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Three Dimensions of Environmental History

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ABSTRACT

Historians are sometimes accused of being light on theory, and environmental historians have not escaped this criticism, sometimes deserved. This essay maintains that environmental historians should increasingly investigate theoretical aspects of their subject, and encourages more prevalent reasoned discourse between multiple viewpoints. The essay does not set forth a theoretical structure, but explores three dimensions that may help to plan such a structure. The first dimension, concerning the subject of the field, is the culture–nature continuum. The second dimension is concerned with method, and lies along the continuum between history and science. The third dimension is one of scale and considers time and space as coordinates of definition. There are obviously other dimensions to explore. These reflections are offered tentatively, in hopes that this piece may serve as an opening to an interesting discussion among colleagues.

KEYWORDS

Theory, environmental history, culture, science, time-space

When, flying above the Great Plains of the United States, one happens to have a window seat and looks down at the landscape, one sees a remarkably uniform pattern of squares, half squares and quarter squares formed by roads, fields, and subdivisions (Figure 1).¹ These represent the townships, six miles to a side, the ranges, the sections one mile square, and the quarter sections each containing 160 acres, set out by the Federal Land Survey in what were then public lands, beginning in 1785. This was also the framework of the Homestead Act of 1862, which provided for the transfer of public land into the hands of citizens who settled on the land and cultivated it. The pattern displays the application of theory to the natural environment. The theory in this instance happened to be that the proper relationship of a citizen to the land was to own it and to cultivate it, and



FIGURE 1. Aerial view of part of the Great Plains, USA.

furthermore that since all citizens in the republic were equal, the land allotted to each was equal in size. I mention it because it is a spectacularly visible case of the effect of theory on nature.

It is not the only such example. Parts of Italy bear to this day the pattern of Roman centuriation, begun by generals who rewarded their faithful surviving legionaries with gifts of land: a hundred *jugera* to each, a *jugerum* being the amount of land a farmer could plough in one day with a team of oxen. Ancient China had a traditional method of land distribution called the well-field system, which divided a square of land into nine smaller equal squares, each of the eight outer plots being assigned to one farm family, with the centre plot being a public field cultivated by all eight families with the produce going for taxes.

Inflexible theories are of doubtful utility when actually applied to a landscape, of course. Arbitrary squares take no account of such fundamental features as springs, streams, and variations in productivity and exposure. As the frontier moved west across the nineteenth-century territory of the United States, it gradually became apparent that 160 acres might be adequate for a farm in the tall-grass prairies with their relatively generous rainfall, but the same area could spell crop failure and starvation on the short-grass plains where, unfortunately, the proverb that rain follows the plough proved to be untrue.

Historians in general have sometimes been accused of being light on theory by their colleagues in philosophy, economics and political science. Environmen-

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tal historians have not escaped this criticism, sometimes deserved. There are outstanding exceptions, such as Carolyn Merchant in 'The Theoretical Structure of Ecological Revolutions' (1989), Madhav Gadgil and Ramachandra Guha in 'A Theory of Ecological History' (1992), and James O'Connor in 'What is Environmental History? Why Environmental History?' (1998).² Perhaps the formulation most often cited is Donald Worster's tripartite description of the lines of inquiry pursued by environmental historians in his 'Doing Environmental History' (1988).³ Worster says that there are three levels on which environmental history proceeds. The first is to try to understand nature and its changes; the second investigates human economic and social organisation and their effects on the environment, and the third studies the expression of human thoughts, feelings and intuitions about all aspects of the environment. Worster had the advantage of precedence among the writers mentioned, and his principles have stood the tests of time and use, although it must be recognised that he was offering a description rather than constructing a theory in that particular section of his essay.

Here I do not attempt even the kind of embracing definition that Worster provides, and which I hasten to add that I accept as a practicable framework. I do think that environmental historians should increasingly investigate the theoretical aspects of our subject, and one of the purposes of this essay is to encourage more prevalent discourse between multiple theoretical viewpoints, carried out in a reasoned manner, which I believe would strengthen our field. However, it is not my intention to set forth a theoretical structure for environmental history, but simply to explore three dimensions that may help in a preliminary way to plan such a structure. I am well aware that there are other dimensions to explore, and I hope to learn from colleagues who will do so. I offer my reflections here tentatively, hoping that this piece may serve as an opening to an interesting discussion with colleagues.

