

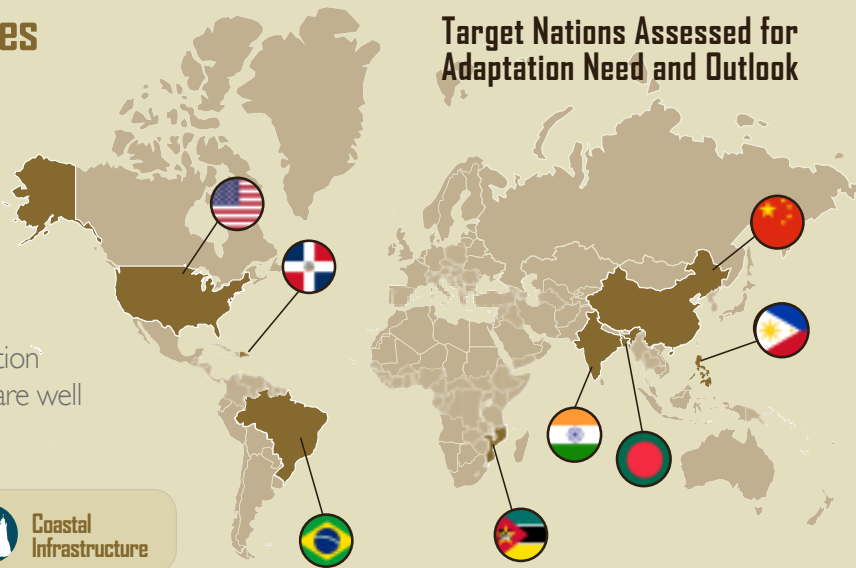
# The Global Need for Adaptation Goods and Services



## Adaptation Outlook in International Markets

To prepare for climate change impacts, companies and countries around the world will have to build their climate resilience through adaptation.

The UN Environmental Programme estimates that, by 2030, adaptation costs could reach CAD 200-400 billion / year in developing countries alone. New research on eight countries scopes the potential need for expertise and supply of goods and services to support adaptation in forest sectors, water, coasts and ocean-based activities. Canadian firms are well positioned to help these countries meet their adaptation needs.



### Assessing National Adaptation Needs

Two climate vulnerability index schemes provide a reasonable assessment of national climate adaptation need.

**GermanWatch Global Climate Risk Index**  
Measures the degree of impacts from weather-related loss events and ranks countries, where higher rankings are better.

**Notre Dame Global Adaptation Initiative**  
Measures balance between climate vulnerability and adaptation readiness and ranks countries, higher rankings are worse.

### Adaptation Market Sectors

- Forestry
- Water and Wastewater
- Ocean Technologies
- Coastal Infrastructure

### Bangladesh

**Current Need**

ND-GAIN 140<sup>th</sup> | GW GCRI 6<sup>th</sup>

- Extremely vulnerable to flash flooding, particularly on coastlines.
- Spends CAD 1.3 billion annually on climate adaptation (6-7% of annual budget).
- Investment in coastal infrastructure represents ~50% of total annual spending.

**Drivers of Demand**

- Demand will be driven largely by economic development and urbanization.
- This trend will increase demand for water infrastructure and land use planning.
- The largest opportunities will be in the coastal infrastructure and ocean technology sectors.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 32.4 - 69.6
- Water and Wastewater: 49.8 - 107.0
- Ocean Technologies: 89.6 - 214.1
- Coastal Infrastructure: 199.3 - 428.1

**Future Outlook**

- Canada's commercial relationship with Bangladesh has experienced steady growth over the last decade.
- Short-Term:** Protecting at-risk populations through investment in coastal infrastructure.
- Long-Term:** Urbanization will drive demand for climate-resilient infrastructure, water and wastewater technologies.

### Brazil

**Current Need**

ND-GAIN 71<sup>st</sup> | GW GCRI 82<sup>nd</sup>

- Impacts include warming, sea-level rise, and changing patterns of rainfall, streamflows, and disease.
- Climate governance is advanced, includes two key adaptation financing mechanisms backed by law.
- Brazil's Climate Fund disbursed CAD 5.6 million in adaptation grants (2011-2014), and spending in Sao Paulo alone is estimated at CAD 1.1 billion (2014-2015).

**Drivers of Demand**

- Water and energy, agriculture, ecosystem services, and coastal assets face mounting risk.
- Infrastructure deficits require investment in transport, energy, and water infrastructure, and ocean tech for offshore energy.
- Achieving Brazil's GHG reduction target means restoring and reforesting 12 million hectares by 2030.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 143.0
- Water and Wastewater: 316.3
- Ocean Technologies: 55.7
- Coastal Infrastructure: 156.0

**Future Outlook**

- Brazil is Canada's 2<sup>nd</sup> largest export destination in Latin America and the Caribbean and is our 13<sup>th</sup> largest trading partner overall.
- Short-Term:** Delivering on priorities in the National Climate Change Adaptation Plan and sector-specific solutions.
- Long-Term:** Climate-resilient water and coastal infrastructure, forest restoration.

