



## OPEN ACCESS DIGITAL MAPS: ASSESSING THE POTENTIAL BENEFITS OF NATURE-BASED SOLUTIONS



### KEY FINDINGS

- Scenario-based modelling assessing current and future implementations of nature-based solutions and their benefits to cities
- European-scale assessment of 775 urban areas
- City-scale assessment of Malmö, Utrecht and Barcelona
- Mapped benefits from nature-based solutions:
  - Reducing heat stress and flooding risks
  - Enhancing carbon storage, recreation and biodiversity potentials
  - Supporting public health

### THE NATURVATION PROJECT

NATure-based URban inNOVATION is a 4-year project involving 14 institutions across Europe in the fields of urban development, geography, innovation studies and economics. We are creating a step-change in how we understand and use nature-based solutions for sustainable urbanisation.



## Assessing benefits from nature-based solutions in cities



Urban nature-based solutions are increasingly recognised for their potential to address challenges related to climate change. Our two assessments quantify the potential of nature-based solutions to i) mitigate heat during a heatwave, ii) store carbon, and to iii) retain water runoff during a rainfall event. To provide additional insights into co-benefits of nature-based solutions for climate change adaptation and mitigation, our maps also quantify additional benefits of urban nature-based solutions, including, iv) recreation opportunities, v) availability of green space to support health and well-being, and vi) biodiversity potential.

## Scenario-based modelling

Our assessment of current and future implementation of urban nature-based solutions (e.g. trees, green roofs) and their benefits is based on a spatially explicit scenario-based approach. The assessment uses two different scales: i) a European-scale assessment, including 775 major European urban core areas and associated hinterlands (i.e. Functional Urban Areas, FUA), and ii) a more fine-grained city-scale assessment for three selected cities (Malmö, Barcelona and Utrecht). After mapping the current nature-based solutions in cities we can now show several scenarios where we add nature-based solutions as green roofs on buildings, trees along streets or new parks. To quantify the benefits of nature-based solutions we use the InVEST modelling framework, an open-source GIS-based modelling tool, as well as our own additional GIS-based models.

## When to use our maps

- Use our maps to assess benefits of nature-based solutions on a local scale in Malmö, Barcelona and Utrecht, and more generally on a European scale, which enables you to compare between cities and contexts.
- You can explore what benefits nature-based solutions can provide to citizens and stakeholders and the maps will also raise awareness of the benefits of nature-based solutions.
- For detailed assessments of other cities, the methodology used for the three cities can be adopted and applied in a local context to provide relevant data for decisions.





## European-scale assessment

Our EU maps show the average heat mitigation and carbon storage per FUA under a specific scenario (i.e. reference, grey, green). For each FUA, additional maps show the spatial distribution of the two benefits provided by urban nature based solutions (see Figure 1)

