Ice, Worms, and Dirt: The Power of Nature in North American History

Donald Worster

Donald Worster is the Joyce and Elizabeth Hall Professor of History at the University of Kansas.

Translated from Donald Worster, "Un regard froid et lointain sur l'histoire. Comment la glace, les vers et la boue nous ont façonnés," *Globe, revue internationale d'etudes quebecois,* 9 no. 1 (2006). Used by permission. This lecture was delivered to the "Situating Quebec in Global Environmental History" colloquium at McGill University in September 2005. An earlier version was published as "A Long Cold View of History," *The American Scholar* 74 no. 2 (Spring 2005): pp. 57–66.

The 2004 tsunami that killed over 250,000 people living along the shores of the Indian Ocean sent a shock wave through western culture. And now Hurricane Katrina has, on a much smaller scale, done the same for people in the United States. In both cases we learned how vulnerable our vaunted technological civilization is to the power of the natural world. Historians are scurrying to find examples from the past when other natural calamities similarly destroyed lives, upset the political order, and challenged religious beliefs in divine providence. They point to the volcanic explosion of Krakatoa in 1883 or the Lisbon earthquake of 1755 or dozens of El Niño effects that, besides causing immense human suffering, may also have brought significant change to the social or intellectual order. A new field of "disaster history" has sprung up, with the usual mix of serious scholars and publicity-seeking charlatans vying to say just how powerful nature has been as a force in history.

But nature not only inflicts us with sudden tragic events that kill or disrupt or impoverish. Far more of nature's power comes to us with the slow, relentless, gradual force of a glacier in motion or a continent in drift and over scales of time that far transcend our written records or memories, scales that often could have been revealed only by modern scientific methods. That power is not simply destructive, although it is always simply indifferent. We would not number over six

billion people if, on the whole, nature had been against us, or if most planetary forces had been hostile to life.

Quite the contrary, Earth is wonderfully fit for life. All civilizations have thrived on that fitness, although seldom acknowledging just how much their success depended on natural resources, on soil fertility, on a generally stable atmospheric and climate system, on many organic allies, and on the services that nature daily provides.

That hidden power of nature affects far more than primitive hunters and gatherers or vulnerable peasant farmers. It has even shaped the growth and development of modern nations like Canada and the United States. Politicians, economists, business people, and academic humanists could all profit by taking a deeper look at the continent of North America, this huge bowl in which we live, stretching from Arctic tundra down to green tropical mountains.

What is this place and what has it allowed people to do here? What terms did an ancient and dynamic nature set for human settlement, economic development, and cultural evolution? How is that nature still influencing the way we live today?

An Icy Beginning

Among other things, this continent has been shaped and influenced over its entire extent by the Ice Age, and much of what we have been allowed to do here reflects that geological epoch. Yet the Ice Age, or the Pleistocene, has almost never figured into the histories that academic historians have written about North America. Historians in the United States talk about the colonial period, the Civil War era, and the New Deal; historians in Canada talk about Confederation or the era of Mackenzie King—but virtually never about the Ice Age and its implications for these nations' stories.

Yet no less than four separate times over the past million years heavy snow has fallen, accumulated, and compacted into immense sheets of ice, and those sheets have crept southward, crunching everything in their path. They have buried rich, luxuriant forests that once grew within the Arctic Circle. They have scraped dark soil down to bedrock and pushed and piled it somewhere else. Repeatedly, they have driven any creature that could walk or fly to warmer climes. Naturalist Peter Farb has described a glacier as a "monumental plow upon the land, scooping out depressions in the earth and grinding boulders down to pebbles."[1] Our historians do talk now and then about plows, but those Ice Age plows exceeded anything we have ever invented. They were capable of moving entire hills and rivers, laying bare hundreds of thousands of square miles, remaking the face of a continent.

