

Anthropogenic Environments:
The Cultural Modification of Landscapes and Ecological Systems
(Conference Proposal)

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We live in an environment transformed by millennia of cultural forces. From the first moment when a hunter deliberately burned grassland to provide better grazing for deer, or a forager scattered seeds on a fertile riverbank, human beings became one of the primary shapers of their ecological systems. No inhabited region of the planet can truly be considered "wild" or "natural" in the sense that humans had no part in creating its current landscape.

The effects and importance of human impacts on the environment are fiercely debated by biologists, climatologists, and public policy specialists, both within scholarly venues and mainstream media. Archaeologists, however, are uniquely able to define the nature and implications of anthropogenic landscapes. Only we have data of sufficient time depth and geographic breadth to understand and interpret the myriad ways in which human societies have created and changed their local ecological communities. The multiple scales of archaeological research, from regional surveys to micro-morphological studies of site stratigraphy, allow us to explore the full complexity of this topic. Not only does our data speak to the larger questions (Did humans cause widespread extinctions at the end of the Pleistocene? Did deforestation and over-grazing lead to the collapse of early civilizations?) but also to the smallest (Did human settlement increase the diversity and variability of local microhabitats? of parasites? of pest species?)

Although media accounts of anthropogenic environmental change would suggest that human impacts on the environment are inevitably negative, human/environmental interactions are far more varied and complex. Certain types of cultural modification of the environment are detrimental to some species of plants and animals, but other species thrive in the ecological niches opened by human settlements. Humans have caused the extinction of some species, like the dodo bird, but they have also spread species with previously restricted geographic ranges to every corner of the globe, as happened with domestic wheat. Traditional foraging and farming techniques often increase biodiversity, both of species that are food sources and those that are not (Nabhan et al. 1982). At the same time, traditional societies have been responsible for environmental disasters with wide-ranging effects on all local species, including humans (for example, Diamond 1995; Kirch et al. 1992; Köhler-Rollefson and Rollefson 1990).

The importance of anthropogenic environments to archaeology, however, goes beyond links to today's headlines about climate change and habitat destruction, although archaeology has a role in understanding those processes. Because the modification of local environments is so fundamental to human adaptations, measures of environmental impacts can be used to answer basic anthropological questions about the past. The way and degree to which prehistoric peoples changed their local landscapes are related to mobility patterns, population size, economic adaptations, and the cultural value placed on plants, animals, and geographic features. An understanding of the built environment can contextualize and explain foraging and production decisions, as well as community and labor organization.

To use the one example with which I am most familiar, measures of human impacts on the environment have been used extensively in the Hohokam cultural region of the U.S. Southwest to further our reconstructions of past economic and social

systems. The presence of weedy species among pollen samples, for example, speaks to the growth of field systems around prehistoric villages and disturbance of the local vegetation with increasing population density (Fish 1985). Relative proportions of rabbit species may reflect the degree to which agriculturalists engaged in irrigation agriculture or cleared woody vegetation and undergrowth (Bayham and Hatch 1985; Dean 2003:317; Szuter 1991:196). The ubiquity of pest species, particularly rodents and small birds, may indicate shifts in mobility patterns from frequent residential moves to larger populations with more permanent settlements (Dean 2005). Although these are examples from only one region, there are many similar studies from around the world that use measures of anthropogenic environment change to answer basic questions about the past (for only a few examples, see articles edited by Ayala and French 2005; Marwick 2005; Stahl 2000; Tchernov 1991).

Because such research has been conducted in a wide variety of contexts, archaeologists working in almost every region of the globe would have something to contribute to this proposed conference. From Polynesian archaeologists interested in the extinction of native birds (Steadman and Rolett 1996), to Mediterranean archaeologists measuring the effects of over-grazing on early Neolithic landscapes (Köhler-Rollefson and Rollefson 1990), to European archaeologists identifying dung-fertilized soil through the detection of predatory mites (Schelvis 1992), this is a topic that is important in many regions. Certainly, some of the most common themes in human/environmental interactions, such as species extinction, the domestication and spread of plants and animals, and the role of farmland destruction in the collapse of complex societies, have long been debated from China to Mesopotamia to Mesoamerica (for example, Culbert 1973; Flannery 1986; Jacobsen and Adams 1958; Liu et al. 2002; Martin and Klein 1984).