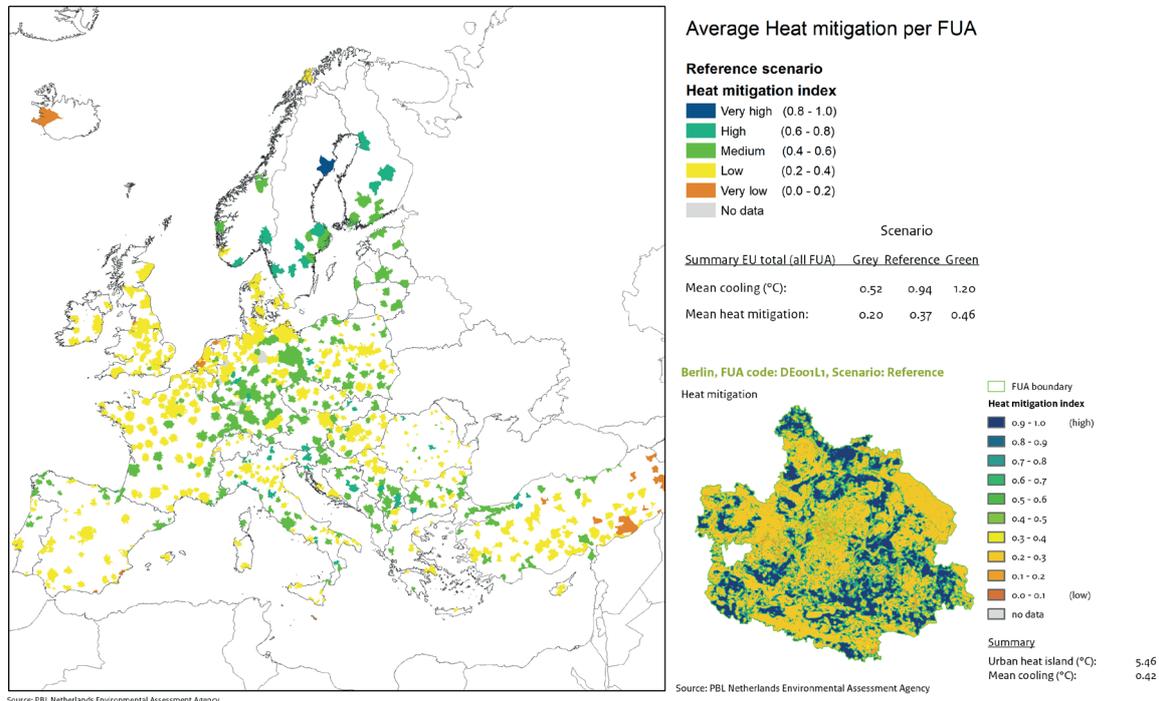


Figure 1: Example map from the European-scale assessment: average heat mitigation across the 775 FUA and in a selected city (i.e. Berlin).

The assessment shows that the implementation of additional green areas and trees for reducing heat stress and enhancing carbon storage, has greatest potential in Southern Europe, Northern UK, Western Balkans and Turkey, while the lowest additional benefits from the implementation of nature-based solutions are in Central Europe (see Figure 2). We are currently further developing this assessment by mapping additional benefits (e.g. health-related benefits from reduced heat stress, flood risk and air pollution; enhanced recreation opportunities and biodiversity conservation) across European cities.

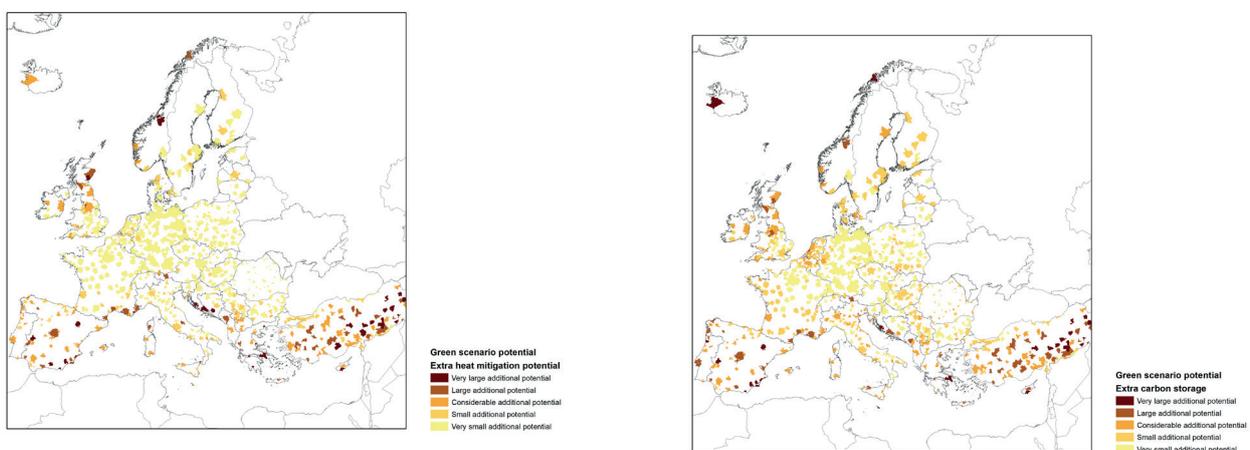
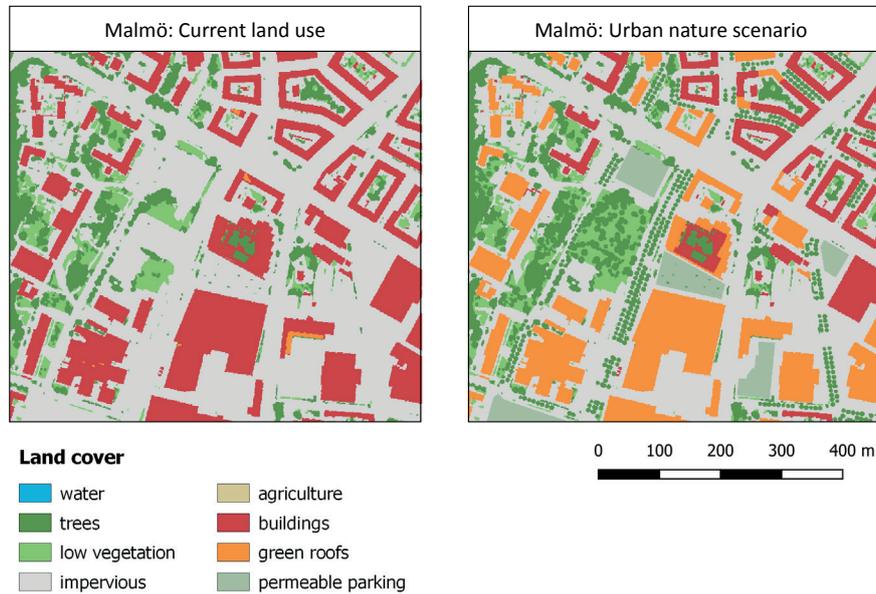