When the rate of melt exceeded the rate of advance, the ice began to retreat, dropping its burden of earth and rock like a dirty blanket. The blanket was very thin in New England, but in what we now call the Midwest it was several hundred feet thick. Mountains emerged from the ice scarred and scraped clean. Eskers, hogbacks, and drumlins testified to the direction of glacial retreat. The largest depressions left behind became lakes, and the largest of them became the Great Lakes, containing more fresh water than anyplace else on earth. Rivers flowed out of those lakes, seeking the ocean, and after each retreat the continent showed a new set of watery veins and arteries.

Scattered around North America today, in the high mountains of Colorado, California, Alaska, and Canada, are a few remnants of the last ice sheet. But it is to Greenland we must go to feel the full massiveness of the ice when it was at its peak. Greenland is really "Whiteland," buried under a sheet of ice two miles thick. So also much of the North American continent once was buried—Montreal, New York, Toronto, Chicago, Winnipeg all occupying sites that once were deeply buried under the ice.

Surely that immensity of cold, hard whiteness, returning again and again, left a mark not only on the land itself but also on subsequent human history, influencing patterns of Canadian or American settlement and enterprise. But what was it, and how to make that legacy of the Pleistocene more visible and convincing? How should it influence our thinking about the history of Quebec, the St. Lawrence valley, or the whole continent? Where do we start and how do we start with this monumental epoch of our common environmental history?

A Counterfactual Account

One way to bring home the significance of the deep past might be to play a counterfactual game. My dictionary does not define "counterfactual," but everyone probably knows what I mean. A counterfactual is an alternative past that never actually happened but that can help us, by comparison and contrast, understand better what *did* happen. It shows us that history might have gone in different directions, that nothing was foreordained to turn out exactly the way it has; at the same time, everything was caused and might have turned out differently if the causes had been even slightly different. Environmental historians might use this counterfactual strategy by imagining an alternative geological history for the continent and then asking what difference that might have made in the human history we have lived and written about.

Begin by imagining a map showing the continent's landforms and vegetation patterns. Its key features are, of course, the eastward-flowing Great Lakes and the St. Lawrence River, the north–south-trending Rockies and Appalachians, with deserts, basins, and coasts filling in the rest of the picture. Usually, such a map just sits there inert and passive in our minds, a terrain fixed in time, completely nonhistorical. The rivers never stop running, the mountains never wear away, the eternal coasts front an unchanging sea. Actually, we realize when we think about it that the physical map of the continent has always been in flux. North America has always been undergoing profound change, though often the changes in the land take far longer to observe than the social or political changes that most historians choose to study.

Put a date of 1534 on our mental map, the year the Breton sea captain Jacques Cartier made his first voyage to the New World. Cartier, the first white man to penetrate the continental interior north of Mexico, provides our earliest written descriptions of the place, and they are filled with ambivalence; not surprisingly, since his mission was to find a way to China. Cartier arrived at the rocky shore of Labrador in June, complaining that "there is nothing but moss and stunted shrubs." Disappointed, he was "inclined to regard this land as the one God gave to Cain," fit only for outcasts and murderers. Fortunately, he came back on a second voyage, which took him up the "great river of Hochelaga and *chemyn de Canada*" (later called the Saint Lawrence), where he glimpsed a more promising continent of extraordinary richness and fertility. Somewhere to the west, he learned from the so-called Indians, lay a kingdom as rich in minerals as Peru, a land that would make France as wealthy as Spain.

Unfortunately Cartier never saw that fabulous (and mythical) kingdom. He died in 1557 in his hometown of Saint Malo, probably after much fruitless dreaming about that faraway place. His countrymen subsequently fell into religious wars that for a long time distracted them from thinking about the nature of the New World.

But now run that 1534 C.E. map backward in time, say, to about 12,000 years before the present. In geological terms that was not so very long ago. What we now see on our mind's computer screen is the last great sheet of ice covering the northern latitudes of the continent, which scientists call the Late Wisconsinan glaciation. Although at first glance it looks like one solid sheet, actually it is made up several discrete ice masses, the largest of which is the Laurentide Ice Sheet occupying the interior of Canada from Newfoundland to the Rockies and, if we go back 20,000 years before the present, reaching as far south as present-day New York City and across to Illinois and Wisconsin. A separate Cordilleran Ice Sheet covers the mountainous areas of far-western Canada. Most of Alaska is free of ice and supports a population of mammoths, horses, bison, musk oxen, and caribou on scanty vegetation.

