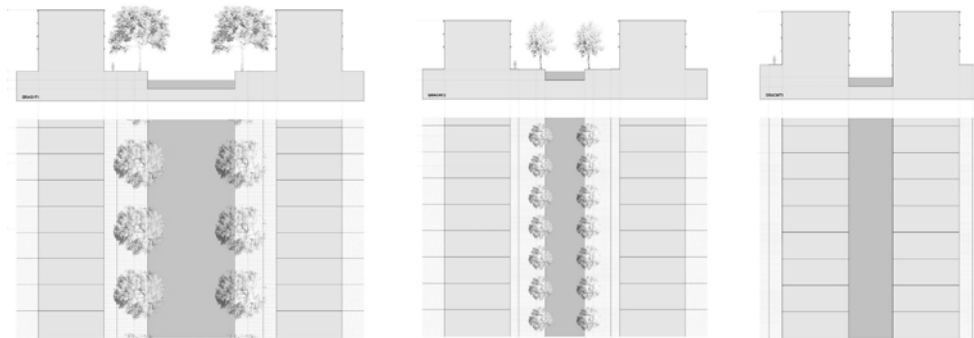
**select the design principles
suitable to your project**



**combine the principles with the
assignment and your design
'signature'**

DESIGN

experimenting with different combinations
of shading, vaporisation and ventilation
strategies around water



DESIGN



to reduce the thermal load placed upon people by increasing shading



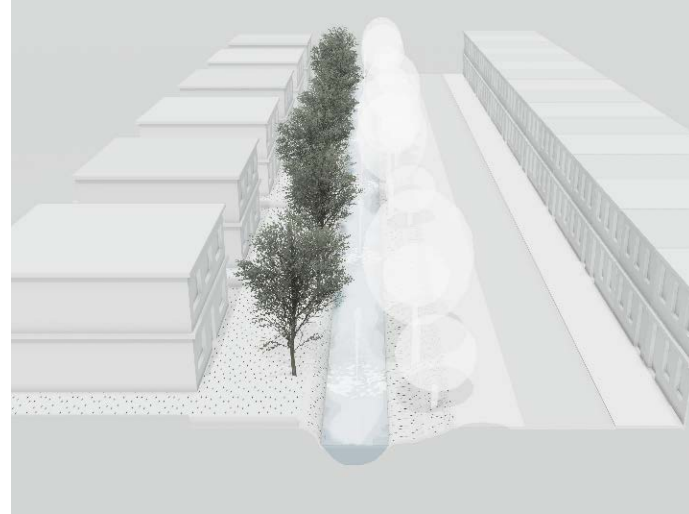
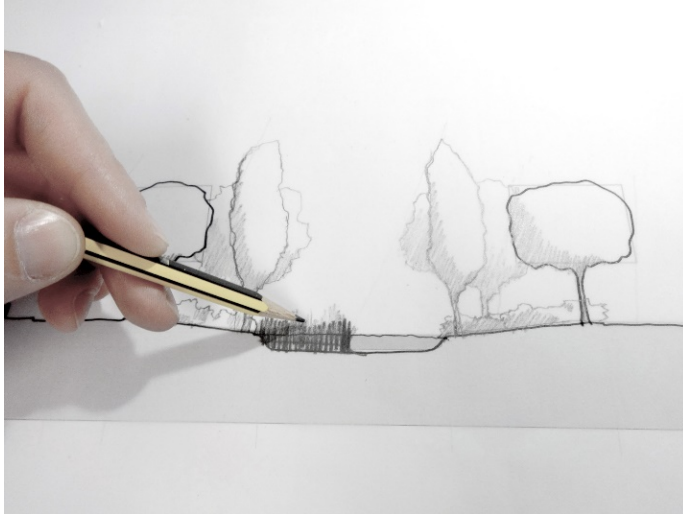
to cool the air through water vaporisation