Each of the three dimensions that I will consider briefly occupies a continuum between two terms. In each case, like Aristotle, I maintain that the desideratum is some point along the continuum rather than either endpoint. The first dimension, which has to do with the subject of the field, is the culture–nature continuum. The second dimension has to do with method, and lies along the continuum between history and science. The third and final dimension is one of scale and considers time and space not as opposites, but as coordinates of definition.

THE FIRST DIMENSION: NATURE AND CULTURE

The first dimension of theory in environmental history that I want to explore is that its subject includes nature and culture concurrently. In its simplest terms, it requires that a study can qualify as environmental history only if it considers and correlates change both in human societies and in the aspects of the natural

world with which they are in contact. The relationship between the two is in almost every case that of reciprocal influence. A change made by humans in the environment virtually always redounds and generates change in cultural conditions. A history that does not include both terms cannot be called environmental history in the sense intended here. This assertion may seem self-evident to many of those who work in environmental history as a subfield of the historical discipline, as well as to many historical geographers, but there are a few who contend otherwise, including those mentioned in the paragraph after next.

To illustrate this principle I would like to present an image of an Egyptian rural landscape at the margin where the cultivated land borders the desert (Figure 2). A section of the vast Sahara occupies the upper portion of the view, stretching into the distance. Just below it is a white-painted village recently built of clay bricks. On the near side of that are irrigated fields planted with cotton, wheat, and other crops, and toward the bottom of the scene, a widely spaced grove of date palms stands among the fields. What we see in this picture is the meeting place between what the ancient Egyptians called the 'Red Land', the dry and interminable realm of Set, the god of windstorms, and the 'Black Land', the fertile watered soil favoured by Osiris, god of plants and cultivation. This is a landscape that can be explicated by environmental history, but only if both natural history and cultural history are included as terms in the definition.



FIGURE 2. Egypt: where cultivated land meets the desert.

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I have colleagues such as A. T. Grove and Oliver Rackham who maintain that environmental history is simply the history of the environment. This is because they define the environment as including 'climate, geology and geomorphology, not living things'. Even plants are not environment.⁴ A history that included living things, they insist, should be called ecological history. Even with the change in terminology, however, they would focus attention on changes in the landscape, not social, economic or other cultural changes. In the Egyptian image before us, therefore, they would focus their investigation on the desert, noting the long geological and climatic record of a terrain that was formerly provided with plentiful rainfall and subjected to water erosion. Climatic transformations associated with the end of the most recent ice age shifted the wind patterns, and by the period around 5,000 years before the present achieved a physical regime not dissimilar to that of the present. There is no doubt that these observations are useful, nor any doubt that an environmental historian needs to know them to help in the reconstruction of the past, but the environmental historian must always keep human history and anthropogenic changes in the centre of the narrative.

Let us look, however, at the other end of the spectrum for a moment. It would certainly be possible to see the scene before us as an illustration of modern Egyptian political-economic history, as part of the events following the Revolution of 1952. Gamal Abdel Nasser had become president of Egypt and had determined to make the new Arab Republic an industrialised, secular, self-sufficient society that could hold its own in the global market economy. To do this, he considered the construction of the high dam at Aswan one of the first priorities, in order to generate electricity for industrialisation, prevent floods, and to provide dependable water for irrigation that would allow year-round multi-cropping of food and exportable cash crops, and make possible the extension of cultivation into formerly desert areas such as the one in our image. All of this is true, and familiarity with it is a necessary prerequisite for the work of the environmental historian, but attention only to the political and strictly economic aspects of the story does not provide us with the depth and perspectives of an environmental-historical narrative.

It is the work of the environmental historian to master both of the preceding accounts, to relate and combine them, but more importantly to see what each of them has left out, particularly in terms of causal interrelationships that may have escaped them. Here I will briefly ask a few questions to indicate the kinds of issues that environmental historians might investigate in such a landscape. Why does the village occupy a belt of land between the sown land and the desert? Is it the desire of the peasants not to allow structures to intrude on the productive soil? But where did the clay to make the bricks in the houses come from? One might observe that it traditionally came from the silt deposited by the River Nile, and that the Aswan High Dam now prevents that silt from reaching Lower Egypt. How rich is this newly irrigated desert soil, and does it require a major

application of industrial fertiliser to keep it in production? What is the state of the soil ecosystem and the various forms of life that make it up? How much of the land produces food for the rapidly growing Egyptian population, and how much bears cotton and other export crops? Again, after the building of the High Dam Egypt became a net importer of food. What is the rate of agriculturally related diseases as schistosomiasis? Is this land subject to salinisation, as is so much of the irrigated land in Egypt?

