BASE
BOTTOM-UP CLIMATE ADAPTATION STRATEGIES TOWARDS A SUSTAINABLE EUROPE

Exploring adaptation pathways: Case of Prague urban heat island

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Introduction

The number and intensity of hot days have considerably increased in the last three decades and it is nearly certain that there will be more frequent hot extremes in the second half of the 21st century. Moreover, in the future, urban areas are expected to suffer more due to the combined outcome of climate and the urban heat island (UHI) effect (IPCC, 2014).

The most common effect of UHI is accumulation of heat in urbanized areas which results in higher temperatures, especially at night, compare to the surrounding non-built up areas (IPCC, 2013).

In the case of Prague, urban heat island has already occurred and is becoming more serious. According to the outcomes of UHI project (http://eu-uhi.eu/), its annual average intensity during the period 1961-2012 was 2.2°C with a peak during June and July (2.4°C). The intensity of the heat island has been increasing in last years, especially during summer months, almost by 0.5°C.

Research objective

Taking into account impact of climate change, potential adaptation measures and spatial planning, we aim to explore adaptation pathways Prague UHI.

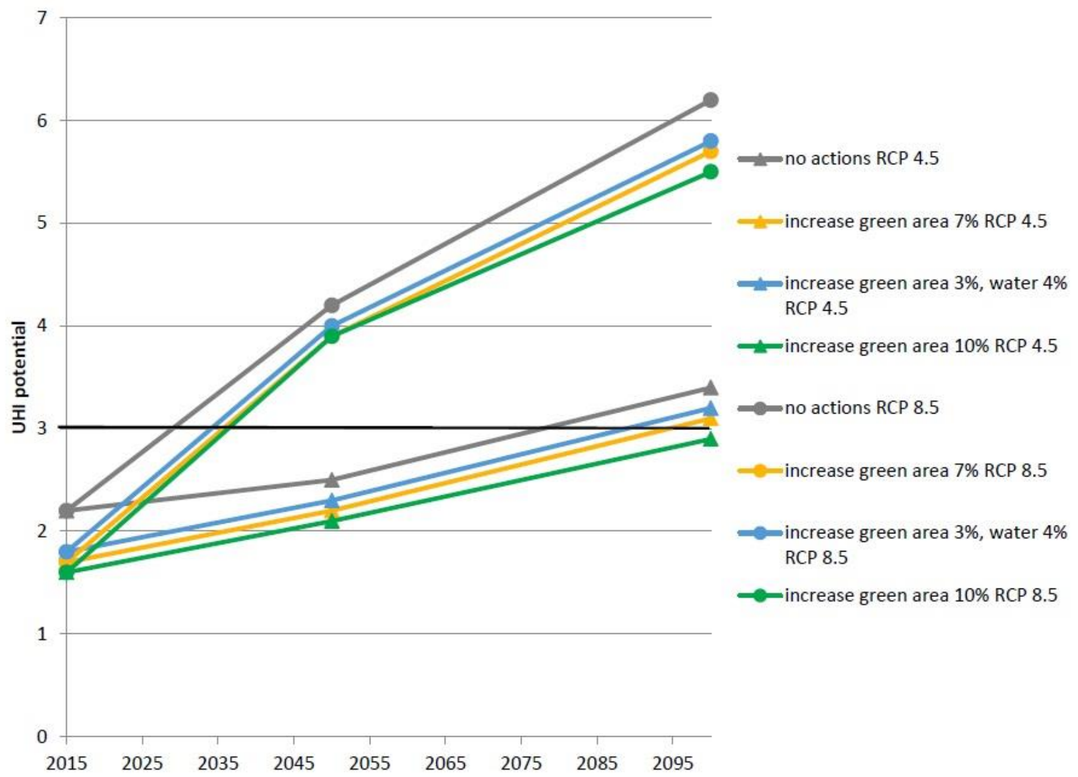
Methods

Study area: For modelling purposes, we selected particular area in Prague 6 - Dejvice (see Figure 1a, 1b below).

