Human activities are causing rapid degradation of natural ecosystems creating novel sources of ecological disturbance for organisms. Among these anthropogenic changes, global warming is of particular concerns because of its major effects on biodiversity, especially in freshwater ecosystems. . To date, the impacts of human activities, in particular global warming, have been mostly studies across large environmental gradients, e.g. latitude or elevation. In comparison, little is known about the impact of global warming at a microgeographic scale, between habitats spanning different natural and urbanized environments, vegetation density or topologies. Indeed, different habitats, i.e. rural and urban environments, even separated by few kilometres may differentially affect the development of an organism and their response to a rise of temperature. It is therefore important to investigate the effects of human activities on organisms across different environments in order to predict their responses to future environmental changes and, ultimately, prevent local extinctions.

The goal of the current project is twofold; first, I aim at investigating intraspecific variations in field-collected adults and in their offspring raised in growth chambers across a diversity of ponds. Second, I will further explore to what extent microgeographic variations affect larval response to a rise of temperature at the physiological and gene expression level.

The study system will be the blue-tailed damselfly *Ischnura elegans*, a common freshwater insect, widespread in Europe. In the first part of the project, adult damselflies will be sampled across a diversity of ponds spanning different types of environment, i.e. urban, rural or forested habitats, located in Southern Poland. Adult damselflies will be screened for various life-history traits (body size, wing morphology) to further investigate to what extent these traits vary between ponds.

In the second part of the project, adult females will be collected in different ponds and their larvae will be raised in growth chambers under three temperature treatments: 20 ºC corresponding to current water temperature during the growth season, + 3 ºC and + 6 ºC above the current temperature, corresponding to different climate change scenarios. At the end of the experiment, larvae will be screened for some life-history traits (body size, growth rate) and for some physiological parameters related to energy storage. In addition, a gene expression analysis will be conducted to identify relevant gene and metabolic pathways affected by the temperature treatments with respect to their ponds of origin.

This project will clarify how human activities impact organisms at multiple levels from the phenotype to gene level and their future response to global warming. The results will reveal phenotypic traits and relevant metabolic pathways affected by the temperature treatments with respect to their ponds of origin and highlight potential negative or positive effects of certain types of environment on traits related to development, survival and reproduction.