Now imagine that our huge sheet of ice does not melt away so quickly, that nature keeps it there until the time when Monsieur Cartier is scheduled to arrive. Bring him along the Labrador coast in our counterfactual story, and what does he see? Ice and more ice. The land that God gave to Cain becomes more forbidding than ever—indeed, no land at all is in sight, only a wall of frozen water, with icebergs calving into the sea. Cartier might just as well have come to Antarctica. No Indian parties paddle out in canoes to meet him, offering to trade the beaver robes on their backs. In fact there are no Indians or beavers in what we call eastern Canada. There is no St. Lawrence River draining the interior. In a sense, there is no interior.

Offshore, the natural environment is changed too. The Grand Banks, that famous shallow sea of upwelling currents that drew fishermen from England, France, and Portugal, has become dry land on our map. No codfish can swim there or attract fishermen. One such voyage would probably be enough for Cartier. He would sail straight home, never to return, and his fellow Europeans would remain indifferent to the New World not merely for a few decades but for centuries, perhaps even for millennia, to come.

All of this remapping is not completely imaginary. Such a glaciated place once really existed. Had that icy reality continued to exist just a little longer than it did, the effects of the New World on European civilization would have been profoundly different (presuming, of course, that any kind of civilization would have emerged in a Europe likewise buried under an ice cap stretching as far south as Italy or Spain).

The New World discoveries, with all their ramifications for European science, literature, economics, political institutions, food, and demography, came at a time when nature wonderfully cooperated, opening up a continent for Europeans to explore, seize, and fight about. Put another way, the natural environment *allowed* European expansion. It also allowed the spread of European plants and animals, which environmental historian Alfred Crosby has called "the portmanteau biota," those introduced species, from smallpox and dandelions to pigs and cattle, that ran wild across North America and helped the Europeans take control.

But if we ventured farther into the purely hypothetical, to imagine a continent that never existed, we might appreciate even more how the power of nature might easily have made quite a

different impact on human history than it did. Bring, for example, that Laurentide Ice Sheet farther south on our mental map, beyond its true line of extent—bring it as far south as the state of Georgia. We now have created a place where teeth-numbing meltwater flows down both sides of the Appalachian Mountains. Now bring Europeans onto *that* imaginary scene and ask, what would they find and what would they do? What *could* they do in that colder, wetter environment?

They would find the eastern shoreline of North America extending far out into the Atlantic basin, as the amount of water in the ocean would be greatly diminished—taken up into the ice—and the continental shelf exposed. Coming ashore on that new raw edge of the continent, they would find tundra all around them, rather than a temperate land. The broad tidewater rivers would not look anything like the James or the Susquehanna, as earlier colonists knew them, whose banks were covered with hardwood forests festooned with wild grape vines and teeming with wild game. On the contrary, the scene would be bleak and cold; the growing season would be that of today's Hudson Bay littoral.

What would that Virginia or North Carolina of a more extensive Pleistocene allow them to do? Clearly, they could not expect to recreate in such a place dominated by lichens and rock any kind of agriculture based on the major crops that have supported human civilization—wheat, oats, rice, maize, legumes, and millets. Importing the New World plantation system (first developed in Brazil to grow large-scale monocultures of sugar cane, tobacco, or cotton) would also have been inconceivable. The most daring entrepreneur would not dream of trying to grow, in such a place, plants requiring a long growing season, abundant rainfall, and temperate or subtropical weather. The plantation was invented to raise non-European crops in very warm latitudes for European consumption. The real South's subtropical climate and soils provided the necessary conditions for such agriculture to flourish, but those conditions would not exist in our hypothetical Virginia of ice, tundra, and hairy mammoths.

