

sDiv working group meeting report

” sGUBIK - Synthesizing Global Urban Biological Invasion Knowledge: Patterns, Mechanisms, and Applications”

Focal areas of discussion, main results/conclusions and open questions

The week-long working group meeting focused on advancing five manuscripts for publication, covering our key themes in urban invasion ecology. Daily agendas combined group discussions to refine each manuscript’s structure, objectives, and methodological approaches, with breakout subgroups dedicated to intensive writing sessions. These discussions allowed for critical feedback, alignment of each paper’s focus, and progress on data analysis and interpretation. Main outcomes included substantial drafting of each manuscript, refinement of key arguments and conclusions, and a collaborative plan for completing and submitting the manuscripts.

General structure of the meeting

- The meeting began with a welcome session, the meeting’s overall objectives were outlined, focusing on the collaborative development of five manuscripts intended for publication.
- Each manuscript’s aims, scope, and target journals were reviewed, clarifying expected outcomes for the week.
- Participants were assigned to subgroups based on their expertise, ensuring each manuscript had a focused team for effective progress.
- The group held regular in-depth discussions on each manuscript, examining research questions, key findings, and analytical approaches. Participants provided feedback on content structure, refined research questions, and addressed methodological considerations, aligning each paper with its target journal’s requirements.
- Subgroups focused on writing, drafting, and revising specific sections of their assigned manuscript. Subgroup members worked collaboratively on introductions, methods, results, and discussion sections, while daily check-ins allowed the whole group to share updates, solve issues, and offer constructive feedback, keeping all manuscripts on track.
- Each subgroup presented a summary of their manuscript’s progress, key findings, and remaining work, giving the group a sense of overall progress and areas needing further attention.

- The group collaborated on finalizing a timeline for completing and submitting each manuscript, confirming responsibilities for any additional analyses or data collection.
- Plans for manuscript submission, including deadlines, next steps, and potential additional resources, were discussed to ensure a coordinated path to publication.
- Time was also allocated for emerging ideas to allow for new insights to be incorporated into future research opportunities.
- The meeting was a hybrid in-person and remote format, with most participants being present in the room and some participants joining online.

General research ideas, questions

Paper 1

We reviewed the extent to which urban areas are sources of biological invasions and evaluate which factors make urban areas vulnerable to biological invasions and shape the diversity and spread of non-native species. Relevant datasets: systematic review of the literature and relevant data captured in a database.

Potgieter, L.J., Li, D., Aronson, M.F.J., Baiser, B., Carboni, M., Celesti-Gradow, L., Kühn, I., Lacerda de Matos, A.C., Lososová, Z., Montaña-Centellas, F.A., Pyšek, P., Richardson, D.M., Tsang, T., Zenni, R.D. & Cadotte, M.W. (2024). Cities shape the diversity and spread of nonnative species. *Annual Review of Ecology, Evolution and Systematics* 55, 157-180. <https://doi.org/10.1146/annurev-ecolsys-102722-012749>

Paper 2

We incorporated multiple data sources and observations from experts to create a global repository of urban non-native flora for 553 urban centres from 61 countries across every continent except Antarctica. The GUBIC dataset includes 8,140 unique established non-native plant species from 253 families.

Next steps and deliverables: December 2024 to submit for publication. Target journal: *Ecological Solutions and Evidence*

Paper 3

We examine trait space for 2,777 native and non-native species in urban areas worldwide to determine if their positions along the major axes of ecological variation differ by species origin.

Relevant datasets: GUBIC dataset, TRY and Diaz et al. (2016) as reference study.

Next steps and deliverables: February 2025 to be submitted for publication. Target journal: *Science*

Paper 4

We combined trait availability of six plant traits used to derive the global trait spectrum (seed mass, leaf mass per unit area, height, leaf area, stem specific density, and leaf nitrogen) from three trait databases (TRY, BIEN, GIFT) with the GUBIC dataset that includes 66,362 species. We evaluated the representativeness of species that occur in urban areas in global trait databases. We specifically assessed 1) what proportion of the species with trait data globally are represented in urban areas; and 2) how many urban species had trait data compared to the global proportions, and specifically trait representation for the most widespread species - those that have been introduced to urban areas outside of their native range (i.e., non-native species).

Relevant datasets: GUBIC, TRY, BIEN and GIFT

Next steps and deliverables: February 2025 to be submitted for publication. Target journal: *PNAS*

Paper 5

Using the GUBIC dataset, we identify the most widespread non-native plants across urban centres of the world and within continents and biogeographic regions. We asked the following questions: (i) Are cities all around the world invaded by the same group of widespread species, or are there specific groups of naturalized species typical for particular geographic and biogeographic regions? (ii) Do cities within the same continent or biome share the same the widespread naturalized species? (ii) What is the origin of the most widespread naturalized urban species globally and do the continents and biomes differ in this respect?

Next steps and deliverables: February 2025 to be submitted for publication. Target journal: *Global Ecology and Biogeography*

Paper 6

We develop guidelines for sampling vegetation in urban ecosystems. Our approach uses a hierarchical decision tree for method selection based on study questions or objectives. Our goal is to design data collection that achieves each study's particular objective while securing the data that are easily integrated into larger datasets across cities.

Next steps and deliverables: July 2025 to be submitted for publication. Target journal: *Methods in Ecology and Evolution*

General working atmosphere and feedback on sDiv support (what kind of support? How helpful was it?)

The support provided by sDiv was excellent. The workshop fostered a positive and collaborative environment, allowing for significant progress in our work.