Heritage & Technology Heritage Conservation Symposium 2013
School of Canadian Studies, Carleton University, Ottawa, March 16th 2013

How 'Appropriate' is our Technological Heritage?

Susan M. Ross, Architect, Ottawa

Introduction

Looking at provocative intersections of cultural and environmental conservation ideas has been this author's objective in recent publications.[i] The 'Heritage & Technology' theme of this symposium therefore inspired a return to the ideas of the Appropriate Technology movement, in order to use it as a critical framework for discussing the conservation of Canadian technological heritage. Due to its vast geography and rapid history of development, Canada's technological heritage offers many useful examples for such a discussion.

The concept of 'appropriate technology,' which thrived in the 1970s and 1980s, was a precursor to aspects of the current concept of sustainable development. Its supporters promoted the need to limit the scale and speed of technological development, and advocated that transfers of technologies to local communities be adapted to their skills, resources and economies. Dr. Fritz Schumacher's writings, such as *Small is Beautiful: Economics as if People Mattered,* are considered seminal texts for defining the principles of appropriate technology.[ii] These basic principles have made their way into current objectives of sustainable planning, which champion local communities and environments, economic capacity and cultural traditions.

In the 1980s, the objectives of appropriate technology were also discussed in the context of building and conservation technologies.[iii] In particular, the appropriateness of applying new technologies from industrialized countries to diverse contexts in developing countries was assessed.[iv] This usually involved the recognition of the greater suitability of regional, traditional and craft-based techniques, over newer industrially enhanced technologies. Appropriate technology can thus be linked to the discourse on traditional building, which continues to frame both new building and conservation approaches in many parts of the world. This includes increasing recognition of the continued values of traditional adaptations to climate and the environment.

Appropriate technology ideas also relate to the principles of applying conservation solutions that have been demonstrated to be physically compatible and effective, and that new technologies need to be proven before being used. The discussion of whether the technologies we employ for conservation are appropriate continues.[v] The Association for Preservation Technology International (APT), for example, defines its mission as advancing "the application of traditional and contemporary technology appropriate to the conservation of the built environment and the cultural resources that contribute to its significance." As Robert Silman, conservation engineer and APT Fellow, has explained, the question we should be asking of conservation technologies is not just can we do it but should we?[vi]

Discussions of appropriate technology and conservation have, however, not inevitably focused on the sites, landscapes, and structures that are emblematic of technological developments and applications. The intent of this paper is therefore to re-introduce 'appropriate technology' into a discussion of the values and conservation of the heritage of technology itself.

The values of technological heritage

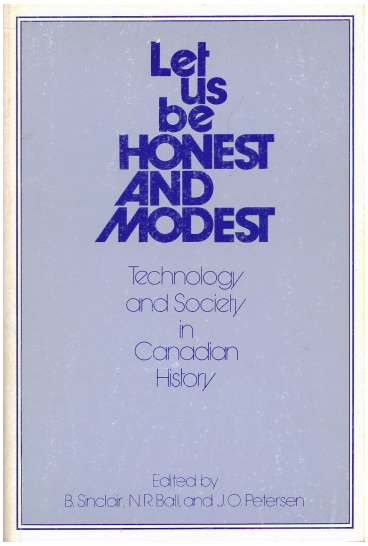
To begin this discussion, it is important to consider the values that are attributed to our technological heritage. Throughout its history, the Canadian environment, from the city to the hinterland, has been transformed by the application of specific technologies.

From the iconic grain elevators, lighthouses, bridges and canals to the more ubiquitous factories, mining

sites, rail lines, and highways, our cities, small towns and countryside are filled with tangible examples of built elements associated with the application of technology in the country's physical and demographic expansion. These forms also reflect intangible values, including individual and community aspirations, knowledge and institutions.