One appeal of a conference on anthropogenic environmental change would be its interest to archaeologists with a wide range of methodological specializations. Although zooarchaeology, paleoethnobotany, and geoarchaeology are the specialties most closely tied to this topic, many general archaeologists have also done research on human-created landscapes. This is particularly true for those archaeologists who work on community- and regional-level interactions, where the built environment is often critical to understanding the patterning of landscape use (for example, Fish and Fish 1991; Nelson and Schollmayer 2003). Such a conference would also be of interest to archaeologists working in marginal environments, including rainforest and arid- or semi-arid regions, where human manipulation of local geology, plants, and animal species had the greatest impact. A variety of methodological perspectives, therefore, using a broad range of archaeological materials, could be represented at the conference.

The cultural modification of the environment is not restricted to societies with any particular level of social and economic complexity, further broadening the appeal of the proposed conference within the discipline. Archaeologists specializing in the study of foraging, farming or complex societies have contributed to the growing volume of research on anthropogenic landscapes. The effects of foragers on their local environments, for example, include burning vegetation, hunting animal species, and scattering seeds (Russell-Smith et al. 1997; Thomas 1981). Subsistence farmers had more measurable environmental impacts, particularly through the domestication and spread of plants and animals, the encouragement of pest species, and changing local habitat diversity (Nabhan et al. 1982; Tchernov 1991). Finally, complex societies have had the largest, and often the most negative, impact on their local environments. Indeed, the collapse of state-level societies has been blamed on human modification of

the environment in such diverse regions as the Maya lowlands and the Mesopotamian river valleys (Culbert 1973; Artzy and Hillel 1988).

In addition to archaeologists, this is a topic of great interest to naturalists, ethnobotanists, biologists, and wildlife management specialists. A conference thrown open to all disciplines would not be productive, but one that focuses specifically on the use of archaeological methods and theory would provide a forum for meaningful inter-disciplinary dialog. This would mean including scholars who have worked closely with archaeologists and archaeological data. Previous inter-disciplinary collaborations on the topic of human environmental change have made for successful books. These include edited research volumes (Baleé 1998; Jacobsen and Firor 1992) as well as more popular books by authors such as Jared Diamond and Gary Nabhan (Diamond 1997, 2005; Nabhan 1987, 2002) that combine anthropological and biological perspectives.

A great deal has already been published on the subject of anthropogenic environments. On the market today, however, there is little that would be comparable to the book that would come from this proposed conference. Popular or semi-popular books on this topic abound, including those that use significant anthropological and archaeological data, such as Diamond's *Guns, Germs, and Steel* and Cartmill's *A View to a Death in the Morning*. While these are of interest to researchers, they are targeted toward a wider, non-academic audience. Other books, such as Redman's *Human Impact on Ancient Environments*, or *The Archaeology of Global Change*, and Jacobsen and Firor's edited volume *Human Impact on the Environment*, are focused more on questions of ecological degradation and species extinction, and have less about the use of environmental data to answer anthropological questions about past societies. Baleé's edited volume *Advances in Historical Ecology*, while focused on questions more closely aligned with the purpose of this proposed conference, is not restricted to archaeology and its methodology, but rather includes a wide variety of ethnographic and historic perspectives. Previously published volumes of archaeological research focused on anthropogenic environments have been more regionally or topically restricted, such as Martin and Klein's *Quaternary Extinctions*, Bottema et al.'s *Man's Role in the Shaping of Eastern Mediterranean Landscape*, or Lentz's *Imperfect Balance: Landscape Transformations in the Precolumbian Americas*. A volume of archaeological perspectives on anthropogenic environmental change over a broad span of time and space, therefore, would find a place in the market for this popular subject.

Potential topics for discussion:

The following are some of the broad themes that may be covered by the proposed conference. These are just preliminary ideas, and of course would be modified depending on the interests of the participants.

- Methods of, and theoretical approaches to, measuring anthropogenic impacts on landscapes and ecological communities
- Causes of increased or decreased plant and animal diversity
- Use of measures of anthropogenic impacts on local environments to identify changes in sedentism, population pressure, and diet
- Environmental manipulation by foraging societies and their impact on the geographical range and diversity of plant and animals communities

- The impact of agricultural societies on local environments, the constraints on agricultural systems imposed by environmental factors, and the consequences of anthropogenic environmental change on farming societies
- Complex societies and the built environment
- Environmental degradation and socio-economic "collapse" episodes world-wide
- The importance of archaeological data to modern ecological challenges

Proposed Conference Structure:

This conference would bring together a wide variety of archaeologists and non-archaeologists who do not normally work together. For the conference to be as productive as possible under these circumstances, discussion must be given precedence over presentations. The work-group style symposia at the SAA annual meetings have been very successful in creating the kind of environment in which in-depth discussion of a given topic can take place. If the resources were available, I would propose that preliminary drafts of papers would be submitted electronically ahead of the conference and placed on a secure server to which participants had password access, allowing them to read the papers before arriving in Carbondale. Participants would be assigned to various working groups, based on their interests. Preliminarily, these working groups would correspond to the topics for discussion outlined above. Rather than presenting their research during their conference session, each working group would participate in a moderated discussion, with the other conference participants as an audience to ask questions and move the discussion forward. This format would promote the exchange of ideas and true dialog between all conference participants. It would also encourage participants to write their papers earlier, theoretically making the task of editing the conference volume easier. The volume itself would be organized by the work-group themes, with individual papers grouped under those headings. The discussion moderators would write short introduction or discussion papers for each of these sections, similar to the format used by Jean Hudson for her 1991 Visiting Scholar volume.

Preliminary List of Invitees:

The following people would be potential invitees to the conference, depending on their availability. The group includes archaeologists, as well as botanists, geologists, and biologists who have previous experience working with archaeological data and issues.

Robert Bettinger, UC Davis
 Virginia Butler, Portland State University
 Carlos Cordova, Oklahoma State University
 Carole Crumley, University of North Carolina
 Paul Fish, University of Arizona
 Suzanne Fish, University of Arizona
 Donald Grayson, University of Washington
 Karen Gust-Schollmeyer, Arizona State University
 R. Lee Lyman, University of Missouri
 Paul Minnis, University of Oklahoma

Gary Nabhan, Northern Arizona University
Margaret Nelson, Arizona State University
Deborah Pearsall, University of Missouri
Charles Redman, Arizona State University
Anna Roosevelt, University of Illinois, Chicago
David Steadman, Florida Museum of Natural History
Lior Weissbrod, Washington University, St. Louis

Bibliography

- Artzy, Michal and Daniel Hillel
1988 Defense of the Theory of Progressive Soil Salinization in Ancient Southern Mesopotamia. *Geoarchaeology* 3:235-238.
- Ayala, Gianna and Charly French
2005 Introduction. *Geoarchaeology* 20:91-92.
- Baleé, William, ed.
1998 *Advances in Historical Ecology*. Columbia University Press, New York.
- Bayham, Frank E. and Pamela C. Hatch
1985 Archaeofaunal Remains from the New River Area. In *Hohokam Settlement and Economic System in the Central New River Drainage, Arizona*, edited by David E. Doyel and Mark D. Elson, pp. 405-433. Soil Systems Publication in Archaeology no. 4, Phoenix.
- Bottema, S., G. Entjes-Niegorg, and W. van Zeist, eds.
1990 *Man's Role in the Shaping of Eastern Mediterranean Landscape*. Rotterdam, The Netherlands.
- Cartmill, Matt
1993 *A View to a Death in the Morning*. Harvard University Press, Cambridge, Massachusetts.
- Culbert, T. Patrick, ed.
1973 *The Classic Maya Collapse*. University of New Mexico Press, Albuquerque.
- Dean, Rebecca M.
2003 *People, Pests, and Prey: The Emergence of Agricultural Economies in the Desert Southwest*. Ph.D. dissertation, University of Arizona, Tucson. University Microfilms, Ann Arbor, Michigan.
2005 Site Use Intensity, Cultural Modification of the Environment, and the Development of Agricultural Communities in Southern Arizona. *American Antiquity* 70: 403-431.
- Diamond, Jared
1995 Easter's End. *Discovery* 16(5):62-69.
1997 *Guns, Germs, and Steel: The Fates of Human Societies*. W.W. Norton, New York.
2005 *Collapse*. Penguin, New York.
- Fish, Paul R. and Suzanne K. Fish
1991 Hohokam Political and Social Organization. In *Exploring the Hohokam: Prehistoric Desert Peoples of the Southwest*, edited by George J. Gumerman, pp.151-175. University of New Mexico Press, Albuquerque.
- Fish, Suzanne K.
1985 Prehistoric Disturbance Flora of the Lower Sonoran Desert and their Implications. In *Late Quaternary Vegetation and Climates of the American Southwest*, edited by Bonnie F. Jacobs, Patricia L. Fall and Owen K. Davis, pp. 77-88. Contributions Series No. 16. American Association of Stratigraphic Palynologists Foundation.
- Flannery, Kent V.
1986 *Guila Naquitz*. Academic Press, New York.
- Jacobsen, Thorkild, and Robert McC. Adams
1958 Salt and Silt in Ancient Mesopotamian Agriculture. *Science* 128:1251-1258.
- Jacobsen, Judith E., and John Firor, eds.
1992 *Human Impact on the Environment: Ancient Roots, Current Challenges*. Westview Press, Boulder, Colorado.
- Kirch, Patrick V., J.R. Flenley, David Steadman, F. Lamont and S. Dawson
1992 Ancient Environmental Degradation. *National Geographic Research and Exploration* 8:166-179.

