

Land-use classification

Kathleen D. Morrison¹, M.-J. Gaillard², M. Madella³, N. Whitehouse⁴ and E. Hammer⁵

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LandCover6k builds Holocene land-cover reconstructions for the purpose of climate modeling (Gaillard et al. 2015), with a focus on anthropogenic land-cover change (ALCC). Existing ALCC models vary significantly (Gaillard et al. 2010), highlighting the need to evaluate and improve model outputs using paleoenvironmental data, here primarily pollen data. While pollen-based land-cover data provide checks on, or alternatives to, ALCC models, they do not address the causal relationships underlying human modification of environments, which stem from past land-use practices. Land-use practices vary significantly across regions so that, for example, extrapolations from temperate zone cases almost certainly misrepresent the impact of farming in the tropics, or in regions without large animal domesticates (Morrison 2015). Further, similar numbers of people in the same environment practicing different forms of land use will have different effects on vegetation. Because the environmental effects of human population are mediated by land use, they are a challenge to model.

The land-use group (group 6) of LandCover6k integrates and maps historical, archeological and geographic data on human land use over the last ten thousand years. To accomplish this, new modes of data sharing, classification and data management need to be developed. Therefore, the goals of the workshop were to: (1) build this new research community; (2) explain the goals of LandCover6k; (3) develop basic global-scale, land-use categories applicable to the entire project; and (4) evaluate requests from the climate-modeling community for information on past human activities such as burning, tillage, livestock grazing and wood harvest.

Although designed as the first meeting of land-use coordinators for each of the continental-scale groups, the meeting was open to all. Forty-four people from 15 countries attended, including pollen analysts, modelers and representatives from PAGES' Global Paleofire Working Group. The workshop focused on the problem of land-use classification; many existing classifications conflate land cover and land use ("forest", for example, is not a land-use category as people may use forests in diverse ways) and thus cannot be used for this purpose. Our land-use classification is both hierarchical and scalable, with a small number of categories at the highest level, and more in each of the two lower levels. Participants agreed the highest, global-scale level of categories



Figure 1: Masinagudi, Tamil Nadu, India. Grazed hill in foreground, tree-bordered fields in middle ground, and forested slopes of the Nilgiri Hills in background. Farmers in this semi-tropical region grow subsistence crops such as rice and pulses as well as spices and other cash crops; nearby forests have been closed for wildlife protection. Prior to the loss of forest access, local farmers practiced forms of agroforestry which maintained denser woody cover. Population figures have not changed significantly, but land-use changes have led to differences in regional vegetation through time (photograph KD Morrison).

applicable from the early Holocene to CE 1850 will be: (1) no evidence for human land use, (2) foraging (hunting and gathering), (3) farming, (4) pastoralism, and (5) urbanism and/or extractive land use (such as mining or quarrying).

Additional subgroups were created, including: (1) separate groups for the CE 1500 and 1850 time windows where strict research separation between historians and archeologists exists, (2) a new group for the Mediterranean and Middle East, and (3) separation of Eastern and Western Europe. Data collection and management issues dictate most of these changes; global-scale synthesis is still planned.

Further details can be found on the LandCover6k website www.pastglobalchanges.org/ini/wg/landcover6k/intro, and

the LandUse6k website <http://landuse.uchicago.edu/>.

AFFILIATIONS

¹Anthropology, University of Chicago, Chicago, USA

²Biology and Environmental Science, Linnaeus University, Kalmar, Sweden

³Humanities, University Pompeu Fabra, Barcelona, Spain

⁴Geography, Earth, and Environmental Sciences, Plymouth University, UK

⁵Oriental Institute, University of Chicago, Chicago, USA

CONTACT

Kathleen D. Morrison: morrison@uchicago.edu

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