Archaeological Studies of the Long-Term Resilience of Food Supplies to Climatic Shocks in Arid North America and the North Atlantic

Jacob Freeman¹, Colleen Strawhacker*†, Andrea Torvinen*‡, Seth Brewington*§, and George Hambrecht*¶

¹Arizona State University (ASU) – United States
²National Snow and Ice Data Center, Cooperative Institute for Research in Environmental Science (CIRES) – Boulder, CO, United States
³City University of New York (CUNY) – United States
⁴The University of Maryland – United States

Abstract

One of the only long-term records of societies’ capacities to change (i.e., maintain a resilient social-ecological system) is the archaeological record. Our papers contribute to understanding how the resilience of a food supply in small-scale societies effects the persistence of social-ecological systems over the long-term. According to the Aims and Vision statement of the Resilience 2014 conference, transformability is “the capacity of a society to change the system’s state variables when current trajectories become untenable.” This vision presupposes that members of a society 1) can recognize that a trajectory is untenable, and 2) have the capacity to cooperate and change the necessary state variables that limit a society’s capacity to change. Our papers investigate these two critical processes over the long-term: The ability to recognize that a trajectory of food production is untenable and constraints on the capacity of societies to change the relevant state variables when a system of food production loses resilience.

Our papers emphasize the work of young scholars leading papers on transdisciplinary projects. We draw on the long-term nature of the archaeological record to identify trade-offs and synergies between strategies for producing food and the persistence of social-ecological systems in arid North America and the offshore islands of the North Atlantic. Both of these regions presented common challenges for food producers: The productivity of terrestrial ecosystems is highly constrained, either by aridity or cold, and terrestrial productivity is also highly uncertain from year-to-year. In arid North America and the North Atlantic, prehistoric peoples developed various systems of food production to cope with the potentially negative consequences of low and unpredictable terrestrial productivity. For example, in the Zuni area of modern day New Mexico, farmers invested in intricate physical infrastructure to subsidize the flow of water into their gardens to produce more reliable yields from domesticated plants,

*Speaker
†Corresponding author: colleen.strawhacker@asu.edu
‡Corresponding author: atorvine@asu.edu
§Corresponding author: seth.brewington@gmail.com
¶Corresponding author: ghambrecht@gmail.com
such as maize, beans and squash. In the North Atlantic, populations attempted to maintain diverse production systems that included pastoralism, the harvest of marine resources, trade and minor crop production. Our research explores the intersection of particular configurations of food production strategies and social networks on the long-term resilience of food supplies to droughts (in arid North America) and extreme cold (in the North Atlantic). Each system of food production considered was embedded in social networks that partly determined how and where people could move and who people could count on during times of food stress. In general, we illustrate the long-term effects of different social structures on the resilience of food supplies to drought and extreme cold. We also illustrate trade-offs between what is the most resilient strategy of securing a food supply for individuals vs. the best strategy at the level of a social-ecological system. Such trade-offs constrain the capacity of groups to cooperate and transform a system.

We seek to create private-public, academic-policy conversations to 1) inform on the variables that effect long-term outcomes in social-ecological systems, and 2) obtain feedback on the relevance and shortcomings of knowledge generated from studies of systems over the long-term.

**Keywords:** Food Security, Tradeoffs, Social Transformation, Resilient for Who?