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sDiv working group meeting report
”sFragment”

Working group meeting report

Assessing how the relative impacts of landscape fragmentation, compared to habitat loss, affect functional diversity and its connection to species richness across spatial scales remains a complex challenge. Our working group (*sFragment*) is tackling this issue by employing a spatially explicit, multiscale, and reproducible framework that integrates information of plant and bird communities sampled in multiple landscapes from different regions of the world. Our framework draws on the expertise of a diverse group of researchers with many years of experience that provide a wide range of expertise across functional ecology, community ecology and landscape ecology. Our group includes researchers that have worked in different countries from the Global South and the Global North. We are at different career stages, ranging from PhD students to a professor, including eight early and mid-career researchers holding a PhD degree. English is the second language for eight out of the 10 members (5 women and 5 men).

A framework developed during our first meeting and accepted for publication in *Trends and Ecology and Evolution* highlights the utility of focusing on particular trait combinations to predict fragmentation effects on biodiversity. During our second meeting in September 2025, we leveraged on the diverse background of our working group to generate a workflow aimed at testing the hypotheses from our perspective piece using global datasets.

We are combining data from different taxonomic groups at different spatial extents (landscapes within different regions across multiple continents) that have not been evaluated before. As a proof of concept, we are focusing on forest dependent species from two taxonomic groups (plants and birds). These groups have distinct suits of traits that will allow us to test hypotheses regarding fragmentation effects on biodiversity. We have also chosen these groups because they are relatively well-sampled compared to other taxonomic groups. In addition, we are highly familiar with databases used to describe macroecological patterns of these species (eBird data (for birds) and sPlot (for plants)). Focusing on forest-dependent species also allows us to measure landscape metrics more easily and will avoid issues associated with analyzing habitats where landscape structure is more difficult to quantify. Most input data for the project is already available as the project is leveraging off access to state-of-the-art datasets, prior experience from group members managing big data and the necessary cloud computing.

During our second meeting, we focused on different activities that included filtering local assemblages from forest habitats in different ecoregions of the world. We then defined the extent of the landscapes of interest considering enough representativeness of sampling points. For each landscape, we calculated landscape metrics related to fragmentation and habitat amount and estimated taxonomic and functional diversity using available trait data. We also discussed modelling options to analyze the data and disentangle effects of fragmentation and habitat loss on different dimensions of functional diversity. The overall feedback for the meeting was highly positive, with participants expressing satisfaction across several aspects including time management and flexibility, proper division of tasks and responsibilities among team members, and balance of speaking time among participants. Attendees also highlighted the diversity of disciplinary expertise, which enriched the discussions and fostered a multidisciplinary approach to our perspective piece.

Over the next six months, we will have monthly virtual meetings to adjust our workflow to expand representativeness of local assemblages from georeferenced datasets. One major challenge is the poor data representativeness of plots in some regions such as South East Asia, and we thus need to look for alternatives that do not rely on sPlot open. Once we have finished collecting and curating all the datasets, we will quantify functional diversity metrics and taxonomic diversity across different ecoregions. We hope to use these analyses to generate a scientific article in a high impact journal that will 1) Compare and contrast the effects of fragmentation on landscape-level functional diversity (functional richness, evenness, and divergence) and taxonomic diversity and 2) Test whether different aspects of fragmentation affect the distributions of traits related to dispersal, life-history, and resource acquisition. Our fully reproducible framework will help to integrate data from global datasets covering different taxonomic groups and regions of the world, remote sensing data, and analytical tools. This framework will also be flexible enough to apply multiscale analyses (beyond patch and landscape) and other assemblages as new data becomes available. Our analysis is also helping us to highlight biases in current fragmentation studies and propose a research agenda to advance the understanding of multiscale fragmentation effects on ecological communities.