

Incorporating Resilience into Key Coastal Infrastructure

A Case Study at Bay de Verde Harbour

Industry Sector

Marine Tourism

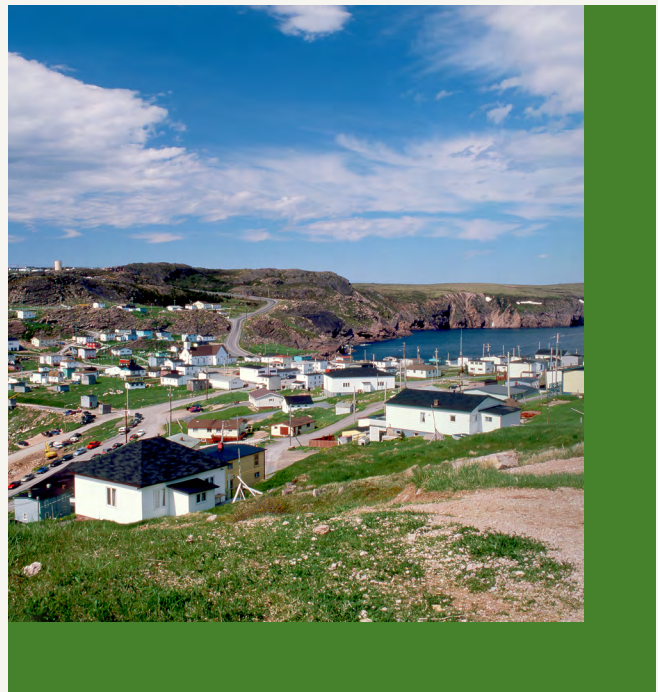
Location

Bay de Verde Harbour

Climate Change Risks

Flooding and infrastructure damage from Sea Level Rise, Storm Surge, and Wave Action

Photo Credit: Josef Hanus



Background

The Town of Bay de Verde is located on the northern tip of the Baccalieu Trail and is the northernmost community in Conception Bay. The town has approximately 400 residents and is primarily known as a fishing village, but over the last several years has been placing significant emphasis on growing its presence within the provincial tourism industry.

Many of the town's tourism operations rely on its working harbour, which is also used as a boat launch for individuals and local businesses, as well as an event space.



- | | |
|--------------------|----------------------|
| 1 - Boat Launch | 4 - Concrete Wharf |
| 2 - Paved Parking | 5 - North Breakwater |
| 3 - Floating Docks | 6 - South Breakwater |

The harbour and its infrastructure can be described as follows:

A marginal wharf parallel to the new fish plant.

- A concrete wharf structure protruding in a north-westerly direction into the basin on the eastern side of the harbour just north of the fish plant.
- A secondary basin sheltered by the concrete wharf north of the harbour entrance and the concrete wharf protruding into the basin on the eastern side of the harbour.
- A number of floating docks in the north basin including a boat launch in the northeast corner, and a slipway (wooden deck) south of the protruding wooden wharf supporting the various floating docks.
- Marginal wharf and parking facilities along the north basin.
- A crib structure with a concrete deck protected by armour stone along the southern extent of the harbour to shelter the facility from Atlantic swell.

Local Tourism

Bay de Verde is located approximately 10 km south of Baccalieu Island, the largest seabird island in Newfoundland and Labrador. Species such as the Atlantic Puffin are found in abundance on the island, as well as significant marine life such as humpback whales, sharks, and codfish in the surrounding waters. The area’s wildlife makes the tourism destination a unique location for boat tours, food and culinary experiences, and other adventure activities.

The Bay de Verde Codfish Experience is one tourism draw to the community offering a historical tour of the town’s rich fishing history, a private cod fishing experience launched from the town’s harbour, followed by an oceanside seafood dinner.

Alongside small tourism operators, the town hosts several festivals and events on its busy wharf, including “Festival on the Wharf”, held each summer. This festival involves live music, food trucks, vendors, and performances all taking place on the Bay de Verde wharf. The wharf has become a crucial piece of infrastructure for the town, not only providing livelihoods for those in the fishing industry but allowing the town to draw thousands of tourists each year for its unique oceanside experiences.

Climate Change Impacts

The Bay de Verde Harbour is exposed to swells from the Atlantic Ocean approaching from the east and southeast, and wind waves generated over Conception Bay approaching from the south. Local extreme water levels are caused by the combined effects of tides, storm surge, and sea level rise. Sea level rise in the area is expected to reach 0.43 m above the year 2000 level by 2065. This, combined with increasing winds, storms, and storm surge events, means the harbour will continue to be exposed to more extreme weather and ocean conditions throughout the coming decades.

Adaptation

The harbour entrance is sheltered by two breakwaters on the north and south sides which protect the wharf from wave run up and associated damages. Throughout 2015 – 2018, DFO, who operates the harbour, has commissioned wave transformation studies. These studies assessed the current wave climate as well as future conditions with climate change, in order to recommend and implement upgrades that will better protect the harbour from wave action and overtopping throughout its design life.



Photo Credit: Tim Booth

This work included upgrading the armor stone protection at both breakwaters to better protect the harbour against wave action and overtopping. Along with climate change projections and local conditions such as ice thickness, the wave studies were used to inform the redesign of the breakwater armour stone, including the optimum elevation of the structure to limit damage.

These upgrades provide an example of incorporating climate resilience measures into coastal structures to proactively mitigate the impacts of climate change and avoid costly repairs or full replacement of the structure in the future. These types of measures help maintain the economic viability of harbour operations in coastal communities and ensure a sustainable future where operators can be confident in the infrastructure that is critical for the viability of their businesses or events.



Photo Credit: Valdemaras D.

Conclusion

This case study highlights the importance of climate resilient coastal infrastructure to support businesses, towns, and economies of rural coastal communities. While this example focuses on infrastructure that is owned by a government organization, the same principles can be applied to wharves owned by individual tourism operators.

Photo Credit: Shirley F. Arnold



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