Image 1. Declining infrastructure quality in North America can make it harder to deliver services reliably and affordably. In some cases, healthy natural assets such as forests, foreshores and riparian areas can deliver the same services as engineered assets but at a lower cost. (Creative Commons image)

Gaining a natural advantage in municipal service delivery

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Infrastructure quality is deteriorating in cities across North America. The 2017 *Infrastructure Report Card* of the American Society of Civil Engineers (ASCE) gives America's infrastructure an overall grade of D+. The Canadian Infrastructure Report Card (CIRC), a project of CPWA, the Federation of Canadian Municipalities, the Canadian Construction Association and the Canadian Society for Civil Engineering, found that one-third of Canada's infrastructure is in fair, poor or very poor condition, increasing the risk of service disruption.

This matters because communities and their ratepayers risk losing critical services as infrastructure deteriorates—sometimes in very visible ways such as flooding or lower water quality. The ASCE argues that the impact goes well beyond ratepayers, noting that poor infrastructure quality and diminished service provision impedes the United States' ability to compete in a thriving global economy.[1]

Population growth and land intensification can aggravate the situation by increasing pressure on existing infrastructure and local government budgets. So can climate change, as extreme weather events become the new normal. In 2017, for example, people from British Columbia to California fled their homes as fires raged, and floods brought landslides, death and destruction from Canada to Vietnam and New Zealand. The damage has cost governments and individuals billions of dollars. Preliminary costs from Hurricane Harvey alone could be as much as US $190 billion.

Action is therefore needed at all levels for the United States and Canada to build an infrastructure system that

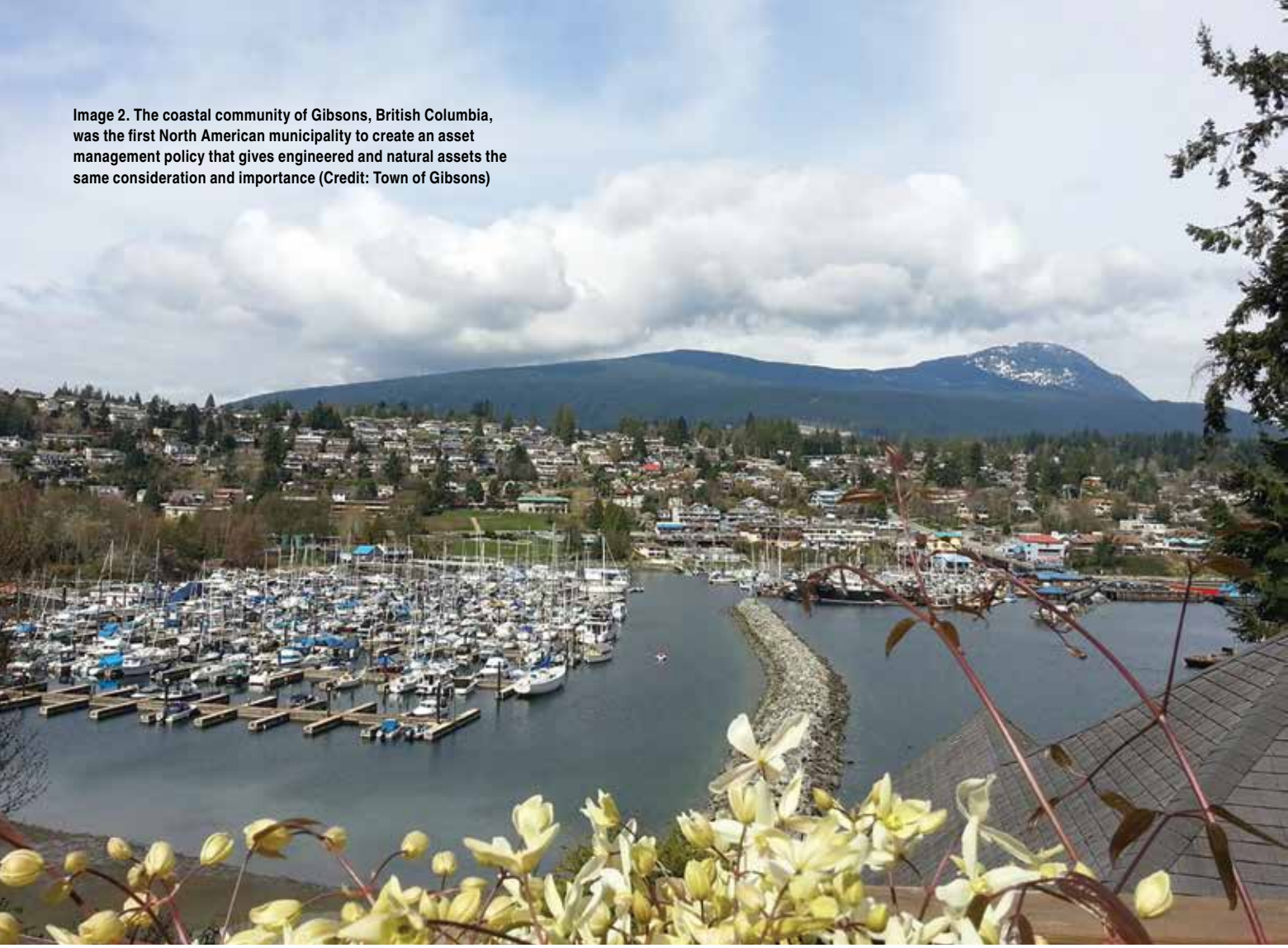

Image 2. The coastal community of Gibsons, British Columbia, was the first North American municipality to create an asset management policy that gives engineered and natural assets the same consideration and importance (Credit: Town of Gibsons)

households can afford and that a competitive global economy demands.

