

sDiv Workshop
***“Synthesising population, community, genetic and evolutionary
dynamics in a simulation platform: a tool for theory and application”***
28.10. – 1.11.13
Workshop Summary

Summary

This workshop was the fourth workshop of the joint initiative “EcoEvol - Eco-evolutionary approaches to understanding and predicting the response of species and ecosystems to climate change”, coordinated by the DIVERSTIAS core projects biogenesis and bioDISCOVERY. It was the first workshop in the series hosted by sDiv. sDiv provided an inspiring environment for intensive discussions and the development of new collaborations.

The workshop aimed to increase understanding of species range shifting responses to climate change by synthesising ecological and evolutionary knowledge with one common modelling platform “Rangeshifter”.

Main workshop topics:

1. Identification and theory development of impacts of biotic interactions (individual variability and species interactions) on species range shifts
2. Implementation of impacts of biotic interactions on one or more focal species in RangeShifter

Workshop program

The workshop started off with inspiring presentations that were open to a wider public. The presentations pointed out the importance of biotic factors and processes (movement decisions, adaptation, evolution and interspecific interactions) for species’ range shifting. To understand range shifts, these factors cannot be considered in isolation.

The presentations in their variety reflected the notion that knowledge on species responses to climate change, although continuously increasing, remains scattered. Specific example systems provide profound empirical and theoretical insight. There is, however, a gap in understanding the mechanisms how biotic factors affect species response to climate change.

To synthesise available information and improve mechanistic understanding, the workshop followed five strategies

- One simulation platform RangeShifter: restriction to one model ensures comparability of modelling outcome across a variety of ecological systems (featuring their specific factors). The simulation platform also provides the link between theory and application. During the workshop, participants familiarised themselves with the software tool and provided suggestions for its improvement.

- Interlinking empirical studies, modelling and theory development: Introduced by brief presentations several working groups were formed that joined together empirical and modelling expertise. Topics comprised synthesis and advances in theory of range limitations, the impacts of species interactions on the species dispersal process. Several case studies were defined on seed dispersal among forest fragments as well as ecoevolutionary responses to environmental change of salamander-pond communities, daphnia-pond communities, mudsnail variability, butterfly-host plant interactions and hybrids of raspberry species. The working groups identified research questions and tasks for follow-up work (e.g. necessary enhancements to the RangeShifter software). These working groups have dedicated themselves to continue collaborative research.
- Empirical studies stimulate theory development, theory stimulates experiments: One outcome of the working groups over time is planned to be the mutual stimulation of theoretical and empirical studies. First steps have been taken during the workshop, e.g. on the optimal setup of an evolutionary model for species range shifts. These discussions will continue and will be substantiated by experience from the on-going collaborative work.
- Devising a synthesis and perspectives paper to define future research on species range shifts: The manuscript describes operable research tasks to further mechanistic understanding of species range shifts. Examples for the impact of evolution and interspecific interactions will be analysed with the RangeShifter software.
- Dedicated programmers and postdocs: Working tasks identified during the workshop require comprehensive modelling, simulation and analysis. This work will be shared by several workshop participants. sDiv additionally hired one dedicated postdoc to support the working group.

Workshop outcome summary

The workshop identified urgent research questions for theory and empirical research on species responses to environmental change. It became obvious that niche adaptation and evolutionary processes will impact future species shifts. Range change also involves invasion of new areas with subsequent interactions with local species. The impact of interspecific interactions for species ranges appears to be diverse and hardly understood.

The workshop participants have formed working groups to continue research along specific case studies. To synthesise their work, the working groups will be seconded by theory development.

Participants

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Schmitz	Andreas	UFZ - Helmholtz Centre for Environmental Research	
Singer	Alexander	Deutsches Zentrum für integrative Biodiversitätsforschung (iDiv) Halle-Jena-Leipzig	http://www.idiv-biodiversity.de/sdiv/workshops/workshop-postdocs/vcard_item_950708/detail



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