If no plantation system were possible, then there would be no need for armies of field hands to cut and dry tobacco leaves or grind sugar cane into molasses. There would be no need of or excuse for indenturing poor Englishmen or for enslaving Africans and transporting them in chains. The natural environment of North America would not encourage such practices. We have no record of slave-based agriculture developing in a tundra landscape.

Slavery, to be sure, was a labour institution created by racist attitudes and an entrepreneurial economic culture, not by nature. Nevertheless, the natural environment of North America as it was fatefully found in the late 16th and the early 17th centuries did play a significant role in the invention and evolution of a plantation economy based on slave labour. The natural environment allowed the spread of plantation agriculture from the Atlantic Tidewater westward to Texas. How can we understand that economy fully without taking into account the role of the environment? The plantation was at once an economic, social, and cultural relationship among different peoples *and* a response of people with capital to the possibilities set by nature.

When we begin to approach all of North American history in this more complicated way, we will begin to see how important ramifications followed the fact that the actual Virginia of history was free of ice and tundra. We will have to grant that even the history of race relationships in North America was not only formed by culture, ideology, and economy, but also had powerful environmental determinants.

Back to Reality

Canada, in contrast to the American South, did not offer suitable natural conditions for the plantation system. True, it had a few good possibilities for agriculture, once the glaciers had receded. Shortly after the last ice sheet melted away, the first indisputable evidence of humans begins to show up across Canada. Whether those archaic hunting peoples were newcomers to the continent or whether they were old-timers who had been here for thousands of years is not important to settle now. We do know for certain that as the ice melted they drifted eastward, skirting a 700-mile long inland sea, Lake Agassiz, which at one time dominated the centre of the continent. And we know that within a few thousand years after their arrival they had learned to cultivate maize in the Ontario lowlands, where there was a lot of good soil.

Over much of Ontario, however, the retreating ice sheet left a land scoured and bereft of fertility. A Precambrian basement rock, the Canadian Shield, now lay exposed in a vast semicircle bordering Hudson Bay, like a medieval breastplate, stretching from the mountains of northern Labrador south to the Great Lakes and then across Manitoba all the way to the Arctic Archipelago. It covered almost half the present-day nation. A hard, knobby plate, it featured low hills a few hundred feet high and hollows filled with muskeg swamp, peat bog, and mosquito-rich lakes and ponds, with a myriad of streams running helter-skelter across the surface. About all that would grow on the Shield were conifers and scattered hardwoods with shallow, spreading roots.

Confronted by such an inhospitable environment, agriculture could not get much of a foothold. Even overland travel was difficult. Long after the Europeans had arrived, the Shield continued to defy land transportation and was open only to canoes and snowshoes. Although one day a railroad would eventually be dynamited through the rock and an industrial economy would grow up around mines, pulp mills, and hydro projects, agriculture would never be widely possible there.

The long-lasting effects of the Ice Age explain better than any cultural or political factor the contrasting fates of Canada and the United States. Here are twin-sister nations with very similar cultural roots, two nations that are virtually identical in physical size (each covering nearly 10 million square kilometres)—yet they are radically dissimilar in population size (the United States has 10 times the population of Canada), in national wealth (again, the U.S. annual gross domestic product is more than 10 times that of Canada). And, following those material dissimilarities, they have become radically dissimilar in global power and in their role in global politics. I doubt that the difference between their current status in the superpower stakes is due to a deep moral repugnance toward imperialism north of the border and a deep lust for imperialism south of the border.

South of the Great Lakes the glaciers left behind that thick blanket of till noted earlier, one that over several thousand years developed into a fertile topsoil, the best and most extensive in the world. When the Europeans first encountered that soil, it was covered with tall prairie grasses and oak-hickory forests. Think what a difference such an abundance of fertility has made to the fate of the United States. Settlers with plows, wagons, and dreams of acquiring private property tended to go south of the international border, avoiding the rock-hard centre of Canada, seeking homesteads on the deep prairie soils of the American Midwest. A tinkerer named Cyrus McCormick followed their trails and invented mechanical reapers for harvesting their abundant crops of wheat. Eventually New World maize flourished even better than wheat in this place and proved a

more profitable crop to raise, leading to the fabulously productive corn belt. Pigs fattened on the maize and trotted to market, where they were sold as ham and bacon to the cities. Thus urban conglomerations grew out of the same soil as maize and livestock—Cleveland, Chicago, Minneapolis, Milwaukee, Des Moines, Omaha, Saint Louis, and Kansas City. So also did industries for milling grain, packing meat, or assembling automobiles. Millions of immigrants came to this region to work in those industries as well as cultivate the earth. Whatever their line of work, they came here mainly because it had rich, abundant soil.

