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Studying the relationship between past people and their environments

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Report on AGU Chapman Conference “Climates, Past Landscapes and Civilizations”

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The fortunes of human societies are intimately linked to the environments that sustained them. This has been true from the first emergence of human ancestors through to the present day. On 20-25th March 2011, an AGU Chapman Conference was held in Santa Fe, NM to discuss the relationship between past people and their environments. Participants examined the state of the field, debated issues of contention and formulated ways that such cross-disciplinary research can progress.. Our increasing ability to generate high-resolution climate records has proliferated studies that link the rise and fall of cultures to climate change, especially in the Holocene. This meeting brought together scholars from across the divide between Earth sciences and archaeology in order to derive a deeper understanding of how humans have reacted to and have shaped the changing environment.

Central ideas that emerged during the meeting included large-scale issues such as complex drivers, climate change, and a synthesis of how humans may have affected climate since the start of the Holocene. Meeting sessions focused on specific geographic regions, with special emphasis on South Asia, East Asia and Central America. Papers highlighted a number of common climate events, most notably at ~8.2, 5.2, 4.2, 3.2 k.y.BP, and explored the evidence relating these events to social change.

The role of water in societal change was a particular emphasis.. The conference participants discussed the extent to which changes in water regimes impacted past societies on several continents. The dramatic case of the Angkor Wat's collapse, despite's its sophisticated water control systems, during an extended era of drought in the 14th century was explored through new dendroclimatological data. Other studies examined the impacts of extended and rapid onset droughts and the key roles of rivers , especially in North Africa and SW Asia. A series of talks probed the legend of the Hindu Saraswati River, triggering a lively debate. New drill data from onshore locations in India and Pakistan suggest that any river system must have considerably pre-dated the rise and fall of the Harappan civilization, and indicate a much more extensive drainage in the western Thar Desert during the Holocene. Related discussion of the impact of droughts around 4.2 k.y. BP in Mesopotamia further extended the discussion of the impact of water on society. Water is one resource that is rapidly being overwhelmed by

population growth, as current growth rates of population and economy are unlikely to continue without affecting major readjustments in our lifestyles

In the Americas, new tree ring records from Mexico provide opportunities to relate climate change and history. For example, strong regional droughts correlate with the decline of the Toltec state (12th century) and the Spanish conquest of the Aztecs (16th century). However, causal links are difficult to prove, especially when it is clear that cities do not "fail" either rapidly or synchronously, as is clearly indicated by the archaeology of Mayan cities. These cases highlight that fine-tuned chronology is vital for robust conclusions.

Another topic for extended discussions and debate was the hypothesis of Early Anthropogenic contributions to greenhouse gases. Several papers explored the mounting evidence that the spread of agriculture, pastoralism and deforestation since the Neolithic could have contributed to rising CO₂ levels (from 8 k.y.BP) and CH₄ levels (from 5 k.y.BP). Although whether anthropogenic sources are sufficient to account for the Holocene "anomaly", and the role of various feedback in the earth climate system attracted lively discussions.

The general public is especially engaged with this type of science because it addresses the origin of the societies in which we live. However, difficulties securing funding for truly interdisciplinary work inhibits progress. Too often interdisciplinarity is seen as a buzzword but not a reality. Those attending the conference expressed the need to build on the Santa Fe meeting by convening further cross-disciplinary gatherings, both as specialist meetings, and as sessions at larger conventions. Future research proposals need both archaeologists and geoscientists focusing on both large-scale synoptic views and more focused temporal and spatial scales in order to advance testable hypotheses. The debate from this conference continues online via a discussion group that welcomes the input of other scientists. Join in at: <https://landscape.groupsites.com/main/summary>.

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