SPRING AWARD Report [2018, June]

Myrna Barjau Perez Milicua

Name:

Impacts of climate change and invasive species on structure and function of freshwater ecosystems.

Thesis Title:

Christopher Hassall, School of Biology, Faculty of Biological Sciences

Supervisor, School and Faculty:

****My PhD focuses on the interaction between climate change (e.g. warming, drought) and biotic stressors (e.g. biological invasions) and on the impacts of this interaction on biodiversity and key processes of freshwaters ecosystems. Environmental variation (also known as noise) may cause fundamental alterations in the dynamics and structure of communities because it influences the duration of favourable environmental conditions and the time that organisms have to acclimatize. Temperature is usually positively auto-correlated (“red” noise) over short timescales (hours-days), which means that temperatures change relatively slowly over time. The increasing frequency and severity of extreme climate events is predicted to lead to a “whitening” of environmental variation (“white” noise is random variation, not autocorrelated) and their effects on aquatic communities’ remains poorly unknown. Therefore, the goal of my research is to use laboratory experiments (microcosms) to measure the effects of different types of environmental noise in temperature variation on the survival and respiration rate of two amphipod species that are key shredders in UK water systems, *Gammarus pulex* and *Dikerogammarus villosus*, as well as their leaf litter processing rates, as a measure of ecosystem function.

Microcosm on a heating pad, containing one of the focal species (*G. pulex*).

Thanks to the SPRING award from water@leeds I was able to buy a Raspberry Pi and heating pads to start the pilots to create heatwaves with auto-correlated and uncorrelated temporal variation in temperature and warm up microcosms containing the focal species. Using open source components, such as Raspberry Pi, will allow us to create complex temperature profiles with a lot of variation, while previous work has relied on larger incubators that have limited flexibility in temperature treatments. This is an exciting experimental approach that has not been widely explored, particularly using this type of microcontrollers to imposed heatwaves with environmental noise on aquatic systems. Our expected results will allow us to better understand the impact of the different types environmental noise on the survival and performance of key freshwater species with differential tolerance to temperature, and the possible implications of this on native and invasive species.

I will strongly recommend the SPRING award to all PGR’s at the water@leeds DRTC. The whole application process is easy and the support throughout is amazing.