13
Retrofitting the Future

Barry Rodrigue

Abstract

This paper considers the subspecialty of adaptive technology. It looks at technology development in the light of our rapidly changing world and in the context of Big History. The author makes a case for past technologies serving as models from which new technologies may be developed. In this way, he sees a collective knowledge of the past, as well as considerations of the present and future, conferring survival benefits on civilization. In this way, Big History holds great pragmatic promise for humanity.

Keywords: *adaptive technology, Big History, traditional ecological knowledge (TEK), future studies, indigenous heritage.*

Big History is involved in a great project of expanding the view of humanity's place in the universe. Its studies are leading to new connections between previously separated entities, from cities and minerals to shipping lanes and thermoclines. But as scientists and scholars develop new insights of cosmic history, they should also think back to their ancestors – to our forefathers and foremothers who took their living from the land, sea, rivers and hillsides of the ancient world. They should also think about today's indigenous peoples who are custodians of a middle tradition between the old and the new ways. Such reflection on the past should not be a focus of just antiquarian interest but it should also reflect a present-day concern for sustainable adaptation to life on our rapidly changing planet.

Classically minded scholars tend to designate the small agrarian cities of 5000 years ago as the 'start of civilization' but, in fact, the individual components that collectively constitute 'civilization' existed long before Mesopotamia became its so-called cradle. The first understandings of the universe began with our Paleolithic ancestors, not with Neolithic rulers and priests. These understandings developed in continual and collective processes, beginning with the evolution of our genus more than two million years ago.

This is borne out with the discovery that many of the traditional hallmarks used to identify 'civilization' began before the adoption of agriculture. Take, for example, permanent residency in single locations and the development of ceramics. Hunters and gatherers lived in permanent communities in places like Palestine and Japan over 10,000 years ago, while pottery has been pushed back 20,000 years with its recent discovery in southern China (Wu *et al.* 2012). Indeed, it was hunters and gatherers who developed strategies that led to the development of agriculture. While hardly news to most scholars, it is a fact that needs to be better articulated with a public that tends to focus on technological and social aspects of Neolithic society.

The hunting and gathering peoples of the world knew their landscapes and waterscapes better than the farmers who had to micromanage their crops on small plots of lands. Agriculture might have allowed the division of labor so that a few specialists could spend their time studying the stars, but, in the older tradition, a majority of hunters and gatherers acquired such knowledge of nature. This, indeed, is a point made by social scholar James Tierney: 'The tendency is to lump all our ancient ancestors into the category of hunter-gather. This implies to the lay person, as well as many scholars, that these were small bands forever on the move, with little or no behaviors that we might describe as "advanced culture"' (Tierney 2011: 290).

Examples

On low alpine peaks along the coast of Maine are small cuts in the granite ledges. These elongated holes were quarries dug a hundred years ago to extract mica. Maine was one of the world's large mica producers back then. Mica is an igneous form of silicon whose name can be translated from Latin as 'a glittering crumb'. Indeed, as you walk up the tote roads on these hills, the earth glitters with fragments that fell off horse-drawn carts a century ago. Mica is inert, flexible, lightweight, non-conducting, and opaque. In earlier days, it was used as windows in boilers (isinglass), in lanterns to shield lampshade fabric from a wick's flame, as well as insulation for electrical plugs and toasters. Today, mica is used in atomic force microscopy, which produces high resolution, three-dimensional imaging.

This is an example of how older uses of technology can be migrated into more modern uses. There is nothing unusual about this process. People have adapted older technologies into newer ones for millennia – this paradigm of transferrable technology is a backbone of material sciences. Pigments that our ancestors developed for use on the walls of caves, like Lascaux and Duogate and Blombos, have been developed for use on the walls of the international space station and are even enroute to Mars (NASA 2012).

My professional training lies in the disciplines of geography and archeology. The research that I entered focuses on the movement of humans into the northern Appalachian Highlands – the frontier region between Canada and the United States. While this research has been about past events, I soon discovered a specialty of adaptive technology that can be called 'futures archeology'. This specialty became apparent one day in 1994, when I discovered the remains of a half-dozen deserted farms, which lay on a hillside, in the woods, many kilometers from any presently existing habitation.[1]

After a long day of work, when I got back to my tent that night, I discovered that I had neglected to measure the downhill dimensions of a causeway. So I got up at 05:00 the next morning. It was raining. I had breakfast – as the rain got worse. I crossed the river, parked my car at the end of a dirt road, and began hiking through the forest. The rain came down even harder. However, it turned out that this torrential downpour was a very fortunate experience, since I got to see the causeway in action.

A causeway is a stone bridge that allows humans and livestock to cross over a stream but allows water to pass beneath it in such a way to minimize erosion. In this case, the causeway worked brilliantly, 150 years after its construction and abandonment.[2] The water pooled upstream and drained through the stonework, leaving the stone crossing dry and the streambed intact.

