Mutualistic populations in a shifting habitat

Andriamihaja Ramanantoanina

Department of Mathematics and Applied Mathematics, University of Pretoria, 0002 Pretoria, South Africa

a.ramanantoanina@up.ac.za

The suitable habitat for various species is moving geographically as a result of changes in the global climate. Facing this change, the species' only chances of surviving are to follow the shifting, suitable habitat or to remain and adjust to the worsening environment. In this talk, we explore the dynamics of populations in a shifting habitat with a particular focus on the spatiotemporal dynamics of mutualistic populations. Mutualism is defined generically as an interaction that benefits both populations. Mutualism offers benefits in three main categories: birth, death, and habitat acquisition.

In this work, we develop models with shifting habitats based on integrodifference equations. We assume that habitats suitable for the populations shift at the same rate. Models for single species indicate that populations with moderate dispersal rates are more likely to survive in shifting environments [1]. In this work, we use the mutualism models to evaluate how different forms of mutualism increase population survival. The results suggest that, in comparison to mutualism that encourages reproduction, mutualism that impacts habitat acquisition contributes more to population survival.

References

[1] Y. Zhou and M. Kot, Life on the Move: Modeling the Effects of Climate-Driven Range Shifts with Integrodifference Equations, *in: Dispersal, Individual Movement and Spatial Ecology*, 2013.