It is not my intention to provide a case study, but simply to indicate the importance of an investigation of questions including both culture and nature in any environmental-historical project. Some might argue that to frame the inquiry in these terms makes environmental history an anthropocentric enterprise. So it is, but it must never lose sight of the ecological impacts and the costs to other forms of life and to the environment itself.

THE SECOND DIMENSION: HISTORICAL AND SCIENTIFIC METHOD

A second dimension of environmental history has to do with methodology, and derives from the preceding argument. It involves the fact that environmental historians use the tools of both history and science, and thus attempt to bridge the gap between what C. P. Snow called *The Two Cultures* within the modern academic community.⁵ On the one hand, environmental historians, being historians, must be consistent and thorough in their employment of the historical method, searching out all the available written sources, subjecting them to external and internal criticism, and interpreting them carefully. Like all historians, we must pass disciplinary muster with our colleagues. But in order to understand the environment, the other term in our self-chosen title, we must become fluent in the language of natural science and be able to use what science can tell us about the realms of history that we choose to study. As Snow said, the failure to comprehend both sides of the cultural divide 'is leading us to interpret the past wrongly, to misjudge the present, and to deny our hopes of the future'.⁶

As an example of the need for environmental historians to use the scientific method along with the historical method, I offer the image of Easter Island, also named Rapa Nui by the modern Polynesians, with its huge anthropomorphic statues of volcanic stone called *moai* standing in a virtually treeless landscape. Specifically, it is Ahu Tongariki, where fifteen moai form a row, facing away from the sea (Figure 3).⁷ The case of Easter Island has become something of a textbook example of a society that destroyed its own resource base through deforestation and overpopulation and duly suffered a collapse ending in a small population and much of the island in ruins. The story has been included in global environmental histories such as Clive Ponting's *Green History of the World* and in Jared Diamond's *Collapse*, where it is told more effectively.⁸ How can an environmental historian arrive at a viable explanation that corresponds



FIGURE 3. Ahu Tongariki, Easter Island.

relatively truthfully to what happened on Easter Island before and after the time of European discovery?

Written historical sources take us only so far. There are the accounts of the discoverers, including ships' logs. On 5 April 1722, the Dutch Admiral Jacob Roggeveen sighted and named the island, describing it as largely bare of trees, with a small population and with a number of the large statues standing. Other explorers, including the English Captain James Cook, followed. There are writings of nineteenth-century missionaries and twentieth-century anthropologists. These reveal that the islanders pushed down all the statues remaining erect by the mid-nineteenth century. The ones now standing were re-erected by Europeans, Americans and Japanese in the twentieth century. When we turn to the crucial pre-European period, traditional historical method gives us very little. There was a native written language on Easter Island, but when most of the population was enslaved and taken off island in the mid-nineteenth century, the knowledge necessary to read it was lost, and it remains undeciphered today. Oral traditions offered interesting but fragmentary hints. From these sources alone, the ecological disaster is inexplicable, although without them the rest of the evidence could not be integrated into an historical account.

The sciences provide much of the needed evidence for that account. The archaeologist is here, as for many of the efforts of ancient historians, a valuable co-worker. Radiocarbon dating indicates that the first human occupation of the island began between A.D. 600 and 800. In several parts of the island, trenches

reveal a layer of closely packed root casts of palm trees similar to the Chilean wine-palm *Jubaea chilensis*, and the casts of palm trunks exist in lava. Hoards of tiny coconut-like fruits of such palms are found in caves. Most of them show signs of gnawing by rats, which were introduced by the Polynesian settlers. There is evidence of many other species of trees. Pollen analysis reveals the presence of forests until about 500 years before the present. All of this indicates that a relatively densely forested island became deforested during the period of human occupation. Dwelling sites show agricultural activity almost everywhere on the island by A.D. 1500. More recent structures include stone-lined planting pits and lithic mulch designed to protect plants from the wind, which would have affected them more after tree removal. It is evident that in the environmental history of Easter Island, historical source work and science supplement one another marvellously.

