

Infrastructure for the 21st century: A case for a climate risk assessment and natural resilience screen for infrastructure funding

The Government of Canada will be investing \$120 billion in infrastructure over the next 10 years. This investment can benefit Canadians for generations, but only if it is designed for a changing climate.

Canadians can already see the impacts of climate change in their communities, and they have a reasonable expectation that government authorities are taking these impacts and future changes into account when they are siting, planning and building the infrastructure that we all depend on. Public infrastructure, designed to last many decades, will be tested by more frequent and more extreme weather events, increased risk of wildfire, by rising sea levels, more intense summer heat and melting permafrost.

Yet many of the tools, standards and decision processes that planners and engineers have traditionally relied on do not account for these changing conditions. Nor, with some exceptions, do they encourage design approaches that incorporate and protect ecosystems and increase overall resilience. Moving forward, making the best infrastructure decisions for Canadian communities requires that climate change impacts be considered and addressed as effectively as possible.

If we fail to invest now in climate resilient infrastructure, we will create expensive and potentially dangerous problems for our communities. We will be looking at early replacement or retrofitting, reduced service levels, and even failure, and a range of financial, human and environmental costs.

Alternatively, we can make investment decisions that equip our communities to flourish, by using the knowledge we already have about climate risks and the benefits of designing with nature for resilience. We propose a climate risk and resilience screen for all federally funded infrastructure projects.

What do we mean by climate risk assessment?

Risk is the combined value of the likelihood of something occurring (like a flood) and the consequences of that event. It can include the cumulative impacts of many small, but frequent events as well as single, large events.

A risk assessment is an estimation of the risk for a given project or place, and a climate risk assessment estimates how a changing climate exacerbates existing risks or creates new ones. It is an invaluable tool for decision makers, policy makers, and planners. It can be used to understand and mitigate present and future damages, to create risk management strategies that are both cost effective and community supported, and to help plan for long-term financial investments.

What do we mean by a natural resilience screen?

Resilience is the ability to withstand and adapt to change. Green infrastructure can offer natural resilience to climate change, and can be an effective and cost-effective alternative or a complement to conventional infrastructure. While green infrastructure practices are gaining ground, they are not yet the standard in many communities or among professionals, but a requirement that green infrastructure options be considered in federally funded projects can catalyze greater uptake. Further, it is important that new

infrastructure funding not have negative impacts on ecosystems and on their ability to adapt to climate change. A natural resilience screen should therefore also include an assessment confirming that a given project does not harm ecosystems or increase their vulnerability to climate change.

How do climate risk assessments and a natural resilience screen work together?

A climate risk assessment will help to support the design of infrastructure that can withstand a certain level of climate change. The level that is chosen will reflect our best knowledge, at the time, about the nature and extent of climate impacts. At the same time, we have to acknowledge that this level will reflect some uncertainty. Because conventionally designed infrastructure is not typically designed to fail, a climate risk assessment will not alone ensure we make the best choices and the best investments. If a dike fails, for example, the consequences can be extreme. By contrast, green infrastructure is less likely to fail completely, even if its function is partially compromised, because it typically has many active components. Tree canopies, rain gardens and other features that intercept and slow the dispersal of rainfall, for example, may not be able to fully buffer a community from an extreme rainfall event, but will not fail entirely. A natural resilience screen requiring the consideration of conventional and green infrastructure approaches together will help communities find the most resilient options.

To ensure full cost accounting for the federal infrastructure investment, the natural resilience screen must also ensure that existing ecosystem services and benefits are not lost. Building a sea wall along a shoreline can have significant, unintended and negative impacts on coastal biodiversity, for example, by promoting coastal erosion, and in future will limit the ability of coastal habitat to move landward as sea level rises. We need to take these medium and long term harms into account in investment decisionmaking.

How can we make this happen?

Climate risk assessments for infrastructure and screens for green infrastructure and ecosystem protection are requirements for obtaining government infrastructure funding in other countries, including the United States, Australia and Japan, and among multilateral finance institutions such as the European Investment Bank and the Nordic Investment Bank. We can draw on these examples. As well, within Canada we have voluntary protocols and guidelines, and considerable practical expertise in these areas. The Government of Canada has the opportunity, and the responsibility, to make the best possible investments in our communities, by using these resources to put in place a climate risk assessment and natural resilience screen as soon as possible.

Submitted to Infrastructure Canada's Public Engagement, September 16, 2016

Deborah Carlson, West Coast Environmental Law and Tamsin Lyle, Ebbwater Consulting