to stimulate cooling by wind

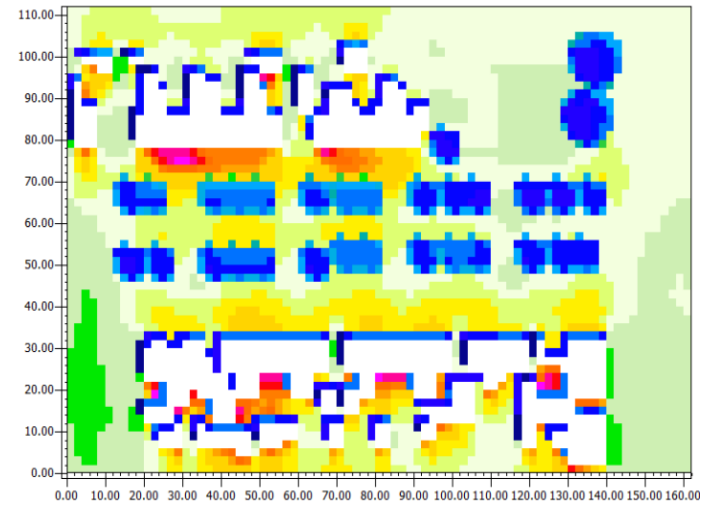
typical tropical day
($T_{\max} \geq 30\text{ }^{\circ}\text{C}$) / 21st June /
solar noon (1.40 p.m.)

DESIGN

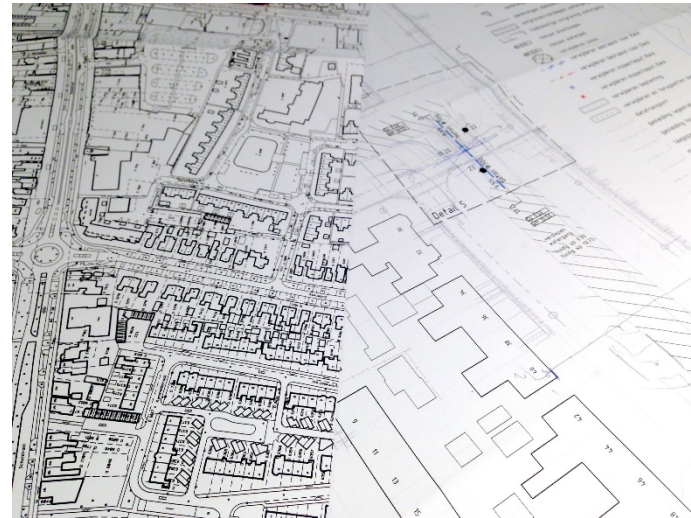


TEST

testing the design experiments on cooling effects
and common practice criteria



TEST



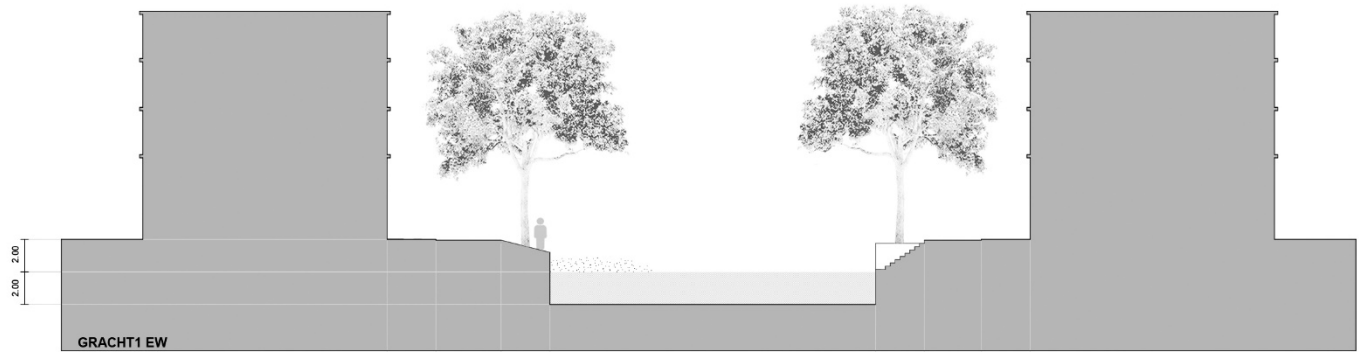
CONCLUSIONS

1. little can be done through design to achieve cool small urban water bodies
2. urban design can create cooler urban water environments: lower PET (1-7 °C at 15h) or redistribute heat
 - 2.1. shading is the most important factor (tree heights above 10 m)
 - 2.2. openness allows cooling by wind
 - 2.3. evaporating water through fountains (4 m high) and sprays has a maximum local cooling effect of 0.5 °C