Scientific techniques studying ecosystems, biodiversity, climate, introductions of organisms, diseases, atmospheric chemistry and many other factors of change are of obvious use to the environmental historian no matter what chronological period or geographic regions constitutes the chosen area of study. This is particularly true of ecological science. Environmental history developed in some measure out of the recognition that ecological science has implications for the understanding of the history of the human species. One of the implications is that human civilisations, even those of advanced technological cultures, cannot place themselves outside the principles of nature. Ecology places the human species inside the web of life, dependent on it for subsistence and survival. One cannot deny the importance of scientific literacy in principle for environmental history, quite apart from the obvious practical difficulties this presents for the preparation and continuing education of environmental historians.

THE THIRD DIMENSION: SCALE IN TIME AND SPACE

A third dimension of environmental history that I will discuss is that of scale in time and space. I hasten to insert that I have no intention of suggesting that there are only three dimensions: by including both time and space, indeed, I have already suggested that there is at the very least a fourth dimension. What I have in mind is that environmental history in its essence and by definition implies a vast sweeping perspective, inclusive of the environment by being global and inclusive of history by stretching from origins to the present and even, dangerously, peering into the mist-obscured future.

First, let us look at time. My contention is that the field of environmental history investigates every time period in human history, including prehistory, ancient, medieval and modern. Individual studies may take shorter periods as their frames of analysis, but the scope of the enterprise of environmental history is only limited by the consideration that human societies were interacting with

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the natural environment, not that there was any particular mode of interaction, or any particular form of recognition of the nature or extent of the interaction at the time. In particular I reject the common, if unarticulated, idea that environmental history should be exclusively, or almost exclusively concerned with the modern world because of the rate of change and environmental awareness that exist in recent times. The ancient and medieval periods, in which perhaps the majority of human modes of environmental relationships and the institutions that enact them originated and developed toward their modern expressions, also merit careful study in environmental history.

The image I use here is one section of a vast system of ancient agricultural terraces in Jordan near the ancient Nabataean city of Petra (Figure 4). They are now almost completely abandoned, although there is a small settlement in view, a few trees and gardens, and here and there people and domestic animals can be discerned in what otherwise seems overwhelmingly an arid and empty scene. These terraces were constructed in a time of greater prosperity to prevent erosion and to allow the planting of crops on a steep hillside. Here, written as it were in the landscape itself, is the story of the rise and fall of human civilisation in one of the lands of its early birth, and it is a rise and fall mediated by the interaction of humans and the environment. Here, the story of the uneven path of civilisation due to environmental problems such as deforestation, erosion and agricultural exhaustion can be traced. Within this single view there are several miles of terrace walls painstakingly built of heavy stone. The labour expended



FIGURE 4. Abandoned terraces near Petra.

in their construction was considered worthwhile, justified economically and in terms of human calories because they made food production possible by preventing erosion on the steep gradient. At that time, forests on the higher elevations evened out the downhill flow from seasonal rainfall and provided a dependable water supply from springs and local streams that then existed. But the incessant cutting of trees for construction and fuel in the nearby city, and the grazing of goats and sheep on the denuded heights, assured the permanent destruction of forests and the water supply that depended on them, so the hills are now dry and the terraces bear almost nothing. Such an image is both an important phase of environmental history and a cautionary tale that warns historians to widen their awareness of the deeper past.

What holds true of time for environmental history also holds true of space. That is, however we may choose to circumscribe the areas for particular studies, for our discipline the whole Earth is our subject. Perhaps it extends even beyond that, since energy from the Sun and tides caused by the Moon are also important environmental influences. Just as every modern historical moment is connected to a long formative past, so every locality or region exists within the setting of the ecosphere, and historians neglect that fact at their peril. Even to write the environmental history of a single garden requires a sense of its place on the planet. Practically speaking, each study must be grounded in a delimited space and in a certain period of time, because research and writing must have a stop, at least until the next book. But theoretically, serious environmental history by its very nature must recognise the many links to a larger and inclusive system.

CONCLUSION

The final image I present is that of the modern Bay of Naples (Figure 5). Naval vessels head out of the port. A medieval fort occupies a point of land. The suburbs climb up the slopes of Vesuvius. Applying the three dimensions I have briefly presented, what can be observed about the environmental history of this place?

First, looking at culture and nature, it is clear that the interplay of land and sea have helped to form the city as an active and economically viable centre, here on this bay. It has been a naval headquarters at least since Roman times. The local culture has adapted to changes in sea level; there are Roman temples here whose columns stand in seawater; obviously they were on dry land when they were built, but water lines and seashells show that the water was at some time or times even higher than it is now. This is due to local changes in elevation produced by an active geology, bringing up the second dimension.