Creating the American Midwest took prodigious human labour and great amounts of capital, but neither the labour nor the capital created the topsoil that made the Midwest possible. That soil was the work not only of the glaciers but also of billions of organisms working in the glacial till: earthworms, mites, nematodes, fungi, bacteria, and badgers, all of them toiling tirelessly over thousands of years. Their significance to history is beyond easy reckoning. It is not too much to claim that the earthworm has been at least as important to the making of the U.S. Midwest as Cyrus McCormick, John Deere, Jane Adams, Frank Lloyd Wright, or even Abraham Lincoln. Somewhere on the streets of Omaha or Chicago there ought to be a monument to the lowly earthworm whose labours in the earth went on long before any humans arrived in the place. How many worm workdays did it take to prepare the ground for civilization? How long can a civilization persist if it forgets its debt to this "labouring class" that has no arms, legs, or voices?

Bringing the Environment In

The fate of nations, I have been suggesting, depends on something more than political ideology or economic systems or human energy or ingenuity. It also depends on nature, starting with the awesome power of climate. Climate is not a fixed entity that we can take for granted; it wobbles and changes as the earth wobbles on its axis. Climate is volatile and chaotic, and as it changes so too do the terms of existence for human societies. So also change the images and mythologies that people use to explain who they are—the people of the long winters, the people of the desiccated plains, the people of Hurricane Alley. Even now, with all the assistance of modern technology at our disposal, we cannot evade that shaping power of climate or of other planetary forces. The future of our vaunted civilization may lie at the mercy of advancing or receding ice sheets, a rising waterline, a prolonged spell of drought, or a volcanic eruption.

But as the example of the Midwest-creating earthworm suggests, many nonhuman living organisms, micro and macro, also have a vital role in making history. They have done so by working together in intricate ways, over evolutionary scales of time, creating complex ecosystems into which humans step and adjust or stumble and fail.

Take away all of those big and little organisms, which together far exceed our own human numbers on the continent, reduce North America to a flat, inorganic, sterile piece of rock or a sandy plain devoid of all living things, and then ask yourself what the United States or Canada would be like today. Neither nation would be here. Nor would all their predecessor nations, the Inuit, the Navajo, the Micmacs, or the Choctaws.

Popular culture now and then recognizes the importance of those other than human organisms by celebrating them in stories, images, and icons. We have turned the beaver, the white pine, the

bison, and the cod into symbols as much as we have turned them into wealth. They have even become markers of national identity, proudly displayed on our money, flags, and corporate logos. Why should their significance not also be acknowledged more often in the books written by academic historians?

But including such organisms in history should not mean merely reducing them to cultural inscriptions in the history of ideas or popular iconography. They have been potent *material agents* in shaping our destiny. Modern science has revealed the extent and importance of the intricate biological interdependencies that have evolved in every habitat—the food and energy webs that link predator and prey, parasite and host, dominants and subordinates to form an ecological community. No organism, humans included, can survive without those complex communities of other living things. It is time that we reconceived of human history from this perspective, using the insights of ecology, geology, and other natural sciences to ask new questions about the past. We can no longer ignore the overwhelming scientific evidence of that principle of evolutionary interdependence.

The significance of the environment does not, of course, stop with the power that nature, organic and inorganic, holds over human life. As humans try to change their surroundings, those changes in the landscape themselves become powerful material forces. To paraphrase Winston Churchill, we reshape the landscape, and then it reshapes us. Among the most critical changes we make in nature are the depletions we cause in vital natural resources, as our habits of consumption increase. Substituting coal for wood or Herefords for bison or deer may help us overcome such depletions, but then the substitutions themselves begin to forge their own chain of consequences. They force changes in technology, in the organization of labour, in gender relations, in the investment of capital, even in the discourse of philosophy—in short they ramify through history.

