



Navigating Coastal Challenges: Clean Technology and Non-Profit case studies in Canada

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Sea Change Canada



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Across Canada, our coastal areas play a vital role in erosion prevention, pollutant filtration, and provide resources for food, livelihoods, and recreational activities. However, a combination of pollution and climate change is leading to ecosystem degradation across our shores. One way to begin reducing pollution and combating climate change involves embracing innovative solutions like clean technology. Clean technology (cleantech) is a field of technology that works to reduce greenhouse gas emissions and environmental degradation by making the lifecycle of products and services better for the environment. As Canada shifts toward a lower-emission society, cleantech has been on the rise. Employment in the cleantech industry has grown by 16% over the past decade and in 2021, 314,000 Canadians were employed in the clean technology sector (Government of Canada, 2023). In the environmental non-profit sector, clean technologies are also being used to align with their mission and values while reducing environmental impact.

OVERVIEW OF COASTAL ENVIRONMENTAL CHALLENGES IN CANADA

Pollution and climate change are two major coastal issues in Canada (Toimil et al., 2020). Marine pollution refers to the introduction of harmful contaminants into the ocean or water bodies resulting in impacts on marine life, ecosystems, and human health (Carney Almroth & Eggert, 2019). Examples of marine pollution include plastic pollution from improper waste disposal and microplastics, and chemical pollution from oil spills. Every year, Canadians throw away 3 million tons of plastic while only 9% of this plastic waste is recycled (Environment and Climate Change Canada, 2021). Unfortunately, most of this plastic ends up in our oceans and can be devastating for

marine life as ingestion can lead to suffocation or injuries like entanglement. Oil spills from ships, offshore drilling, or onshore facilities can also impact marine life. When oil enters the ocean, it tends to generate a thick layer on the surface that can suffocate and poison marine animals and birds. Climate change is also impacting our shorelines through ocean warming, acidification, and sea-level rise. Combined these can lead to species extinction, alongside loss of human infrastructure, sense of place, and life.

WHAT ARE CLEAN TECHNOLOGIES?

Renewable Energy Technologies

Renewable energy represents a clean technology that offers an alternative to fossil fuels while still allowing for energy to be restored faster than it is consumed. Examples of renewable technologies include off-shore wind farms alongside tidal and wave technologies. Canada's first offshore wind farm was announced in Halifax, Nova Scotia in 2023, where 20-25 floating wind turbines are set to be installed and generate up to 20% of Nova Scotia's total energy capacity by 2030 (Canadian Broadcast Company, 2023a). Bay of Fundy, Nova Scotia was also home to Canada's only tidal power station which unfortunately ceased operations in 2023 (Canadian Broadcast Company, 2023b). Despite the potential, there have been issues in deploying the project due to miscommunications and difficulties in building a path for marine renewables that works for humans and marine life. Unfortunately wind turbines and tidal power pose threats to marine life due to noise pollution, damage to habitat, and threat of injury or death from rotating turbine blades (National Marine Fisheries Service, n.d.).

Waste Management Technologies

Waste management technologies can be used to develop sustainable waste disposal and recycling systems, alongside plastic alternatives to reduce waste. Designing more sustainable waste systems works to optimize waste collection, processing, and disposal while creating a user friendly experience to reduce pollution. A sustainable waste system can also help to foster public awareness and educate people about responsible waste handling, while encouraging a culture of sustainability and environmental stewardship within communities. British Columbia has one of the highest recycling rates in Canada, with the City of Vancouver improving their recycling rate to 65% in 2021 (City of Metro Vancouver, 2021). A large part of Vancouver's recycling success has been attributed to their recycling system which promotes low contamination and the use of recycling technologies to generate raw recycled materials that can be reused or resold (Canadian Broadcast Company, 2019).

Plastic alternatives are another important aspect because they provide an alternative that is less harmful to the marine environment. As part of Canada's goal to reach Zero Plastic Waste by 2030, single-use plastic has been prohibited in phases, encouraging the use of these plastic alternatives (Environment and Climate Change Canada, 2022). These include products that are known as bioplastics that are made from renewable materials like plants, starches, and sugars or opting for products made of stainless steel, glass, bamboo, natural cloth, and ceramics where possible.

