



The Research Group

Ecology and Biodiversity

has the honor to invite you to the public defense of the PhD thesis of

Joren Snoeks

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

**The ecological dynamics of inselberg rock pool communities -
from local to global scale**

Promotors:

Prof. dr. Bram Vanschoenwinkel (VUB)

The defense will take place on
**Friday, February 23, 2024 at 16h in
auditorium D2.01**

Members of the jury

Prof. dr. Iris Stiers (VUB, chair)
Prof. dr. Kristien Brans (VUB, secretary)
Prof. dr. Thomas Merckx (VUB)
Dr. Tom Pinceel (KU Leuven)
Prof. dr. Frederik De Laender (Université de
Namur)

Curriculum vitae

Joren obtained his Master of Science in Biology at KU Leuven in 2017. Afterwards, he started his PhD research at the VUB with the Department of Biology. His research interests include the fields of aquatic ecology, macroecology, and community ecology. He has one article published as a first author and three articles as a co-author in peer-reviewed journals. As an assistant, he has also assisted in several courses and excursions and supervised numerous bachelor's and master's thesis students.

Abstract of the PhD research

In resistant bedrock, eroded depressions can form which may periodically hold water after rain. Such freshwater rock pools form a peculiar habitat for aquatic organisms. These rock pools are often associated with inselbergs: isolated rock outcrops in the landscape that have been inspiring scientists and adventurers throughout the ages. Rock pools can be harsh environments where organisms need to cope with drought, high irradiance, and unpredictable and fluctuating environmental conditions. This has led to a surprisingly high floral and faunal biodiversity. This PhD provides a first attempt to integrate patterns across spatial scales from case studies on local inselbergs to analyses at global scale to fill four major knowledge gaps.

In the first study, we demonstrated that rock pool biodiversity was higher than and strongly differentiated from the other aquatic systems that exist in the same landscape. This study shows how unique rock pools can be, compared with other temporary wetlands, supporting their conservation value.

In the second study, we used rock pools as model systems to answer macro-ecological questions. Rock pools are discrete entities with clear boundaries and can be seen as a double insular system, with clusters of rock pools on isolated inselbergs. Because of this clear hierarchical structure, we could quantify variables that affect biodiversity and ecosystem functioning on two scales: the local (rock pool) and regional (inselberg) scale. We showed that, contrary to our hypothesis, not regional but local biodiversity was generally associated with higher ecosystem functioning. This relationship was quite variable but more positive in highly mobile organisms.

In the third study, we found that, over a period of 25 years, rock pool communities become more differentiated and underwent strong taxonomic and functional shifts. We found that this was the result of a strong decline in crustaceans both in terms of diversity and occupancy. Insects, on the contrary, did better than 25 years ago. We demonstrated that these changes were at least partially related to climate-driven changes in rock pool hydrology.

In the final study, we showed that feral goat dung tends to accumulate in deeper rock pools and that this eutrophies these relatively small freshwater ecosystems. While this eutrophication did not result in dramatic reductions in invertebrate richness just yet, it did alter the community structure, seemingly benefitting specific groups like large branchiopods.

The first two studies illustrate and support the value of rock pool biodiversity, while the last two studies give a first confirmation that rock pool communities are indeed changing under global change.