

European Union Marie Curie International Outgoing Fellowship (IOF) for the project "RAPIDEVO" (Grant Agreement Number 300077).

Title

Rapid evolutionary responses to climate change in natural populations: Integrating molecular genetics, climate predictions and demography into an eco-evolutionary modelling framework.

Abstract

Intensification and increased frequency of weather extremes is emerging as one of the most dramatic aspects of climate change. Thus, the study of ecological implications of global-scale changes is expanding from a focus on trends (e.g., mean temperatures) to broader investigations including the effects of extreme events and associated catastrophic disturbances (e.g., floods, fires, droughts). However, investigations exploring adaptations of individuals and species to altered patterns of extreme events are still rare and overarching studies are greatly needed. Crucially, rapid evolutionary and adaptive processes are highly relevant for understanding and predicting species responses to changing climate trends. I propose to investigate the selective consequences of periodic catastrophic disturbances on genetic diversity and life-history traits, using marble trout (*Salmo marmoratus*) populations living in Slovenian streams as a model system. In this system, flash floods and debris flows causing massive fish mortalities are increasing in frequency and intensity.

I will use an innovative multidisciplinary and interdisciplinary approach, combining (i) molecular genetics, (ii) demographic analysis and statistical characterization of temporal and spatial patterns of flood events, and (iii) life-history, demographic and eco-evolutionary modelling, to understand and predict the selective consequences of the altered pattern of catastrophic disturbances on the genetic composition and life-history traits of marble trout. Bringing together genetic, climatic, life-history and demographic aspects in this model system will allow the development of an overarching and general modelling and conservation framework for rapid evolutionary and adaptive processes, and establish a reference of how to explore the consequences of climate change-induced intensification of weather extremes on natural populations.