Examples of plastic alternatives being used across Canada include paper straws, and biodegradable plastic bags and food containers. Additionally, other groups have been working to reduce plastic use like Clean Catch, who are a Canadian-owned company that is working to create biodegradable fishing gear (Clean Catch, n.d.).



CASE STUDIES ON COASTAL NON-PROFITS USING CLEAN TECHNOLOGIES IN CANADA

Although many nonprofits are not necessarily designing clean technologies, they are using them in their daily operations to help our shores. Clean technologies coastal nonprofits are using include technologies like trash trapping devices, fish-friendly flood infrastructure, and data collection for water bodies. Watershed Watch Salmon Society, Water Rangers, and U of T Trash Team are three non-profits from across the country that are using clean technologies to support their operations.

Watershed Watch Salmon Society

Watershed Watch Salmon Society (WWSS) is a non-profit organization who focus on helping wild salmon populations in the Lower Fraser River area in British Columbia. WWSS is on a mission to reconnect over 1500 km of wild salmon habitat in the Lower Fraser River watersheds through restoring salmon habitats that have been disjointed by old flood infrastructure. To do this, WWSS has been working with community partners and the government to implement fish-friendly flood infrastructure that balances the needs of human communities with the well-being of wild salmon by restoring vital habitats and migration routes. An example of WWSS's success in restoring habitat connectivity is the Lower Agassiz Slough in the Fraser Valley, where WWSS and the District of Kent installed a new fish-friendly sluice gate. Agassiz Slough had an outdated top-mounted floodgate that blocked the waterway and prevented wild salmon from moving upstream. They worked to replace it with a new vertical sluice gate, which offers fish an unobstructed passage while still protecting the community from floodwaters. Since implementation of the new fish-friendly infrastructure, the salmon returned to the site for the first time in over 70 years.

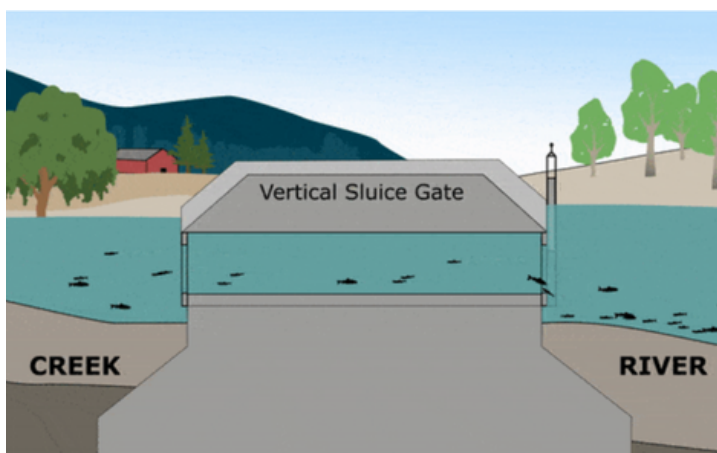


Figure 2: Vertical Sluice Gate, image created by Watershed Watch Salmon Society (<https://watershedwatch.ca/what-makes-flood-control-fish-friendly/>)



Figure 1: Vertical Sluice Gate, image created by Watershed Watch Salmon Society (<https://watershedwatch.ca/what-makes-flood-control-fish-friendly/>)

Water Rangers

Another example of an organization utilizing clean technologies is Water Rangers. Water Ranger's is a non-profit whose goal is to lower barriers for communities to monitor their local water bodies by gathering and sharing water quality data. Since its founding, Water Rangers has trained over 20,000 people in water monitoring, helped to generate 200,000 new data points about Canadian water bodies, and has over 250 groups from across the country utilizing their services. Water Rangers provides easy-to-use test kits that include devices to test for a variety of baseline water parameters. These baseline parameters include conductivity, temperature, clarity, dissolved oxygen, pH, alkalinity, chlorine, and water hardness. All their tools fit into a portable backpack, and results can be uploaded easily to their IOS App where the data is open-access and free to use. Access to these test kits are important so coastal communities can test their water quality themselves and begin to understand how activities in their waters like pollution are harming their water supply.

