



Land-cover and land-use change through the Holocene: Wrapping up the PAGES LandCover6k working group

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The PAGES LandCover6k working group (Gaillard et al. 2015; pastglobalchanges.org/landcover6k) met in December 2021, via Zoom, for the final scheduled conference on the progress of the group (pastglobalchanges.org/calendar/26936). Thirty-six authors presented 29 papers, over four sessions, on regional reconstructions of land cover and land use, as well as the related topics of synthesizing and publishing the output of the project and collaborating with climate modelers. The meeting, originally planned to be held in person in Philadelphia in 2020, was moved online due to ongoing Covid concerns. While it was disappointing not to be able to host our colleagues in-person, the online format allowed many people to present, and a wider audience to attend, than might have been possible otherwise.

Global overview and regional progress

A global overview of the progress made during the working group's lifetime was provided by Marie-José Gaillard, Kathy Morrison, Marco Madella, and Nicki Whitehouse. Significant headway has been made with the publication of both land-cover and land-use reconstructions (e.g. Gaillard et al. 2018, Morrison et al. 2021, Githumbi et al. 2022) for the Holocene. These reconstructions are designed to help improve Anthropogenic Land-Cover Change (ALCC) scenarios such as HYDE 3.2 and achieve paleoclimate model simulation experiments (e.g. Strandberg et al. 2022). Four sessions were divided by global region, providing regional subgroups with the opportunity to provide updates on the progress of past land-use and land-cover change mapping. In a few regions, including Europe, China, and the Near East, data analysis is nearly complete for both pollen-based reconstructions of past land cover and archaeological data-based land-use maps. In many other regions,

work has progressed further for either land cover or land use. For land-use reconstructions, much of the discussion revolved around the different approaches that have developed for different regions, especially methods of interpolating archaeological site data to the regional scale, based on the differences in the availability of published site data and accurate ¹⁴C dates.

Integrating land cover and land use

Two key recurring topics discussed throughout the conference were the challenge of incorporating regional land-use data into a final global database so that it can be useful to climate modelers, and the challenge of integrating land-use and land-cover data. One important ongoing effort to do this comes in the form of a recently awarded PAGES data stewardship scholarship. This will help fund the long-term curation of pollen-based REVEALS land-cover reconstructions, gridded at 1° x 1° over 25 time windows throughout the Holocene (e.g. Githumbi et al. 2022), a new global historical Per Capita Land-Use (PCLU) database, and regional historic land-use data using the LandCover6k classification system gridded at 8km x 8km (Morrison et al. 2021). The REVEALS reconstructions for Europe, first (Trondman et al. 2015; Marquer et al. 2014) and second (Githumbi et al. 2022) generations, are already archived in PANGAEA (Gaillard 2019; Marquer et al. 2019, and Fyfe et al. 2021), as well as the land-use map for the Middle-East at 6 kyr BP (Hammer 2020).

The future of LandCover6k

This was the final conference of the PAGES LandCover6k working group in its current incarnation. However, a lively thread running through the meeting was the ongoing nature of the work, and the need for the work to continue. Discussions continue about how to finish individual publications, how collaborations between land-use and land-cover

researchers will endure, and how the results from regional land-use work will be brought together into the final global database, as well as new research directions.

One important change, as LandCover6k transitions to the next stage, will be in leadership. Marie-José Gaillard has recently retired and will step down as group coordinator for future iterations of the project. We thank Marie-José for her tireless work inspiring, organizing, and shepherding the group over the last seven years. We also wish to thank all colleagues worldwide who coordinated subgroups, provided and/or collected data, contributed to land-use and land-cover reconstructions, and worked on the publication of datasets and results. Last but not least, we are grateful to all members of the core group (Victor Brovkin, Jane Bunting, Anne Dallmeyer, Erle Ellis, Jed Kaplan, Kees Klein Goldewijk, Sandy Harrison, Boris Vannière, and Peter Verburg) and the rest of the coordinating group, in addition to the authors (Jennifer Bates, Oliver Boles, Andria Dawson, Esther Githumbi, Emily Hammer, Sandy Harrison, Furong Li, Stefania Merlo, and Marc Vander Linden) for the valuable discussions and exchanges of ideas during numerous meetings over the years.

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REFERENCES

- Fyfe RM et al. (2021) PANGAEA, doi:10.1594/PANGAEA.937075
- Gaillard M-J et al. (2015) PAGES Mag 23: 38-39
- Gaillard M-J et al. (2018) PAGES Mag 26: 3
- Gaillard M-J (2019) PANGAEA, doi:10.1594/PANGAEA.897303
- Githumbi E et al. (2022) Earth Syst Sci Data, doi:10.5194/essd-2021-269
- Hammer E (2020) PANGAEA, doi:10.1594/PANGAEA.922243
- Marquer L et al. (2014) Quat Sci Rev 90: 199-216
- Marquer L et al. (2019) PANGAEA, doi:10.1594/PANGAEA.900966
- Morrison KD et al. (2021) PLoS One 16: e0246662
- Strandberg G et al. (2022) Quat Sci Rev 281: 107431
- Trondman AK et al. (2015) Glob Change Biol 21: 676-697

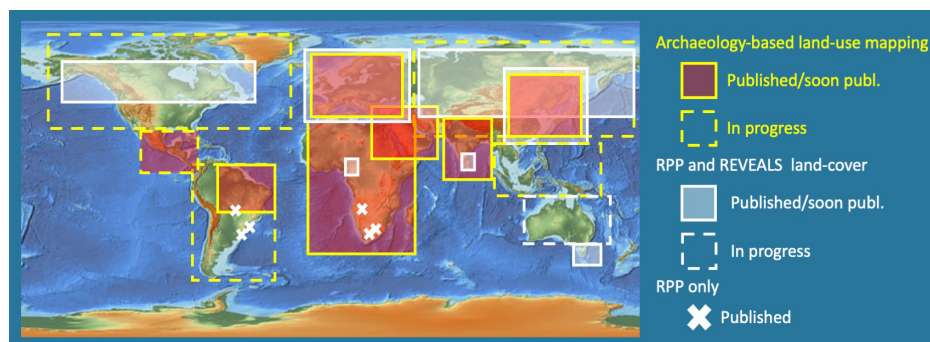


Figure 1: Progress of PAGES LandCover6k publications by region (image credit: K.D. Morrison, M.-J. Gaillard).