

sDiv working group meeting summary

“A global soil biodiversity database and its application to data synthesis and theory development (sWORM)”

Biodiversity patterns of soil biota and the factors which drive these patterns remain poorly understood, particularly at broad scales. Yet, soils may harbour the greatest biodiversity on earth per unit area and support a range of ecosystem functions, benefiting humans worldwide. Consequently, quantitative synthesis to understand and predict global biodiversity patterns of soil organisms, as well as the effects of anthropogenic disturbances on this biodiversity, is critical. However, synthesis and theory development in soil ecological research is currently limited by the availability of soil biodiversity data.

Throughout the week the sWorm working group, both those at iDiv as well as those participants who assisted remotely, spent time together and in subgroups to focus on three aspects to address these gaps in our knowledge.

Soil Biodiversity Theories

In this subgroup the four days of the meeting were focused on biodiversity theories; Can biodiversity theories, which are typically developed for aboveground diversity, be applied to belowground diversity? And, if there is more biodiversity belowground, can any of these biodiversity theories explain why?

The group discussed the unique properties of soil that might explain why there might be higher diversity belowground than aboveground – for example, the unique 3D structure, as well as the temporally unstable soil aggregates. The issue of scale was a common theme throughout the discussions, as some of the biodiversity theories could be applied to a range of spatial scales, potentially changing the expected pattern.

Going forward, an in-depth literature review will be completed, which will serve as a basis of a paper that discusses biodiversity theories and how they might explain observed biodiversity patterns belowground.

Global Earthworm Diversity

In order to determine large scale patterns in belowground biodiversity, earthworm diversity data had been collated prior to the first workshop with some preliminary analysis and ideas presented to the group during the week. Evidence exists linking earthworm ecological groups (anecics, epigeics and endogeics) directly to ecosystem functions that are relied upon for human wellbeing. During the week we collated evidence of these direct links. We aim to continue collating data in order to analyse global patterns in

earthworm diversity, with analysis focusing on the three ecological groups, and modelling how they might change under future climate scenarios.

Until the next workshop, data will continue to be collated and analysis performed, so that the focus of the next workshop can be on the results and the manuscript. Preliminary results will also be presented at various conferences in the coming months, in particular, the 2nd Global Soil Biodiversity Conference in China. In addition, a second manuscript will also be written that will go alongside the dataset we collate, as we plan on making the dataset open access.

Soil Biodiversity Database

Currently, most global biodiversity databases are biased towards aboveground biodiversity. We aim to start the process towards creating a database where the focus is shifted belowground. During the workshop we decided that the best approach was to initially focus on a single taxa before expanding methods to other taxa. As earthworm diversity data is currently being collated, we decided that starting the database using the earthworm data would be most efficient.

To provide inspiration for discussions on developing a database that satisfies the needs of both scientists (easy data download and metadata available) and policy makers and the general public (good map visualization), presentations were given by various members of the subgroup. These presentations sought to showcase other examples of biodiversity databases as well as platforms that host and visualize data.

Discussion also focused on establishing the longer term plan, and how such a large task could be started by a relatively small number of people. Open questions remain on the best way for the database to be structured to capture as much data as possible, that is both ecologically meaningful and consistent across a range of taxa, as well as how to coordinate with other existing projects to prevent doubling of efforts.

Overall, the workshop was a great success, and all participants agreed that we had thought-provoking discussions and a clear plan for going forwards to achieve our goals.

**Participant list**

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