

This research proposal aims to evaluate how the development of cities influences urban heat islands - areas of excessive temperatures, bad for human health, and to explore the mitigating possibilities by extending urban greenery and water in Beijing and Warsaw.

Climate change involves an increase in surface air temperature, especially problematic in urban areas. Cities are under the pressure of rapid development, which worsens the urban heat islands effect. Urban greenery and water bodies can mitigate the heat effect. However, it appears difficult to adequately plan green areas in cities due to multiple economic and social demands and pressures. Additionally, cities still experience constant rapid growth, so it's important to adequately plan for the development and minimize the urban heat island effect.

In this study, two cities will be investigated, Beijing and Warsaw. In the first step, high-resolution simulations will be performed to detect the spatial and temporal characteristics of urban heat islands in both cities. Based on that, it will be identified to what extent urban greenery influence could be enhanced by water bodies in Beijing and Warsaw.

Secondly, the perception of thermal comfort will be determined by residents using applications on their mobile phones. It will allow for determining human thermal comfort in areas with different levels of greenery within a hot season. Moreover, the perception of ecosystem services provided by greenery and water will be analyzed to understand the social conditions for mitigating the urban heat island effect.

Thirdly, the spatial data simulations will be combined with thermal comfort perception data, which would be instrumental in developing urban heat islands mitigation strategies for both cities.

Results from the research project include datasets of surface air temperature over Beijing and Warsaw, as well as analysis of the data and comparisons of thermal conditions in Beijing and Warsaw. Analysis of residents' thermal comfort and their perception of urban heat islands will be collected as well, which will allow an understanding of how is this issue viewed by people who live in these cities.

The results will lead to developing options to mitigate heat island effects in future development in both cities. The proposed options will be confronted with stakeholders' judgments, leading to recommendations regarding planning and urbanization policies in China and Poland.