

Insights from the past: incorporating long-term landscape evolution in studies of land degradation

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Modern approaches for assessing land degradation encompass multidisciplinary studies that have allowed a more realistic understanding of the causes and consequences of land degradation. This incipient perspective includes an increasingly important role of the studies of the past, including human history, to understand modern ecosystems and landscapes. Indeed, the current promotion of indigenous resource-use strategies as models of sustainable development was initially prompted by historical studies. However, systematic studies on whether or not indigenous management practices led to land degradation, and therefore their benefits or constraints for sustained use of natural resources, are not truly known.

We argue that a joint approach combining the characterization of current soil properties with the archaeological study of traditional agricultural systems can provide insights on their sustainability. Archaeological excavation enables discerning the order in which sediments are deposited and the sequence in which structures are built. This provides data on coincident cultural and ecological change, and a long-term perspective on how agro-ecological systems operated in pre-modern states and the ways in which they resemble or differ from modern contexts. Simultaneously, these changes would have left a physical, chemical and isotopic imprint in soils that can be detected and interpreted to contribute to the production of a “usable past” (Stump, 2013). The premise is: since ancient agricultural sites may provide information on agronomic conditions after centuries to millennia of use, they can help in understanding the ways in which agroecosystems have survived, failed or adapted in the past. This will contribute to a better holistic understanding of social-ecological systems evolution by including a temporal perspective, and to a more nuanced assessment of land degradation and sustainable use.

To illustrate this we present the outcome of our research at two traditional agricultural systems in Ethiopia and Tanzania that are being studied under two EU funded projects: tRRACES (H2020-MSCA-IF-2014-657355) and AAREA (ERC-StG-2012-337128-AAREA). Combining archaeological research with soils characterization (elemental composition, mineralogy, micromorphology and molecular composition of the organic matter), we demonstrated that a focus on the processes of landscape evolution and soil formation can change our interpretation of a system and hence our assessment of its current status and its past and future sustainability.