- Köhler-Rollefson, Ilse, and Gary O. Rollefson
1990 The Impact of Neolithic Subsistence Strategies on the Environment: The Case of Ain Ghazal, Jordan. In *Man's Role in the Shaping of Eastern Mediterranean Landscape*, edited by S. Bottema, G. Entjes-Niegorg, and W. van Zeist, pp. 3-14. Rotterdam, The Netherlands.
- Lentz, David L.
2000 *Imperfect Balance: Landscape Transformations in the Precolumbian Americas*. Columbia University Press, New York.
- Liu, Hogyang, Lihong Xu and Haiting Cui
2002 Holocene History of Desertification along the Woodland-Steppe Border in Northern China. *Quaternary Research* 57:259-270.
- Martin, Paul S. and Richard G. Klein, eds.
1984 *Quaternary Extinctions: A Prehistoric Revolution*. University of Arizona Press, Tucson.
- Marwick, Ben
2005 Element Concentrations and Magnetic Susceptibility of Anthrosols: Indicators of Prehistoric Human Occupation in the Inland Pilbara, Western Australia. *Journal of Archaeological Science* 32:1357-1368.
- Nabhan, Gary
1987 *Gathering the Desert*. University of Arizona Press, Tucson
2002 *The Desert Smells Like Rain*. University of Arizona Press, Tucson.
- Nabhan, Gary P., Amadeo M. Rea, K. L. Reichhardt, Eric Melink, and C. F. Hutchinson
1982 Papago Influences on Habitat and Biotic Diversity: Quitovac Oasis Ethnoecology. *Journal of Ethnobiology* 2:124-143.
- Nelson, Margaret C., and Karen Gust Schollmeyer
2003 Game Resources, Social Interaction, and the Ecological Footprint in Southwest New Mexico. *Journal of Archaeological Method and Theory* 10:69-110.
- Redman, Charles L.
2004 *The Archaeology of Global Change: The Impact of Humans on their Environment*. Smithsonian Books, Washington.
1999 *Human Impact on Ancient Environments*. University of Arizona Press, Tucson.
- Russell-Smith, Jeremy, Diane Lucas, Minnie Gapindi, Billy Gunbunuka, Nipper Kapingiri and George Namingum
1997 Aboriginal Resource Utilization and Fire Management Practice in Western Arnhem Land, Monsoonal Northern Australia: Notes for Prehistory, Lessons for the Future. *Human Ecology* 25:159-195.
- Schelvis, Jaap
1992 The Identification of Archaeological Dung Deposits on the Basis of Remains of Predatory Mites. *Journal of Archaeological Science* 19:677-682.
- Stahl, Peter W.
2000 Archaeological Accumulation, Fragmented Forests, and Anthropogenic Landscape Mosaics in the Tropical Lowlands of Prehispanic Ecuador. *Latin American Antiquity* 11:241-257.
- Steadman, David and Barry Rolett
1996 A Chronostratigraphic Analysis of Landbird Extinction on Tahuata, Marquesas Islands. *Journal of Archaeological Science* 23:81-94.
- Szuter, Christine R.
1991 *Hunting by Prehistoric Horticulturists in the American Southwest*. Garland, New York.

Tchernov, Eitan

1991 Biological Evidence for Human Sedentism in Southwest Asia During the Natufian. In *The Natufian Culture in the Levant*, edited by Ofer Bar-Yosef and François R. Valla, pp. 315-340. Archaeology Series No. 1. International Monographs in Prehistory, Ann Arbor, Michigan.

Thomas, David Hurst

1981 Complexity Among Great Basin Shoshoneans: The World's Least Affluent Hunter-Gatherers? *Senri Ethnological Studies* 9:19-52.