Today, we are forging powerful new chains of environmental consequence by our often-unwitting behaviour. The rock oil that was discovered in 19th-century Pennsylvania, for example, and then was developed into a global oil industry, is now required to fuel over 100 million automobiles in North America and millions more overseas. Those automobiles are altering the global atmosphere, creating, according to the overwhelming majority of atmospheric scientists, a greenhouse effect that may make much of future North America hotter and drier than it has been for thousands of years. If that desiccation happens, if Saskatchewan becomes the new corn belt, or if Florida disappears through a melting of the polar icecaps and a rising ocean level, then environmental change will once again profoundly affect the history of civilization. This time it may be humans, not nature acting alone, that turn Manitoba into Nebraska, and Nebraska into west Texas.

Historians have too often found such matters uninteresting, marginal, irrelevant, or even repugnant to their work. They have not been adequately trained to see the power or complexity of the biophysical world. But if we ignore the power of nature and physical places in writing history, we will write history with only one eye open. We may see much with that one eye, but we will not see the past in its full breadth and depth. For depth of vision you need two eyes, one trained to see culture and one trained to see nature, and you need to keep them both wide open.

Conclusion

Whatever their social status or level of wealth, humans–from presidents and priests to homesteaders and housekeepers–have all had to derive their living, directly or indirectly, from the land. They have, most basically, had to eat. Historians who look at the past with both eyes open will see that every generation of humans, our own included, has had to rely on soil, forests, and animals to get the food they consume. They will see that when people fought they were often fighting over who could exploit the land beneath their feet. The full-vision historian will see that we cannot truly write the history of North America if the St. Lawrence River is left invisible, or if the adaptation of a farming society to the grasslands becomes marginalized, or if the hard physical labour of climbing mountains to reach California is forgotten.

If historians ignore or deny the power of nature, if they ignore the Pleistocene, the force of climate, the interdependent web of life, the limits of natural resources, they will write *bad history*—history that is analytically incomplete and ungrounded. They will also add to our society's irresponsible and thoughtless behaviour. History ought to make us better equipped to deal with the world around us and to act as responsible citizens. But how can we do that if we are blind to the nature that feeds us, the nature that conditions us, the nature that thwarts us from time to time, and the nature that every day imprints itself on our very existence?

Discussion Questions

1. Counterfactual arguments are based on things that didn't happen. This might suggest that there could be no evidence to support them. Is this the case? Why or why not?
2. Does the author's counterfactual history suggest the importance of environment in history? What is gained, for example, in considering the earthworm's role in history?
3. Why and how might a reader argue that Worster is wrong, that history should not consider geological time?

Note

1. Peter Kalb, *Face of North America: The Natural History of a Continent* (New York: Harper & Row, 1963): p. 12.

Further Reading

Crosby, Alfred. *Ecological Imperialism: The Biological Expansion of Europe, 900–1900.* Cambridge, UK: Cambridge University Press, 1993.

Ferguson, Niall. *Virtual History: Alternatives and Counterfactuals.* New York: Basic Books, 2000.

Gaddis, John Lewis. *The Landscape of History: How Historians Map the Past.* Oxford: Oxford University Press, 2004.

Hawthorn, Geoffrey. *Plausible Worlds: Possibility and Understanding in History and the Social Sciences.* Cambridge, UK: Cambridge University Press, 1993.

Mithen, Steven. *After the Ice: A Global Human History 20,000–5,000 BC.* Cambridge, MA: Harvard University Press, 2006.

Pielou, E. C. *After the Ice Age: The Return of Life to Glaciated North America.* Chicago: University of Chicago, 1992.

Worster, Donald. *Nature's Economy: A History of Ecological Ideas,* 2nd ed. Cambridge, UK: Cambridge University Press, 1994.