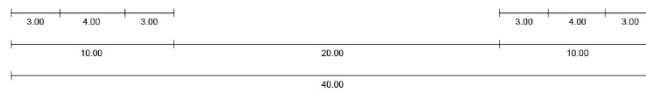
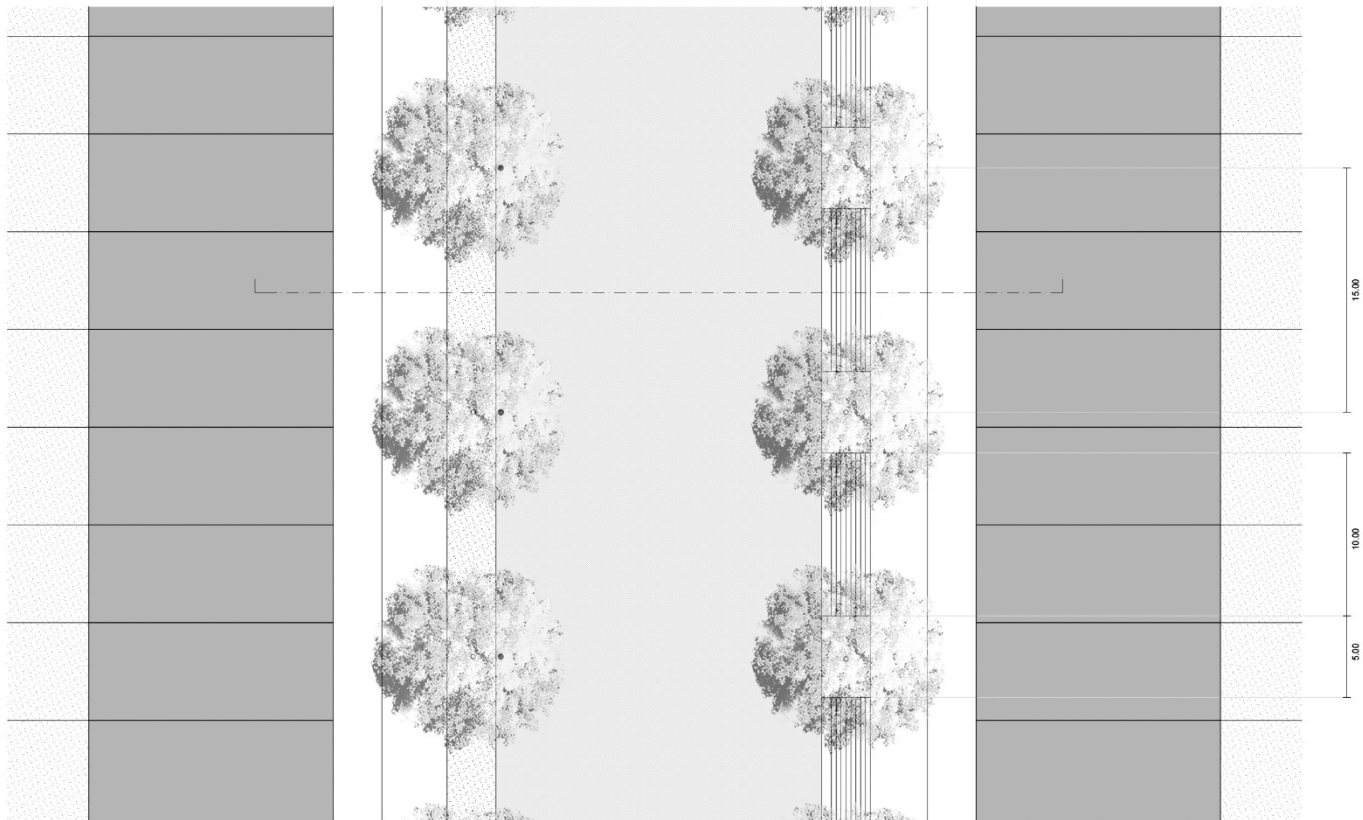