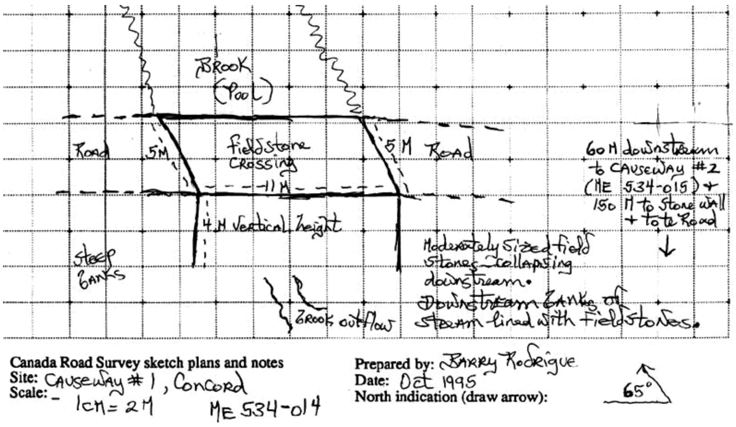

Fig. 1. Causeway plan. Barry Rodrigue, Causeway No.1, Concord, Maine, ME 534–014, for the Maine Historic Preservation Commission, Augusta, Maine (USA)

[1] Barry Rodrigue, Maine Historic Preservation Commission, ME 534-016.
[2] Barry Rodrigue, Maine Historic Preservation Commission, ME 534-014.

I took the measurements that I needed and hiked back out of the forest. Back at my field camp, I mentioned the experience to the owner of a hunting lodge. She said this design would solve one of their problems, as their stone causeways washed out every year. This began my thinking about old methods being used to solve modern problems. Conversations with archeologists and other professionals revealed similar examples of adaptive technology.

However, simple adoption of old techniques can be problematic. One infamous example is that of the sailing vessel, *John F. Leavitt*. In the wake of the oil crisis of 1973–1974, people began to search for alternatives to petroleum power. A well-designed adaptation of a traditional coastal schooner was developed in Waldoboro, Maine (USA) – it was 30-meters long and had two masts rigged with fore and aft sails. In the winter of 1979, it set sail down the eastern seaboard of the United States with a cargo of lumber, bound for Haiti. However, it foundered in moderate seas off Long Island, New York. After much study of the incident, the problem was identified as the crew not having sufficient knowledge of commercial deep-water sailing, which had been lost in the century since the era of 'wind, water and wood' (Koltz 1980: 40–42).[3] In other words, knowledge needs to go with technology.

Bridges to the Present

The examples of this more complete development of technology and its use abound. Two examples may be seen in Alaska. Archeologists, biologists and indigenous peoples in Southeast Alaska have begun collaborating to deal with declines in the region's basic fisheries economy. Traditional halibut hooks fashioned by the indigenous Tlingit were designed in such a way so as to avoid capture of immature fish and large breeding females, while their intertidal salmon weirs allowed for capture of fish only at certain times of an ebb tide. This was a technology-based method of conservation (Ratner and Holen 2007: 45–46, 48). Likewise, architectural studies of earth-fast, traditional housing among the indigenous peoples of Alaska led to construction of new housing forms in Anuktuvuk Pass, a Nunamiut Eskimo community in the Brooks Mountain Range in the Alaskan arctic. By merging traditional design and with high-tech design, the result was a cut in the cost of house construction and a reduction in the annual heating fuel use by a factor of ten. This kind of merger of traditional and modern skills is referred to as 'traditional ecological knowledge' or TEK (Ratner and Holen 2007: 45–46, 48).

Russian anthropologist Anatoly Alekseyevich Shtyrbul, who teaches in Western Siberia, at the Omsk State Pedagogical University, has

[3] I would like to thank Nathan Lipfert of the Maine Maritime Museum for his background information of this incident and others.

carried this view further by stating that the so-called 'primitive' traditional societies possess many of the skills that we will need to adapt to the future.[4] Shtyrbul is echoed by American archeologist, Stephen Scharoun, who specializes in eighteenth- and nineteenth-century farm technology and systems of farm management. His career was not chosen because of an atavistic appreciation for the past. His view is that with the decline of cheap fossil fuel, we should know such techniques, so that we can adapt them to soon-to-be changing forms of food production.

This is by no means a unique view, as many journals, societies, books, individuals and organizations advocate it. In the United States, *Foxfire* magazine was begun in 1966, the *Whole Earth Catalog* in 1968, and the *Small Farmer's Journal* in 1976. These are the kinds of technological compilation begun by encyclopediasts in fifteenth-century China and eighteenth-century France. The designer, Victor Papanek, devoted his life to such applied uses, as in his 1971 book, *Design for the Real World*.