Figure 2: Extra heat mitigation and carbon storage potential when additional NBS are implemented (green scenario).

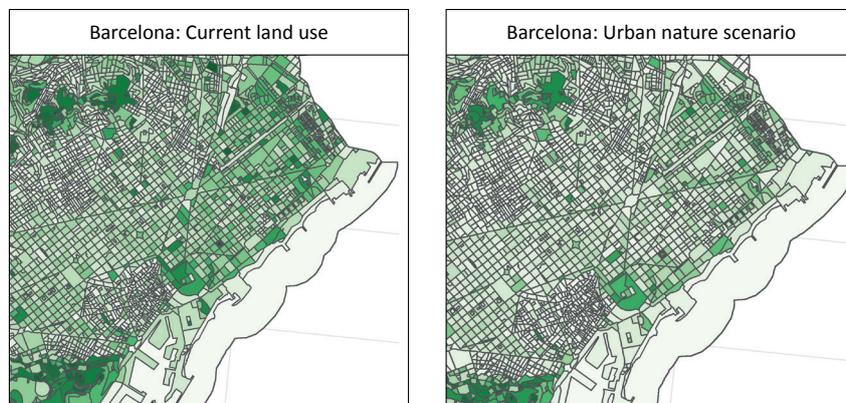
## City-scale assessment



We simulated scenarios of nature-based solutions such as green roofs, parks, street trees, permeable parking areas onto maps of current land use as shown here in the city of Malmö. The nature-based solutions all fit to the city on a local and small scale. The scenario changes impermeable surfaces as e.g. parking lots, but not houses or roads.



The maps of Barcelona show the potential benefits of water infiltration through a combination of all nature-based solutions across the city landscape.



### Urban Nature Navigator

The Urban Nature Navigator helps you to assess the contributions that different nature-based solutions can make to meeting urban sustainability challenges and to identify the nature-based solutions, which fit your needs the best. The assessment tool uses indicators capturing ecological, social and cultural benefits that nature-based solutions can provide towards urban sustainability goals. The Urban Nature Navigator also provides methods to enable the decision-making processes for implementing nature-based solutions in cities.

<https://naturvation-navigator.com/>

[www.naturvation.eu](http://www.naturvation.eu)