the prototypes in practice

aesthetics
functionality
costs
maintenance
health effects



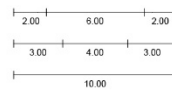
N





A photograph of a canal in Amsterdam. In the foreground, a small wooden boat is docked at a brick quay. A woman with blonde hair, wearing a grey cardigan and blue jeans, is sitting on the brick steps, reading a magazine. To her left, a large tree stands on a small patch of grass. Further down the canal, another boat is visible. The opposite bank is lined with trees and historic buildings. A few people are walking on the sidewalk. The text "how well does this work in practice?" is overlaid in white, bold, sans-serif font in the center of the image.

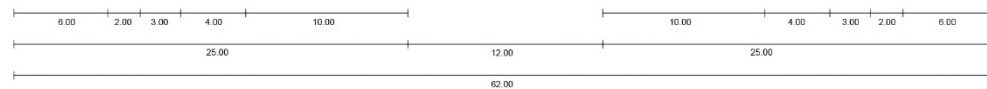
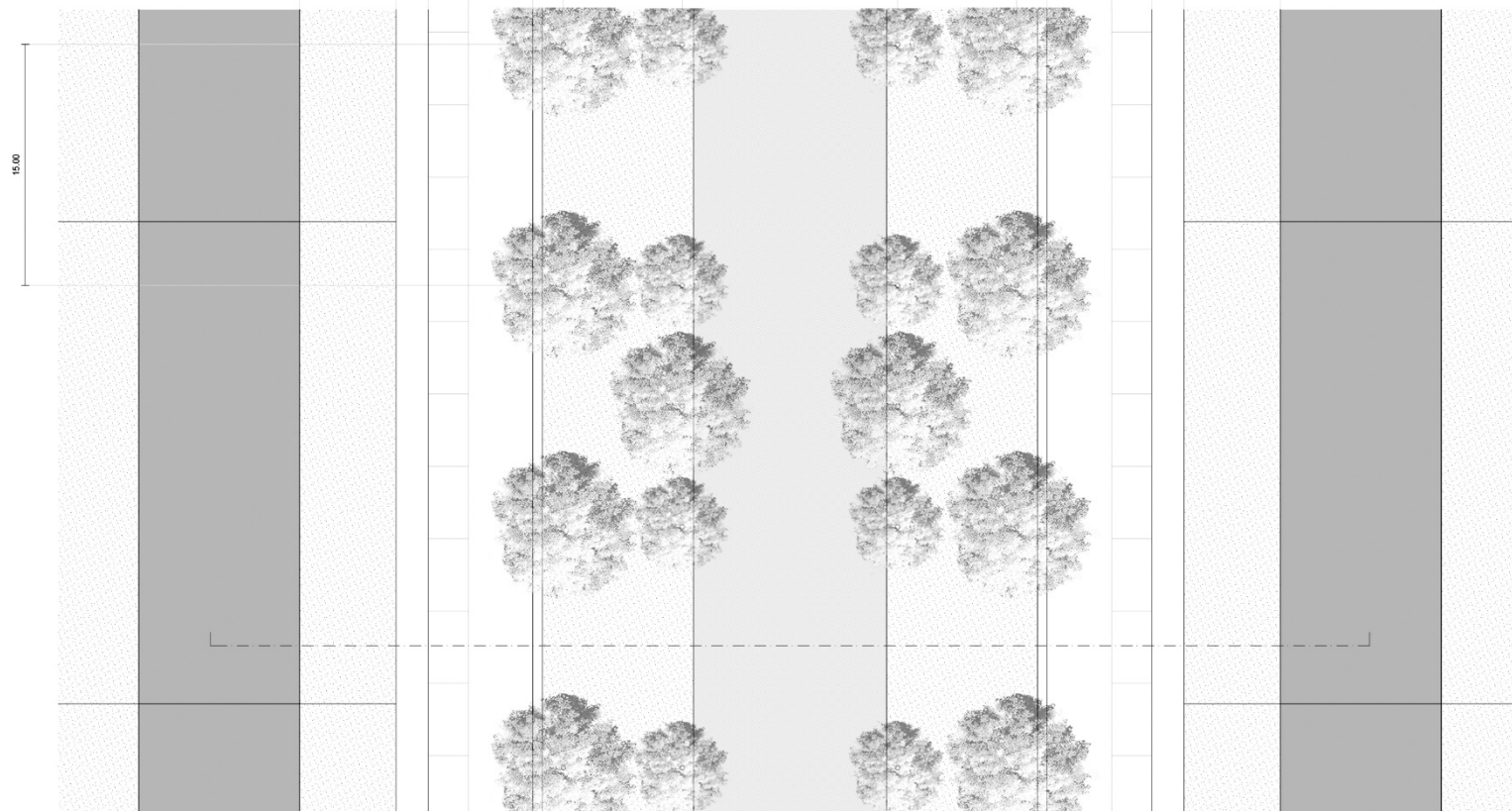
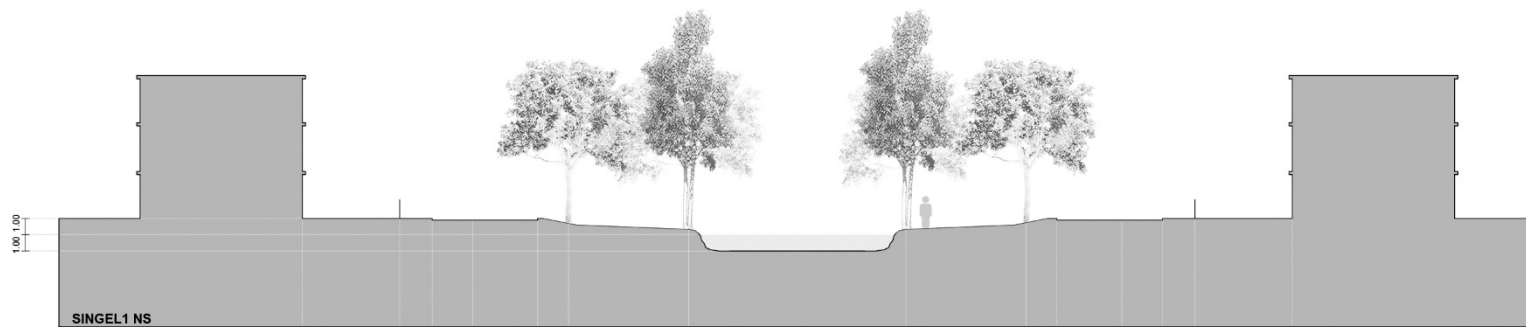
how well does this work
in practice?





A photograph of a narrow canal in a historic European city, likely Amsterdam. The canal is flanked by tall, multi-story brick buildings with many windows. A modern wooden walkway runs along the left side of the canal, with a low green hedge separating it from the water. Several people are walking on the path. A blue umbrella is visible on a balcony of one of the buildings. The text "how well does this work in practice?" is overlaid in the center of the image.

how well does this work
in practice?





A wide-angle photograph of a park featuring a calm pond in the foreground. The pond's surface is dotted with green lily pads. To the left, a person in a bright pink shirt sits on the grassy bank. The right side of the image shows a grassy area where two people are exercising: a woman in a purple long-sleeved shirt and dark pants is in a low lunge, and a man in a red t-shirt and black shorts is in a plank position. In the background, a row of tall, leafy trees separates the park from a residential street where cars and other pedestrians are visible. The sky is a pale blue with light clouds. The text "how well does this work in practice?" is centered in white, sans-serif font.

how well does this work
in practice?