

Environmental economic history

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A global literature has developed that illuminates the reciprocal and dynamic relationship between humans and their environment in other regions across the world. This column, which first appeared as a chapter in a recent Vox eBook, surveys on two topics in the literature: the impact of geographic endowments and the impact of environmental shocks on historical and long-run development.

Nash (1972) is generally credited with coining the term 'environmental history' to refer to the then-emerging field, integrating ecology and geography into the understanding of history. Examining 'the interaction between human cultures and the environment in the past' (Worster 1988), many early environmental historians followed the path set by pioneering works such as Turner (1921) and Webb (1931), and wrote on the experiences of Western countries. Nash (1967) studied American perceptions of wilderness, while Hays (1959) focused on the conservation movement in the US. As the field developed, a global literature also developed that illuminated the reciprocal and dynamic relationship between humans and their environment in other regions of the world, for example in Africa (Beinart 1984, Fairhead and Leach 1996, Harms 1999), in Asia (Elvin 2008, Gadgil and Guha 1993), and in global perspective (Crosby 1972).

For over a decade, economists have been contributing to this literature, usually using different techniques than those used by environmental historians, and emphasising the different contributions made by their work. A key contribution of this literature has been a focus on isolating specific causal relationships, within a broader and more complex environment that includes knowledge, capital and institutions (Hornbeck 2012a), usually involving the generation and assembly of new Geographic Information Systems (GIS) databases. The list of environmental factors considered in this literature is broad, including, but certainly not limited to, pollution, wind patterns, natural disasters, soil quality, topography and the disease environment. This brief overview of environmental economic history will focus on the effects of the environment on human outcomes, both concurrent and in the long-run, rather than on human transformations of the environment, though the latter is an important part of this literature (e.g. Hansen and Libecap 2004, Hornbeck and Keskin 2014, Taylor 2011). As we discuss in the following paragraphs, the environmental factors have far-reaching implications for development, beyond direct environmental impacts – for instance, agricultural endowments or changes can be mechanisms for the evolution of institutions, norms, and societal development. Other environmental factors, such as the disease burden, have similar implications. We focus on two topics in the literature in particular – the impact of geographic endowments and the impact of environmental shocks on historical and long-run development. This aspect of environmental economic history is thus closely related to the broader economic history literature concerning the impact of historical events on long-term development (see Nunn 2014 for a comprehensive treatment).

Impacts of geographic endowments

One major strand of this literature has examined direct economic impacts of those characteristics of the environment that are either time-invariant or very slow to change. This overlaps with studies of the role of geography in economic growth over the very long run (e.g. Andersen *et al.* 2016 on ultraviolet radiation, and Galor and Özak 2016 on potential crop yields). For instance, economists have written on the effects of the disease environment on development in the past and on how the environment has shaped historical institutions. Bleakley (2007) draws causal inference on the impacts of hookworm disease on education by measuring the convergence of previously high- infection areas with previously low-infection areas of the US in the aftermath of a rapid eradication campaign in the early 20th century. His empirical approach has also been used to evaluate the importance of other diseases in other contexts (e.g. Lucas 2010, Cutler *et al.* 2010).

In estimating the impact of geographic endowments on institutions, Fenske (2014) and Depetris-Chauvin (2015) have both linked state centralisation in pre-colonial Africa to the gains from trade stemming from ecological diversity. Fenske (2013), similarly, documents the geographical forcing variables that predict land rights, slavery and population density in a cross section of global societies. These studies have merged GIS maps of the African environment with other spatial data on the continent's institutional history, and based causal inference on evidence from instrumental variables and narrow within-country comparisons of observations. Bubb (2013), on a microeconomic level, has found exogenous suitability for tree-crop cultivation to be a much stronger predictor of property-rights institutions governing land in the Ivory Coast and Ghana than the colonial institutions of either country. Similar GIS databases on soil characteristics and their variations have been used to examine the historical origins of cultural patterns such as female labour force participation (Alesina *et al.* 2013), ethnic diversity (Michalopoulos 2012) and the spread of Islam (Michalopoulos *et al.* 2016).