Second, looking at history and science, it is well known that Vesuvius erupted in A.D. 79 and destroyed several cities along the shore of the Bay of Naples, including Pompeii and Herculaneum, with great loss of lives. We have, for ex-



FIGURE 5. Modern Naples.

ample, the contemporary account of Pliny the Younger, who actually witnessed the eruption and described it. Science can testify that there have been many other eruptions and earthquakes here, that the soil in this area is fertile because it is volcanic in origin, and that Vesuvius is still active. It erupted during the Second World War, for example. Yet people continue to build close beneath it as if there were no danger. There is perhaps a parallel here with the present threat of global warming, bringing up the third dimension.

Third, looking at time and space, it is evident that a complete understanding of this modern scene depends in large part on knowing the ancient and medieval history that produced it. And Naples, connected through its bay with the Mediterranean Sea to the world ocean, and through the atmosphere to everywhere else on Earth, cannot truly be considered in isolation.

The five images we have seen depict five regions of Earth: the Great Plains of North America, the Nile Valley of Africa, Easter Island in the Pacific Ocean west of South America, the arid land of Jordan in western Asia, and Naples in Mediterranean Europe. They represent samples of the global extent of environmental history.

We have touched on only three dimensions, three of the salient theoretical issues that have concerned and divided environmental historians. There are, of course, many others such as professionalism, environmental determinism as opposed to anthropogenic causation, the accuracy and appropriateness of declensionist narratives, the extent to which our perception of nature is simply a social construction, whether tracing ideas of environmental history in past historical periods is merely presentism, the ways in which political-economic explanations

are applicable, and the extent to which environmental historical analysis serves environmentalist advocacy. The debates on these issues seem unlikely to recede; rather, it is most likely that similar issues will continue to arise. My contention is that vigorous discourse between multiple theoretical viewpoints, carried out in a reasoned manner, sharpens our analyses and strengthens our field.

NOTES

¹ See illustration 7 in J. Donald Hughes, *What is Environmental History?* (Cambridge: Polity Press, 2006), p. 43.

² Carolyn Merchant, 'The Theoretical Structure of Ecological Revolutions', *Environmental Review* 11, 4 (Winter 1987): 265–74, doi:10.2307/3984135; see also Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (Chapel Hill: University of North Carolina Press, 1989). Madhav Gadgil and Ramachandra Guha, 'A Theory of Ecological History', Part One of *This Fissured Land: An Ecological History of India* (Berkeley and Los Angeles: University of California Press, 1992), pp. 9–68. James O'Connor, 'What is Environmental History? Why Environmental History?', in *Natural Causes: Essays in Ecological Marxism*, ed. James O'Connor (New York and London: The Guilford Press, 1998), pp. 48–70.

³ Donald Worster, 'Appendix: Doing Environmental History', in *The Ends of the Earth: Perspectives on Modern Environmental History*, ed. Donald Worster (Cambridge: Cambridge University Press, 1988), pp. 289–307. After hearing me present parts of this paper at the meeting of the European Society for Environmental History in Amsterdam in June 2007, Worster informally remarked to me that what environmental history needs is not primarily theory, but better methods of working with evidence in constructing an accurate narrative. This is a good point, and I consider it to be the other side of a valuable coin. We can use both; theory and method can reinforce one another.

⁴ A. T. Grove and Oliver Rackham, *The Nature of Mediterranean Europe: An Ecological History* (New Haven: Yale University Press, 2001), pp. 45, 376. They have to resort to locutions such as 'interacting with the natural environment and with animals and plants' (p. 14), and insist on using the terms 'landscape history' and 'ecological history' instead of 'environmental history'.

⁵ C. P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge: Cambridge University Press, 1959).

⁶ *Ibid.* p. 60.

⁷ See illustration 14 in Hughes, *What is Environmental History?*, p. 82.

⁸ Clive Ponting, *A Green History of the World* (New York: St. Martin's Press, 1992), pp. 1–7; Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (New York: Viking, 2005), pp. 79–119. A solid, dependable treatment in greater detail of the evidence and its interpretation is offered in John Flenley and Paul Bahn, *The Enigmas of Easter Island* (Oxford: Oxford University Press, 2003).