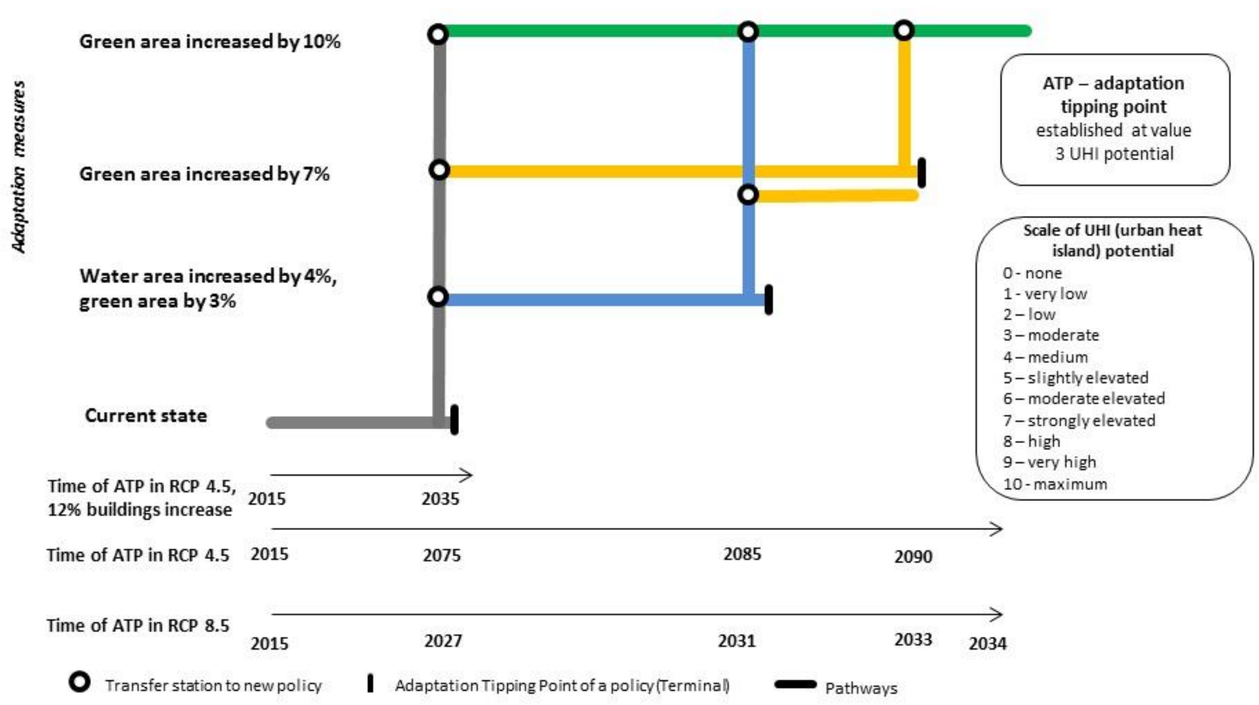
Modelling tool: Urban Heat Tool was used to model the urban heat island (UHI) potential. The higher UHI potential is, the higher risk of heat island in the selected area is.

Adaptation pathways approach was applied to assess future climate change impacts and potential adaptation measures. Firstly, we calculated tipping points for particular actions and scenarios - RCP 4.5, RCP 8.5 (see Figure 2).

Calculation of tipping points based on UHI potential



Based on calculated tipping points, we identified adaptation pathways for three adaptation measures: (a) Water area increased by 4%, green area by 3%, (b) green area increased by 7%, (c) green area increased by 10% (see Figure 3).



Conclusions

- Moderate value (3) of UHI potential selected as adaptation tipping point
- In case of RCP 4.5, adaptation measures have substantial impact on UHI reduction
- UHI potential is significantly increasing in RCP 8.5, adaptation measures sufficient only to year 2034. Therefore, need for other adaption options.

References: Kirtman, B., S.B. Power, J.A. Adedoyin, et. al. (2013): Near-term Climate Change: Projections and Predictability. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change., IPCC (2013): Climate Change 2014: Impacts, Adaptation, and Vulnerability. Working Group II Report.; IPCC (2014): Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

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