

RESEARCH ON THE THERMAL ENVIRONMENTAL EFFECTS OF URBAN WATER BODIES (CASE STUDY OF HANGZHOU)

Bachelor's thesis

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ABSTRACT

The relevance of the research: As China's economy booms and urbanization accelerates, the issue of urban heat island effect has become increasingly prominent. This study focuses on Hangzhou City, utilizing Landsat remote sensing images from 1985 to 2020 to analyze land surface temperature (LST) and its relationship with land use changes. Thermal profile analysis reveals the spatial distribution pattern and trends of LST in Hangzhou.

The object of this study : Landscape pattern indices are computed using a 480m*480m moving window to study the response of urban LST to different land cover types. Additionally, land use information from four water bodies in Hangzhou is extracted to quantitatively analyze internal average land surface temperatures, water body cooling intensity, and propose a cooling distance threshold for water body cooling island effect.

The purpose of this qualification work is to analyze the land use types in the study area. To achieve the purpose of the study, the following **results** were shown:

1. Urbanization in Hangzhou leads to increased impervious surfaces, exacerbating the urban heat island effect and causing negative impacts on the urban environment and residents' lives. Moreover, land surface temperature increases with distance from the city center, forming an urban-rural temperature gradient.

2.The urban construction pattern in Hangzhou is similar to the spatial distribution characteristics of heat islands, with higher heat island effects on impervious surfaces and lower temperatures in green spaces and water bodies.

3.Significant correlations exist between selected landscape pattern indices and land surface temperatures of different land cover types, particularly indicating the cooling effect of water bodies.

4.Water bodies such as the Qiantang River, West Lake, Beijing-Hangzhou Grand Canal, and Xixi Wetland exhibit notable cooling effects, especially in spring and summer, influenced by seasonal changes, water characteristics, and surrounding land cover distribution.

These findings are crucial for effectively managing water body landscapes and mitigating the urban heat island effect.

Structure of the work. The qualification work consists of 3 sections, an introduction and conclusions, laid out on 52 pages. Contains 10 figures and 9 tables.

Keywords: temperature inversion; long-time series; water body cooling; land use; landscape pattern