The associated values of technological heritage are defined specifically in the multitude of statements of value about places that have been designated, and more generally in national and international texts about industrial, engineering and modern heritage, such as the *Nizhny Tagil Charter for the Industrial Heritage* (2003), and the more recent ICOMOS-TICCIH 'Dublin Principles' which the symposium's last speaker discussed.[vii]

Canadian historians have long recognized the important role that technology played in the country's history, recognizing for example, our multiple roles in receiving, adapting or imposing technologies.[viii]



This critical historic analysis has created a strong basis for defining the broader heritage values of technological heritage and for making connections to social and environmental ideas embedded in these sites. [ix] In the 1990s, studies by Parks Canada for the Historic Sites and Monuments Board developed criteria for assessing both 'Canadian Engineering Achievements' and 'Built Heritage of the Modern Era'.[x] Such studies helped to underscore that engineering history is about innovation but also about adaptation to suit the country's climate and geography; and, that rapid technological advances of the modern era illustrate quickly changing social, political and economic conditions.

Learning from the Canadian Register for Historic Places

How do the unique stories of specific technological developments reflect this understanding? Some characteristics that have been formally recognized in specific sites already embody ideas of appropriate technology, including in particular the importance of ingenuity in using local materials, skills and conditions. In making use of the web – a type of technology a few other speakers focused on – what can be learned by analyzing the values and fate of the heritage of technology through information available on the Canadian Register for Historic Places?

Consideration of three engineering works from the early 20th century, built when communities across the country were struggling to develop infrastructure, services and employment, can provide some initial insights:

The **Fredericton Water Treatment Plant, in New Brunswick** is a municipal heritage site whose "value as a Local Historic Place resides in its original and continued purpose of providing a healthy, plentiful water supply to the residents of Fredericton."[xi] It is also valued for illustrating technological evolution in the ongoing adaptation to changing needs, from the 1880s to the 1980s. While early changes – such as more efficient pumps – focused on increasing capacity, most of the later developments – such as filtration processes – improved water quality. Perhaps the most significant change was the transition from surface to groundwater in the 1950s. As a result both the historic role of the St. John River and the current abundance of the aquifer are valued. So too however is the 1980s manganese removal plant, as the largest in North America.

The heritage value of the **Percival Windmill, a municipal heritage site near Willowdale, Saskatchewan,** built in 1905, "lies in its association with Saskatchewan's rural water system. Due to the

province's semi-arid climate and general lack of standing water, windmills provided a technology that gave many access to underground water reservoirs during the settlement period. The use of windmills was particularly important prior to the 1950s' rural electrification."[xii] The windmill's 12-blade wheel technology – developed and fabricated in Minnesota – was selected for its ability to adapt to the region's fluctuating wind speeds. Although this technology is in itself valued, it now stands unused but restored as a record of a community that no longer exists. This monument to technology is prominently visible to travelers on the nearby Trans-Canada highway.

The heritage value of **the Britannia Mines Concentrator, in Britannia Beach, British Columbia**, a National Historic Site of Canada, "lies in its physical illustration of the innovative (gravity-based) technology that made Britannia Mines an important copper mining site in Canadian history. The steel and concrete structure built in 1922-23 (…) incorporated new milling and processing techniques, (making) Britannia the largest producer of copper ore concentrate in the British Empire between 1925 and 1930. The concentrator continued to operate until Britannia Mines closed in 1974."[xiii] The mine site has been used as a museum since the 1970s, commemorating the success of the mine's evolving technology. As understanding of the mine's devastation to the landscape has developed, in particular its negative impact on the water quality of Britannia Creek, the need for environmental stewardship has emerged as a key educational message. Since 2005 a water treatment plant has been addressing the pollution from the mine. This hopefully also opens the door for greater acknowledgement of earlier aboriginal land use.

These three sites – whose stories are all available to us through the web-based Canadian register – illustrate a range of values associated with our technological heritage, from innovation to adaptation, including understanding and using local resources, climate and geography. The evolution of the water supply, wind power and mining technologies illustrate that regardless of the site's purpose, there was emphasis on efficiency and growth. However when growth was strictly related to resource exploitation, this has often proved to be unsustainable. In many cases there is no longer a community directly associated with the earlier uses. Although the sampling is too small to be conclusive, the comparison of these two municipal designations and a National Historic Site suggest that nationally-commemorated technological sites may be inherently less likely to reflect 'small is beautiful' thinking.