U of T Trash Team

The U of T Trash Team uses clean technologies like trash traps to help reduce plastic pollution in waterways across Toronto. Trash traps U of T Trash Team uses include Seabins, WasteSharks, Osprey Litter Blooms, and LittaTraps. Currently, the U of T Trash Team monitors a family of Seabins across the Toronto Waterfront and Outer Harbour Marina. Seabins are floating filtration devices that sit on the water's surface and trap plastic debris, preventing it from entering the waterway and ending up in our oceans. U of T Trash Team also monitors LittaTraps in storm drains alongside Osprey Litter Blooms in basins along Queens Quay in Toronto. LittaTraps sit in storm drains and prevent the plastic waste carried by stormwater from entering our lakes and oceans. Osprey Litter Booms are floating barriers designed to prevent litter from continuing to float downstream.



Figure 4: LittaTrap
(<https://uofttrashteam.ca/trappingtrash/>)

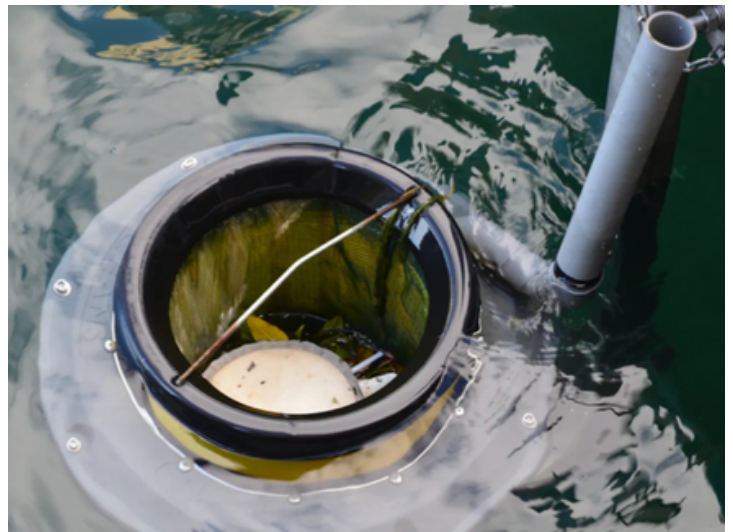


Figure 5: Seabin
(<https://uofttrashteam.ca/trappingtrash/>)



Figure 3: Osprey Litter Bloom
(<https://uofttrashteam.ca/trappingtrash/>)

Combined with skimming, a manual technique that involves using a net to skim and remove plastic pollution from the water, the U of T Trash Team has diverted a total of 118.15 kg of plastic debris, including 96,208 small plastic pieces from Toronto's waterways in the summer of 2022. Trash traps are a great addition to community clean ups as they can work 24/7, 7 days a week, and collect waste ranging from large anthropogenic debris down to small microplastics. Clean technologies like trash traps are important because they provide a method to remove plastic from aquatic ecosystems in addition to beach clean ups.

CONCLUSION

In conclusion, incorporating clean technologies is an important aspect of resolving the crisis on our coastlines, as they present a pathway forward that reduces climate change and pollution. For coastal communities, clean technologies are important as they prevent further degradation of ecosystems while preserving livelihoods and the cultures of coastal communities. However, a lack of initial funding and investment for clean technology companies has impacted the clean tech industry (van den Heuvel & Popp, 2022). This indicates the need for further investment and support for clean technologies across Canada.

Embracing clean technologies, such as renewable energy and efficient waste management systems, in addition to their implementation into coastal nonprofits can help protect coastal ecosystems. Ways to embrace clean technologies include educating yourself about clean technology or supporting clean tech financially and working with groups who are utilizing clean tech like the non-profits above. Overall, clean technology provides Canadians a pathway toward a more sustainable and resilient future.



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