Other work on the impact of geographic endowments has instead focused on the indirect legacies of geographic endowments that affect the present, because of how they have shaped history. Alsan (2014), in a prominent example, argues that the tsetse fly reduces African prosperity in the present, principally because it inhibited pre-colonial political centralisation. To do this, Alsan constructed a novel GIS tsetse suitability index and merged it with existing spatial data on African ethnic groups' locations, precolonial institutions, and modern luminosity. Her causal claims were supported by adjustment for a wide set of covariates, narrow within-country comparisons, and a placebo exercise showing no similar effects of tsetse suitability in parts of the world where the fly itself was absent. Fiszbein (2016) uses exogenous variation in climatic conditions that affect the returns to agricultural diversity to study the impact of agricultural diversity on long- term industrial development in the US.

Nunn (2014), similarly, has highlighted the role of the environment in shaping particular historical events and processes, which themselves have long-term impacts. Africa's slave trades are an example: recent work has shown that terrain ruggedness (Nunn and Puga 2012) and geographic isolation from sources of slave supply (Nunn 2008) have influenced the dynamics of the slave trade and, through these factors, African development. These studies have employed GIS resources on the continent's geography and historic climate and

added geocodes to existing databases of the slave trade; they draw causal inference from the results of instrumental variables and placebo analyses. Studies of the long-run impacts of Africa's slave trades have turned to these same geographic conditions in isolating plausibly exogenous variation in slave exports (e.g. Nunn and Wantchekon 2011, Dalton and Leung 2014).

Impacts of environmental shocks

Given the importance of time-varying environmental events, such as weather fluctuations and natural disasters, and due to the possibilities for convincing causal inference stemming from exogenous change, several studies have evaluated the importance of environmental shocks in economic history. Several papers have examined immediate economic effects of events such as droughts, floods, and the spread of new diseases. Much of this literature has focused on the US. Davis *et al.* (2009), for example, use the weather-driven variations in 19th century cotton crops to infer a causal effect on non-agricultural business cycles; greater cotton exports increased the supply of high-powered money in the economy. Fishback *et al.* (2011), similarly, have investigated whether climate or weather affected mortality rates during the Great Depression. Other papers have examined the effects of similar shocks in other parts of the world: Fenske and Kala (2015) and Rönnbäck (2014), for example, have both examined the role of temperature fluctuations in the transatlantic slave trade and found that these affected the extent of participation in the slave trade and prices in African markets.

The relative ease with which events such as conflict and political transitions in the historical context can be recorded, and their importance in impacting the course of history, have made these the focus of a considerable volume of work. Hsiang *et al.* (2013) provide an extensive bibliography that includes several historical examples. Christian and Fenske (2015) and Papaioannou and de Haas (2015) have linked episodes of adverse weather to unrest and crime, respectively, during the colonial period in Africa. For China, both Jia (2014) and Bai and Kung (2011) have similarly used fluctuations in weather to explain historical episodes of violence. Chaney (2013) has found that years of deviant Nile floods reduced the chances that the highest-ranking religious authority in Muslim Egypt was replaced. These studies have taken data on historic weather from archival sources or historic reconstructions and merged these with both primary and secondary sources that document conflict and political transitions, in order to produce historic datasets covering environmental economic history.

Other work has traced out the longer-run effects of environmental catastrophes by contrasting the later trajectories of places or individuals affected by these events with reasonable comparison groups who were not similarly treated. By geocoding soil erosion maps, writers such as Cutler *et al.* (2007) and Arthi (2014) have examined the long run health impacts of America's dust bowl era on individuals, while Hornbeck (2012b) has traced its implications for land values, population, and agricultural development. The long-run consequences of droughts on the eve of the Mexican revolution (Dell 2012), the spread of the boll weevil (Lange *et al.* 2009) and the Great Mississippi Flood (Hornbeck and Naidu 2014) have received similar treatment. By demonstrating that these effects often persist up to the present, these works have shown the relevance of environmental history for understanding modern development.

Conclusion

Environmental history is now a mature field, and the environmental sub-field of economic history is well-developed, but the integration of these literatures is, as yet, less than ideal. It is our hope that findings, data sources and methods from the environmental economic history literature will further enrich the writing of environmental history. Furthermore, several important themes in the environmental history literature have received limited attention from economists, such as the dynamic relationship between successive Chinese states and their environment (Elvin 2008), the welfare implications of colonial forest reservation (Gadgil and Guha 1993), and the political economy of colonial land conservation (Mackenzie 1998). The natural environment has played an important part in the development of societies, often mediated by its impact on their institutions, and we look forward to seeing the integration of new methods and questions in service of this important topic.

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