

Re-thinking colonialism to prepare for the impacts of rapid environmental change

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Abstract This essay demonstrates how key concepts from ecology can be applied within historical analyses in order to gain insights regarding contemporary environmental change. We employ a coupled human and natural systems conceptual framework in a nascent historical analysis of rapid societal and environmental change in colonial New England, where European colonization led to stark and rapid transformations. Introduced diseases reduced indigenous communities to a fraction of their pre-contact levels. European agriculture and associated pest species, deforestation and overharvest of ecologically influential species were among key aspects of the rapid changes in colonial New England. Cross-continental biotic introductions initiated reinforcing feedback loops that accelerated the transition of human and natural systems into novel states. Integrating colonial history and ecology can help identify important interactions between human and natural systems useful for contemporary societies adjusting to environmental change.

1 Introduction

Recent and projected climatic change could lead to the most drastic, rapid environmental changes in North America since those that followed European colonization. Yet colonial history has rarely been studied for insights applicable to current environmental change problems. In this essay, we suggest that new and existing research on environmental and colonial history can generate insights applicable to current mitigation and adaption efforts in the face of rapidly changing environments. We briefly explore an example of this new line of inquiry, examining existing scholarship on New England's colonial history for lessons concerning human responses to rapid environmental change. We engage history and ecology to show how partnerships between historians and scientists studying linked social and

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ecological change can lead to fruitful strategies or diagnoses for environmental change mitigation and adaption. Our goal is to use this Special Issue of *Climatic Change* as a forum for *preliminary* remarks and to introduce a form of inquiry worth further exploration.

In our nascent analysis, we consciously avoid making a point-for-point comparison between the early colonial era and today. Such a task could prove fruitless given the vastly different circumstances between the early colonial venture—which focused on (1) the quick-and-dirty extraction and exploitation of plant and animal resources, (2) gaining land base for settlements, and that (3) succeeded in large part due to the rapid depopulation of indigenous communities—and today’s environmental change trajectories, which are themselves the progeny of this earlier time period. Rather, our preliminary example gains traction and relevancy by leveraging key concepts from ecology within an historical analysis in order to gain insights applicable in contemporary settings. Specifically, we look at the concepts of coupled human and natural systems, feedback loops and tipping points, all notions that are currently used by ecologists and others studying linked social and ecological issues. We look back in time to understand the effects of rapid environmental change on coupled human and natural systems; we identify social and ecological tipping points and try to explain the ways that feedback loops can both amplify and mitigate environmental change.

To date, researchers have responded to global environmental change and rapidly changing local environments by *forecasting* future change via predictive models and *backcasting* to determine pathways to desirable future outcomes. Backcasting involves imagining a desired future scenario, then planning the steps that could achieve that vision. De Young and Princen (2012) describe this process as *prefiguring* “the needed institutions, economies, physical structures, norms, and behaviors necessitated by biophysical constraints.” While forecasting and backcasting are indispensable, this paper suggests the relevancy of a third approach: using historical analysis to study linked ecological and societal consequences of rapid changes.

Indeed, research using this third approach already exists. For instance, paleo-ecologists undertook synthetic research investigating coupled human and natural systems change over long timescales (Delcourt and Delcourt 2004); environmental historians investigated ecological change (e.g., Cronon 1983) and consequences of environmental change for societies (Davis 2002; Sandlos 2007); and cultural anthropologists examined the social, cultural, political and economic impacts of, and responses to, rapid socio-ecological change (e.g., Colombi 2012; Wenzel 2009). Colombi’s work (e.g., Colombi 2012; Colombi and Smith 2012) in particular examines tribal historical narratives to understand how tribal societies develop adaptive capacity and other cultural-level responses to continual socio-ecological change. A 2012 special issue of the Proceedings of the National Academy of Sciences Sustainability Science section (Butzer and Endfield 2012) explores historical examples of linked social and ecological change and contemplates lessons for contemporary societies. Endfield (2012) looked at societal resilience and adaptive capacity to climatic variability (drought) in colonial Mexico. With these recent works in mind, our paper highlights the contribution colonial Native American and environmental history can make in identifying mitigation and adaptation strategies needed for addressing various forms of contemporary, rapid environmental change.

2 Key ecological concepts and contemporary environmental change

2.1 Coupled human and natural systems

Humans have always interacted with natural systems. Increasingly, scholars interested in the interplay between ecology and society view humans as *integral components* of ecosystems.