

sDiv working group meeting report

“sPriority - Mechanisms and Quantification of Priority Effects”

During the second sPriority meeting held on 26-30 September 2022, we continued to work on all of the three objectives of this working group:

- Objective 1: Writing an opinion paper to highlight the pervasive nature of priority effects in biology. In addition to defining priority effects and providing a brief history of the concept, this paper also aims to describe how a diversity of subfields in biology identify and study patterns consistent with priority effects, as well as to identify outstanding questions for this field to move forward. We focus on inhibitory priority effects in this paper, not because they are more important than facilitative priority effects, but because the literature so far is richer for inhibitory ones.
- Objective 2: Conducting a quantitative analysis (meta-analysis) on the strength and direction of priority effects across organisms and ecosystems using data from experiments that explicitly manipulated the order of arrival of species.
- Objective 3: Investigating the importance of historical contingency and priority effects in structuring plant biodiversity using data from the Global Restore Project (GRP) spearheaded by Emma Ladouceur and Jonathan Chase (iDiv).

On each day of the week of the meeting, we first met as a whole group to discuss general directions and next steps for each objective. We then split into three groups each focused on one of the three objectives to make progress with drafting the manuscript (objective 1), discussing to decide how to analyze data extracted from papers, extracting data from papers for meta-analysis, and coding to prepare for the meta-analysis (objective 2), and discussing and deciding what data to use from the GRP dataset and how to analyze data (objective 3). Some members moved between the sub-groups as needed. At the end of the final day of the week, we met again as the whole group to decide the next steps. Most members participated in person, but a few did remotely via Zoom.

The working atmosphere was excellent. We found it much easier to work together in person, compared to the first sPriority meeting, where about half of the members, mostly based in North America, had to participate virtually. The logistical support from the iDiv staff was very helpful, and we cannot think of any feedback to give for improvement, except that we wish there was adequate financial support for full-member participation at iDiv for the next (third) meeting.

Since the second meeting, members of sPriority have continued to actively work on the three objectives and we expect to have one manuscript published (objective 1) and two manuscripts ready for submission to peer-reviewed journals (objectives 2 and 3) by the end of 2023.

James Stroud (Washington University, St Louis, USA) has been leading the writing of our opinion paper (objective 1). The first draft of this manuscript is currently being revised by all working group members. We expect to submit this paper to Trends in Ecology and Evolution (or potentially Ecology) in early 2023.

The meta-analysis work (objective 2) is led by Chelsea Little (Simon Fraser University, Canada). Members of sPriority who are involved in this sub-project are currently building a database with data and moderators extracted from 142 papers that meet our inclusion criteria, which we identified by manually screening our initial set of 3,187 papers. Relevant papers published in 2022 will also be added to this database. Our sPriority database will be a unique output for our working group as it will provide the effect sizes we are currently quantifying from each of the 142 papers for our first meta-analysis (objective 2), but also to conduct additional synthesis work on priority effects in the future. We are also developing an R package (led by PI Delory) linked to our sPriority database to calculate effect sizes using different priority effect metrics. We expect to submit the manuscript presenting the results of our first meta-analysis to the Synthesis section of Ecology Letters at the end of 2023.

The third objective of our working group is to use restoration data from the Global Restore Project database to test for priority effects in plant communities undergoing restoration. This work is led by Emma Ladouceur (iDiv). Plans for data selection and analysis were thoroughly discussed at our second sPriority meeting in September 2022. We aim to submit the manuscript presenting the results of these analyses at the end of 2023.

In November 2022, members of the working group, led by Fletcher Halliday (University of Zürich, Switzerland), submitted a proposal for an Organized Oral Session ("When does history matter during community assembly?") at the annual meeting of the Ecological Society of America to be held in August 2023.

The third sPriority meeting will be held at iDiv on 9-13 October 2023 to finalize work on all objectives.