

Pollinating insects have become an important group in raising public awareness about the impact of human activities on biodiversity. Bees, butterflies, and hoverflies are crucial pollinators for many cultivated and wild plants. The urban landscape differs significantly from natural and semi-natural areas. Urban green spaces, especially parks, often feature a high presence of plants from foreign origins. Additionally, extensive urban development and hardened surfaces, along with road networks, act as barriers limiting the movement of insects. Moreover, not all urban green areas are equally valuable for maintaining high diversity and abundance of pollinating insects. This is due to differences in vegetation and the management practices of these areas. In many cities, areas relatively untouched by urban development can still be found, acting as so-called "hotspots" characterized by high biological diversity due to their similarity to natural areas. These are often composed of urban meadows, relatively large areas with wild vegetation left unmanaged. Despite numerous studies focusing on the negative impact of increasing urbanization on the alpha and beta diversity of fauna and flora, leading to biotic homogenization, there is limited research on such an important group as pollinating insects. In this project, we will focus on the influence of urbanization and types of urban greenery on the biological and genetic diversity of three groups of pollinators: bees, hoverflies, and butterflies. The project will address three main research questions: Q1) How does urbanization affect the taxonomic, functional, and phylogenetic diversity, as well as the community assemblages of pollinators in cities? Q2) Does the process of urbanization lead to biotic homogenization within habitats in the city and across cities? Q3) What is the impact of urbanization on the genetic diversity of pollinators along an urbanization gradient? The research will be conducted in various habitat types: city parks, areas around residential complexes, and urban meadows across different urbanization gradients in three major cities in Poland—Poznań, Wrocław, and Warszawa—as well as in adjacent semi-natural areas around these cities. We plan to assess alpha and beta diversity indicators to understand the impact of habitat type and urbanization level on pollinator diversity. To achieve this, we will employ not only a classical taxonomic approach but also functional and phylogenetic indicators. Genetic diversity along the urbanization gradient will be examined for three selected representative species of bees, butterflies, and hoverflies. The study will involve SNP genotyping and bioinformatic procedures to explore genetic variation within the urbanization gradient and the potential influence of environmental variables on genetic populations. Understanding the dynamics through which urbanization shapes pollinator communities is crucial for developing effective conservation strategies and promoting biological diversity in the urban environment. This project aims to fill this knowledge gap.