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Climate-human-environment interactions: resolving our past

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Abstract. The paper reviews how we can learn from the past about climate-human-environment interactions at the present time, and in the future. It focuses on data sources for environmental change at local/regional and regional/global spatial scales, and shows the scope and limitations of each. It reviews alternative methods for learning from the past, including the increasing use of simulation models. The use of multiple records (observational, palaeoenvironmental, archaeological, documentary) in local case-studies is exemplified in a study from China, where independent records help unravel the complexity of interactions and provide a basis for assessing the resilience and sustainability of the landscape system. Holocene global records for Natural Forcings (e.g. climate and tectonics), Human Society and Ecosystems are reviewed, and the problems of reconstructing global records of processes that are only recorded at local scales examined. Existing regional/global records are used to speculate about the veracity of anthropogenic forcing of global climate, with specific consideration of the Ruddiman theory. The paper concludes that a full understanding of causes of earth system change through (at least) the Holocene can come only through the most rigorous reconstructions of climate, human activities and earth processes, and importantly their interactions, at all locations and at all scales. It follows that we need to promote inter-scale learning: regionalisation and generalisation of existing data would be useful first steps. There is now a need to develop long-term simulation models that can help anticipate complex ecosystem behaviour and environmental processes in the face of global environmental change – and resolving our past is an essential element in that endeavour.

◻ Final Revised Paper (PDF, 998 KB)   ◻ Discussion Paper (CPD)

Citation: Dearing, J. A.: Climate-human-environment interactions: resolving our past, Clim. Past, 2, 187-203, 2006.   ◻ Bibtex ◻ EndNote   Reference Manager

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◻ TWO editors of Climate of the Past funded by ERC

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