Part of the solution is for local governments to rethink how they deliver services, and for a growing number of Canadian municipalities this means looking around at existing natural assets such as forests, riparian areas and coastal ecosystems for answers. Their experiences suggest that natural assets can provide some of the same services as engineered assets but with lower capital and operating costs and greater resilience to a changing climate—findings that could be equally relevant in the United States.

Historically, natural assets are either not managed at all by local governments or managed only for a narrow range of "green" attributes such as biodiversity or their ability to provide recreational amenities. As examples, the inherent ability of a forest to store water and reduce local and downstream flooding, or of a wetland to improve water quality, are rarely understood. The value of these services remains unquantified by local governments. The tools and support are not usually available to local governments to turn the service value of a given natural asset into plans and operations.

As a result, natural assets are only rarely deliberately managed for the core local government services they can provide; their value does not show on local government balance sheets. As a result, more expensive engineered options remain a default for most local governments.

The first North American municipality to break from these historical approaches was the Town of Gibsons, a Canadian west coast community of 4,400. As part of an effort to deliver services reliably and cost-effectively, Gibsons inventoried engineered assets. However, this traditional approach excluded what turned out to be their most important assets from a service delivery perspective: their foreshore, which protects the business area from storm surges; their aquifer, which provides drinking water to the community; and a forested area that conveys and absorbs stormwater.

Town officials realized that if any of these "natural assets" failed, the community would be required to develop an engineered alternative, without having allocated funds to do so.

The town's "a-ha moment" was that it matters less whether stormwater, for example, is managed by culverts and retention ponds or healthy wetlands; and more that it is managed cost-effectively and reliably. This is where natural assets can have an advantage. For example, the town determined that to manage stormwater they could spend

approximately CAD $15,000 every three years to dredge sedimentation plus a one-time fee of CAD $45,000 to complete the initial assessment and modelling of these natural services. Or, they could provide the same stormwater management services through engineered assets at an estimated cost of CAD $3.5 to $4 million.

These early insights—and cost savings—have led to a flurry of activity since 2013 including:

- The first asset management policy in North America to give natural and engineered assets equal importance;
- Legal changes that require developers to pay for the upkeep of natural assets where these provide core municipal services;
- Managed assets like parks not only for recreational benefits but with other departments for stormwater management services;
- Federal funding sources that might traditionally have only supported engineered infrastructure being used to better manage natural assets;
- New developments considered holistically, including whether existing natural assets can preclude the need to build new engineered assets.

These insights also led to the growing field of municipal natural asset management and the development of the Municipal Natural Assets Initiative (MNAI) to refine, replicate and scale up the Gibsons approach in other communities.

In 2016-17, municipal natural asset management approaches were piloted by MNAI in three communities in British Columbia and two in Ontario, and included:

- Identifying the priority natural assets;
- Determining their condition, the services they provide, and modelling how the natural asset performs in different scenarios (e.g., different environmental management, climate change or land intensification);
- Determining the cost to deliver the same services by engineered means; and,
- Developing tools and strategies to deliver services by other means.

Image 3. Project results in Canada show that some natural assets can meet increased service delivery requirements under predicted climate change scenarios, meaning that their value can grow over time. (Credit: Town of Gibsons)

These first pilots validated the concept of municipal natural asset management, assigned a monetary value to the services of natural assets so that they can be properly accounted for, and gave rise to a range of strategies to manage natural assets consistent with service delivery requirements.

Other findings included:

- Engineered assets have a defined lifespan, at the end of which they must be disposed of and replaced, while some natural assets may provide services in perpetuity and become more valuable over time with monitoring, maintenance and restoration; and,
- Some natural assets are resilient and can meet increased service delivery requirements under predicted climate change scenarios, meaning that their value can grow over time.

For example, in the Region of Peel, a large, mostly urban municipality west of Toronto, Ontario, the monetary value of the stormwater services provided by existing natural assets in the two sub-watersheds examined was estimated at roughly CAD $702 million under current climate conditions, rising to CAD $752 million under climate change conditions in 2065.

Based on results from the first pilots, MNAI launched a second cohort, to be expanded to an additional seven local governments and extending the methodology beyond stormwater-related issues to include coastal zone challenges.

One factor that has made municipal natural asset management in Canada highly replicable is local government adoption of advanced asset management practices that consider assets across their lifecycle and from an organization-wide perspective. U.S. cities that are adopting system-wide advanced asset management processes consistent with the ISO 55000 standard will find that the move to municipal natural asset management can be relatively straightforward with appropriate tools and support.

For more information, local governments can visit MNAI.ca and Gibsons.ca/natural-assets.

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[1] www.infrastructurereportcard.org/solutions/