### China

**Current Need**

ND-GAIN 52<sup>nd</sup> | GW GCRI 31<sup>st</sup>

- Climate impacts combine with environmental degradation due to rapid economic growth, and social inequality to augment population risk.
- Investments to date have helped, but gaps remain between needs and implementation capacity.
- Adaptation priorities include agriculture, water, forestry, coastal systems, and public health.

**Drivers of Demand**

- Urbanization and population, especially in coastal areas, will increase need and thus demand.
- More stringent design standards for building will drive the demand for climate resilient engineering.
- The cost of future adaptation is estimated at just under 0.3% of China's regional GDP on an annual basis.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 2,217.6
- Water and Wastewater: 413.0
- Ocean Technologies: 1,551.0
- Coastal Infrastructure: 2,827.4

**Future Outlook**

- China is Canada's 2<sup>nd</sup> largest merchandise trading partner after the United States, and is the largest Asian export destination.
- Short-Term:** Exporting environmental consulting and training services, technologies and equipment for restoration, monitoring and forecasting.
- Long-Term:** Spatial planning, climate-resilient infrastructure, forestry and agriculture; observation and information services.

### Dominican Republic

**Current Need**

ND-GAIN 97<sup>th</sup> | GW GCRI 11<sup>th</sup>

- Small Island Developing State that is vulnerable to climate and weather extremes, hurricanes, tropical storms and drought in particular.
- Warmer temperatures, decreased rainfall in the "wet" season and sea level rise are also important.
- Position is that compliance with climate commitments will be impossible without sustained donor support.

**Drivers of Demand**

- Less predictable weather will pose a challenge to meeting basic population needs.
- Growing coastal populations highly vulnerable to flooding and erosion.
- Coastal impacts and ecosystem loss may curtail economically important tourism development.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 0.18
- Water and Wastewater: 6.7
- Ocean Technologies: N/A
- Coastal Infrastructure: 15.0

**Future Outlook**

- Canada is the 2<sup>nd</sup> largest foreign direct investor, primarily in mining, financial services, textile manufacturing and tourism.
- Short-Term:** Spend is likely to continue to focus on water, coastal infrastructure, ecosystem restoration and management and disaster risk reduction.
- Long-Term:** Short-term spending patterns expected to persist, along with sustainable tourism.

### India

**Current Need**

ND-GAIN 120<sup>th</sup> | GW GCRI 16<sup>th</sup>

- Most impacted by extreme heat, intense rainfall, drought and water shortages, and sea level rise.
- Current adaptation spending ~2% of budget (2014-2015).
- Adaptation spending is allocated primarily to agriculture (82.9%), forestry (9.6%), water (4.6%) infrastructure (0.9%), and coasts (0.2%).

**Drivers of Demand**

- India is projected to see a 15% increase in intensity of tropical cyclones by 2085.
- Sea levels are expected to rise 15 to 38 cm by 2050, driving demand for coastal infrastructure adaptation.
- India is also expected to see a significant shift in forest species by 2085, increasing the need for forestry adaptation.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 872.1
- Water and Wastewater: 334.8
- Ocean Technologies: 472.0
- Coastal Infrastructure: 603.9

**Future Outlook**

- Identified as a priority market by Global Affairs Canada for infrastructure, particularly ports, and for professional services.
- Short-Term:** Opportunities to support India in the majority of the climate adaptation needs.
- Long-Term:** Due to adaptation needs, imports are expected to rise by 5% between 2010 and 2050.

### Mozambique

**Current Need**

ND-GAIN 149<sup>th</sup> | GW GCRI 27<sup>th</sup>

- Subject to extreme weather events and high rainfall variability.
- Most vulnerable sectors are agriculture, which employs over 70 percent of the population, energy, transport infrastructure, and coastal areas.
- Adaptation focus is on strengthening early warning systems, agriculture, coastal zones and water resources.

**Drivers of Demand**

- Projections forecast increasing precipitation, extreme weather, and sea level rise.
- Sea levels are expected to rise 18 to 59 cm by 2090, driving demand for hard / soft coastal infrastructure adaptation.
- Climate-resilient water infrastructure will be needed to withstand higher flood frequency.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 4.9
- Water and Wastewater: 36.8
- Ocean Technologies: 3.5
- