



PERCÉ

Evaluating the costs and benefits of adaptation options

By Sophie Guilbault

THE SCIENCE

Canadian municipalities are often faced with competing priorities when it comes to investing in their future. This is especially true when trying to decide which adaptation options to choose when aiming to build safer and more resilient communities.

Cost-benefit analysis has proven to be a great tool to assist local decision makers in their effort to pick the best climate adaptation options for their municipality.

The process of comparing expected costs and benefits provides more information on the likely efficiency of an adaptation investment, and can assist in comparing and prioritizing different adaptation measures for a specific situation. Using a cost-benefit analysis can be helpful for municipalities, as it allows them to compare the impacts of various options through the use of a single metric and can help municipalities justify their decision-making process. Furthermore, it can provide an economic justification for investing in adaptation.

THE TRIGGER

In 2012, Natural Resources Canada established the Climate Change Adaptation Platform. Its objective was to provide a national forum supported by key working groups that would allow representatives from different sectors, including government, industry, communities, researchers, and professionals, to collaborate on climate change adaptation priorities. Under the platform, the Economics Working Group aimed to develop economic knowledge and tools that could assist decision makers in making better informed decisions as to the implementation of climate change adaptation measures.

Ouranos is a non-profit organization based in Montreal whose mission is to acquire and develop knowledge on climate change and its impacts in order to help policy-makers identify, evaluate, promote and implement adaptation strategies. It has been an active contributor to the Economics Working Group of the Adaptation Platform. The Group launched an initiative to conduct economic assessments of the impacts of climate change, as well as cost-benefit analysis of adaptation options for coastal communities in Quebec and Atlantic Canada. Ouranos and the Laboratoire de dynamique et de gestion intégrée des zones côtières at the Université du Québec à Rimouski partnered with the Town of Percé and four other communities to assist them in their adaptation effort. The Town of Percé was approached to become a partner in this research initiative because of their longstanding relationship with Ouranos, and because of the climate risks faced by the community.

For many years, the coastline of the Town has been affected by sea level rise, erosion and severe storms that resulted in flooding events. More specifically, in recent years, two major storms have affected the coast in the Anse du Sud area, in 2010 and 2016. Both resulted in significant damage to the recreational and tourism facilities along the coastline.



Figure 7: Major storms affected the coast in the Anse du Sud area, in 2010 and 2016, resulting in significant damage to the recreational and tourism facilities along the coastline. (Source: Town of Percé)

THE APPROACH

Over the years, rising sea levels, loss of ice cover, and changes in weather patterns accelerated the degradation of the coastline in Percé, particularly affecting the boardwalk and properties located on the coast. It became clear that climate adaptation measures were needed to better protect the area. Ouranos undertook a study, using cost-benefit analysis to determine optimal adaptation options for protecting the coast in the context of climate change. The analysis was designed to compare the net present value and the cost-benefit ratio for different adaptation options, and to compare these values with those associated with no intervention.

Beyond economic impacts, the researchers evaluated environmental and social impacts for each option, as well as the cost of each of the suggested adaptation measures. The cost of the adaptation measures was estimated by considering construction and maintenance costs over 50 years.

A key area considered under the study was the Anse du Sud area, an important heritage and economic hub for the Town. In recent years, the Town and the Provincial government have had to invest tens of thousands of dollars annually to repair the concrete seawall supporting the boardwalk. Emergency interventions over time have kept the wall standing, but by the time the study was completed, the wall was coming to the end of its life. Without appropriate protection, it was estimated that this portion of the coast would experience approximately 15 cm of erosion every year as of 2020.

Five different options were considered by the research team to protect the area: the construction of a new seawall, rock-filling the shoreline, installing a riprap, and replenishing the beach with or without groynes. The option that emerged as the most beneficial economically was the beach replenishment with pebbles. The benefits of this option were valued at approximately \$773 million over 50 years compared to the non-intervention option, which was estimated to cost the town \$705 million. This implied a net benefit of \$68 million for the town, mostly originating from a 2 percent increase in tourism as a result of the intervention. Construction costs associated with the beach replenishment with pebbles option were also lower than all the other options considered in the analysis.

THE OUTCOME

Once the analysis was completed by Ouranos and their research partners, the Town of Percé started promoting the Anse au Sud beach replenishment with pebbles to various ministries with the hope of receiving funding to move the initiative forward. In December 2016, a severe storm affected the area, resulting in the destruction of the concrete wall previously in place to protect the boardwalk and neighbouring properties, motels, restaurants and shops. The storm caused important damage in the community and ended up reinforcing the need for intervention in the area. Shortly after this event, the Town was awarded funding for the beach replenishment with pebbles.

A WORD FROM PERCÉ

When asked what recommendations she would give to other municipalities interested in pursuing similar initiatives, Lisa-Marie Gagnon, the Planner in charge of the coastal rehabilitation project for the Town of Percé, attributed the Town's success to strong partnerships with the research community, and to the fact that the Town was able to plan ahead and take action quickly when funding opportunities were made available. "Small towns do not always have the resources to have engineers in their staff and rarely have the capacity to conduct comprehensive research initiatives to assist with their decision making process. For the Town of Percé, it was very important to surround ourselves with the right players, and to actively promote the initiative so that our project was well known by various ministries when the time came to receive funding and move forward with the construction," said Ms Gagnon.