Questions raised by appropriate technology

Applied to technological heritage, the appropriate technology framework suggests we need to ask some basic questions, including but not limited to:

Was the technology developed as part of serving a collective purpose that endures? Or does it recall a resource-exploitation boom and competitive commercial interests, to be abandoned when depleted?

Did it result in lasting socio-economic benefits to a community, such as the development of skilled trades or organized labour? Or did it displace earlier, less formalized communities from a potentially more sustainable use of their land?

Are there still lessons we can learn from the earlier water-, wind- and gravity-powered technologies that reflect periods of adaptation prior to later emphasis on absolute efficiency and unlimited growth?

The fate of technological heritage – to be used or lost?

The importance of the function, purpose, or use of technological heritage is reflected in the charters on Industrial Heritage.[xiv] Looking at these three examples, one can identify three possible 'fates': ongoing use (evolution, growth, or adaptation); loss of use (mothballed, mummified as a museum, or demolished); and change of use (interim or permanent). Loss of use may have had important socio-economic implications. Further use, whether continued or adapted, will be more effective if appropriate and sustainable. Conservation inevitably requires a discussion of how to manage change.[xv] Sites that no longer serve their original purpose and that were not intended for human use represent

significant challenges in applying health and safety requirements related to any type of new use.[xvi] Technological sites that have survived have evolved, and will continue to do so.

Appropriate conservation of technological heritage

The appropriate technology framework becomes a useful perspective for assessing the ongoing value of our built technological heritage. It helps expand conservation objectives by including the creation of better-adapted, and more community-oriented places. It is in the nature of technological heritage to change and adapt. This is seen in the values attributed to many sites, when the site is shown to reflect an evolution in technologies.

One example of a sustainable adaptive reuse of a technological landscape that has become almost commonplace in North America and Europe is the transformation of an industrial transportation corridor to a recreational green pathway (as is illustrated here in Ottawa on the Rideau Canal, Ottawa)[xvii]. One may however ask: did the implementation of contemporary landscape architecture possibly conceal contamination or other historic issues that remain to be addressed?

Another example is the transformation of lighthouses in many countries. There is little current recognition of the risks that were associated with the work of the early lighthouse keepers, such as working with flammable fuels and exposure to toxic mercury fumes. Light sources have now universally been replaced by cleaner more efficient electricity-based technologies. Even more recently, many electric sources were converted to solar power. One may however question the durability of photovoltaic cells in such exposed conditions, even as we contemplate how automation often led to neglect of the supporting tower structures.

Specific Canadian challenges

This discussion of Canadian technological heritage values reveals themes that are important to consider when assessing how appropriate our technological heritage is.

There are many others to consider as well, including how it reflects: the challenge of demanding and diverse climates; the importance of large-scale transportation and energy networks in the country's rapid development; and, the settler economy that emphasized temporary uses and forms and led to emphasis on employment over skilled labour.

Perhaps the most significant challenge facing much of this heritage is its distance from where most people live. While it is important to ask how local, how community-based or how resource-saving our decisions are, in many cases there may no longer appear to be an adjacent community to connect to. There may also be a historic aboriginal community to consider, whose technology was so appropriate it left no apparent artifacts.

Canadian communities and governments have recognized much of their technological heritage, taking pride when it demonstrated adaptation. But an appreciation of the ways that technology was appropriate – and the critique of when it wasn't – could be more explicit, and thus help to orient further development in the changes required to make new uses possible. To close, it is interesting to consider the example of Lunenburg, Nova Scotia, a town that has set an inspiring example in considering how to reinvent its industrial heritage to new industrial purposes. Perhaps one of the more inspiring aspects is that is it illustrates a local initiative, of local businesses thinking small.[xviii]

The Lunenburg Forge – sustaining industrial uses

[i] Powter, A. and S. Ross (2005). "Integrating Environmental and Cultural Sustainability for Heritage Properties," *APT Bulletin,* 36.4: 5-11; Ross, Susan (2006), "Saving Heritage is Key to Sustainable Development" *Heritage* 6.11; Ross, Susan (2008), "How Green Was Canadian Modernism, How Sustainable will it be?" *Docomomo Journal*, Canada Modern issue, No.38, 67-72.

