

Master's thesis investigating bird songs in urban landscapes

Background

This master's project is part of the CitySoundscape project (www.citysoundscapes.de), which aims to guide sustainable urban planning by designing urban green spaces that promote biodiverse ecosystems and create beneficial sound environments for city residents. This project studies how bird songs travel in urban landscapes. This framework is essential for understanding how urban infrastructure, such as buildings and parking spaces, affects sound transmission in cities. Overall, this knowledge will contribute to the development of models that predict the diversity of natural sounds in urban environments, thereby offering valuable insights for the design and planning of green spaces and the surrounding urban infrastructure.

Details

Acoustic communication plays a crucial role in birds for various inter- and intraspecific interactions, such as attracting females and defending territories. In urban settings, birds encounter unique challenges when it comes to singing. For instance, noise from transportation can mask natural sounds, significantly reducing the area where a bird's song can be heard. Moreover, the structures of roads and buildings can either obstruct sound propagation, such as tall buildings acting as barriers, or enhance it, as roads bordered by buildings may amplify sounds. While several studies have examined the impact of human-generated noises and the three-dimensional shapes of urban buildings on sound propagation for landscape planning, it remains to be explored how bird songs propagate within urban environments. The student will address this gap by conducting propagation experiments in urban areas of Munich. This will involve playing bird songs through a loudspeaker at progressively increased distances from a recording device. The experiments will allow for the mapping of how sound degrades as the distance from the recording device increases. They will be repeated at multiple locations within Munich, taking into account different landscape configurations. The objective is to predict how various landscape arrangements and human noise levels affect the detection space of bird songs in the city.

Fieldwork

Several days of fieldwork, six hours each day, with some flexibility depending on weather conditions. Field work for this thesis will be conducted in coordination with other parts of the overall project in spring.

Data Analysis

(1) Label and analyze already collected test records; (2) Analyze the recordings using Python or R; (3) Perform landscape analysis by summarizing landscape features at each location using spatial data; (4) Conduct spatial data analysis.

Requirements

Previous experience with GIS, Python or R is highly beneficial but not required. Experience with the identification of German birds by sound is a plus. Driver license preferred. The fieldwork will aim to start in spring 2025/2026. The thesis will be supervised in English.

Application Procedures

To apply, send your CV/Resume, two reference contacts, and a one-page motivation letter to Dr. Michela Busana (m.busana@tum.de), Prof. Dr. Monika Egerer (monika.egerer@tum.de), and Leonie Schulz (leonie.schulz@tum.de). For inquiries, please contact us.

Deadline: Open until filled.