Since the 1980s, agricultural scientist Anil Gupta of the Indian Institute of Management in Ahmedabad has researched grassroots innovation by common people throughout South Asia.[5] Alexander Petroff has successfully established a self-sustaining program of agricultural recolonization based on oxen power in eastern Congo, an area lacking petroleum access. Petroff envisions his organization, Working Villages International, to be applicable to other regions of the world.[6]

But what is new about these efforts is that the present and future circumstances of life on Earth have so dramatically changed, and that a new, degraded world is in sight – one with little cheap energy, one that is polluted, overpopulated, and trying to adapt to collapsing infrastructures. Such adaptations as articulated by Shtyrbul and others are perhaps more important than ever. So, what does this kind of adaptive technology mean for Big History?

Big History and Adaptive Technology

In a way, adaptive technology could be seen as an extension of *Little Big Histories*, where a complete historical profile is given on a subject. In this respect, Esther Quaedackers has analyzed Tiananmen Square as an expression of building styles, making connections between human and other animals' construction techniques, while Craig Benjamin has ana-

---

[4] This discourse was part of Shtyrbul's presentation at the Fifth International Conference on Hierarchy and Power in the History of Civilizations (Shtyrbul 2009).

[5] Gupta's organization, the Honey Bee Network (http://www.sristi.org/hbnew/), promotes grassroots innovation.

[6] See the website for Working Villages International at http://workingvillages.org/.

lyzed the deep history of Jericho as the world's oldest and continually inhabited city (Quaedackers 2011; Benjamin 2011).

However, adaptive technology moves the concept of *Little Big Histories* a few steps further into the realm of filtering them for pragmatic lessons, for application to life. It thus could become prescriptive as well as descriptive. We, Big Historians, have done well in describing the past and beginning the assemblage of deep historical contexts. I propose that a next step might be more in the direction of applications.

In his study of the Little Big History of Jericho, Craig Benjamin has outlined the factors that gave Jericho such an advantage, such as reliable fresh water source, protected valley, closeness to a major trading route, fertile soil, *etc*. If we were to convert such a predictive model to a prescriptive model, it might point us in directions to plan our lives for more stable and equitable existence – for example, on site locations for cities like Camargue, France (below sea level) or San Francisco, USA (on an earthquake fault).

Our indigenous societies are repositories of knowledge and ways of learning that the modern world will increasingly come to need as our access to cheap fuel dwindles and the damage from industrial waste increases. This is not to advocate for the celebration of primitiveness or ethnic identity, but an acknowledgement that we need to establish a 'world heritage commons' where the best ideas, both technology and process, are assembled and adapted.[7]

References

Alaska Conservation Voters. 2012. 'Anaktuvuk Pass test home'. 28 July 2012. URL: http://www.acvoters.org/clean-energy-spotlight/anaktuvuk-pass-test-home-arctic-living-build-it-and-live-in-it-for-less.

Benjamin C. 2011. The Big History of Jericho. Paper presented at the World History Association, 20th Anniversary Conference, Beijing, People's Republic of China, July 8, 2011.

Koltz B. 1980. *The Reintroduction of Sail for Maritime Commerce: And the Consequent Effects upon Small Port Economy and Trade Routing*. M. A. Thesis. Notre Dame, IN: Notre Dame University.

NASA. 2012. *Protective Paint Tested on Space Station Makes for 'Curious' Ride to Mars*. URL: http://www.nasa.gov/mission_pages/station/research/news/curiosity_coating.html).

[7] Occoquan Paleotechnics (http://www.occpaleo.com/about.html) is an example of an effort that focuses on the study and reproduction of primitive technology.

Papanek V. 1971. *Design for the Real World: Human Ecology and Social Change*. New York: Pantheon Books.

Quaedackers E. 2011. 'The Big History of a Big Square: New Perspective on the Architecture of Tiananmen Square. Paper presented at the World History Association, 20th Anniversary Conference, Beijing, People's Republic of China, July 8, 2011.

Ratner N., and Holen D. 2007. Traditional Ecological Knowledge: Applying Principles of Sustainability to Wilderness Resource Management. *Forest Service Proceedings.* Washington, D.C.: United States Department of Agriculture, RMRS-P-49.

Shtyrbul A. 2009. Anarcho-Polity: The Evolution and Transformation from Theory to Practice, Fifth International Conference: *Hierarchy & Power in the History of Civilizations*, Moscow, 25 June 2009. Moscow: Russian Academy of Sciences.

Tierney J. 2011. Two Themes Inherent in Big History. *Evolution: A Big History Perspective* / Ed. by L. Grinin, A. Korotayev, and B. Rodrigue, pp. 287–293. Volgograd: Uchitel Publishing.

Wu X., Chi Zhang, Goldberg P., Cohen D. , Yan Pan, Arpin T., and Bar-Yosef O. 2012. Early Pottery at 20,000 Years Ago in Xianrendong Cave, China. *Science* 336 (6089): 1696–1700.