[ii] Schumacher, Fritz (1973), *Small is Beautiful, Economics as if People Mattered*, London: Blond and Briggs.

[iii] Alva, Alejandro and Elizabeth M. Chapman (1981) "'Appropriate' Technology?" *Appropriate Technologies in the Conservation of Cultural Property,* UNESCO Press, 115-134.

[iv] Willoughby, Kelvin W. (1990) *Technology Choice: A Critique of the Appropriate Technology Movement*. Boulder: London: Westview Press; Intermediate Technology Publications.

[v] Fixler, David (2008). "Appropriate Means to an Appropriate End: Industry, Modernism, and Preservation," *APT Bulletin*, 39.4, 31-36; Yeomans, David (2007) "Appropriate Technologies for Conservation," *Journal of Architectural Conservation,* 13.3: 9-20.

[vi] Silman, Robert (2007), "Is Preservation Technology Neutral?" *APT Bulletin*, 38.4, 3-10.

[vii] The International Committee for the Conservation of the Industrial Heritage (TICCIH) (2003), *The Nizhny Tagil Charter for the Industrial Heritage*.

[viii] Examples include: Sinclair, B. N. R. Ball, and J. O. Petersen, editors (1974), *Let Us Be Honest and Modest: Technology and Society in Canadian History,* Toronto: Oxford University Press; Ball, Norman, editor, (1988) *Building Canada, A History of Public Works*, Toronto: University of Toronto Press.

[ix] Passfield, Robert W. (1990), "Industrial Heritage Commemoration in the Canadian Parks Service - Part I," *IA: Journal of the Society for Industrial Archeology*, 16.2, 1990, 15-39; Passfield, Robert W. (1991), "Industrial Heritage Commemoration in the Canadian Parks Service- Part II," *IA: Journal of the Society for Industrial Archeology*, 17.1, 1991, 33-67.

[x] Parks Canada (2001), *National Historic Sites of Canada System Plan: Commemorating Canada's Built Heritage of the Modern Era*; Parks Canada (2001), *National Historic Sites of Canada System Plan: Commemorating Canadian Engineering Achievements*.

[xi] Fredericton Water Treatment Plant, Statement of Significance, Canadian Register of Historic Places, http://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=12962

[xii] Percival Windmill, Statement of Significance, Canadian Register of Historic Places, http://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=3104&pid=0,

[xiii] Britannia Mines, National Historic Site of Canada, Statement of Significance, Canadian Register of Historic Places, http://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=7561&pid=0

[xiv] ICOMOS-TICCIH (2011), *Principles for the Conservation of Industrial Heritage sites, Structures, Areas and Landscapes* (The Dublin Principles) and TICCIH (2003), *The Nizhny Tagil Charter for the Industrial Heritage*.

[xv] Clark, Kate (2005), "From Valves to Values: Industrial Archaeology and Heritage Practice" in Symonds, James, and Eleanor Conlin Casella, editors, *Industrial Archaeology Future Directions*. New York: Springer, 95-120.

[xvi] Parks Canada (2011), *Standards and Guidelines for the Conservation of Historic Places in Canada, 2nd edition*. See Guidelines for Engineering Works, and Guidelines for Archeological Sites - Industrial Sites)

[xvii] Other examples of transportation corridor revitalization as 'greenways' include Montreal's Lachine Canal and New York's Highline.

[xviii] The Lunenburg Waterfront Association is committed to keeping a 'working' waterfront, revitalizing the marine industry while maintaining community ownership and public access. This has been integrated in Conservation Guidelines for this World Heritage Site. See http://www.lunenburgwaterfront.ca/Waterfront-Background.html.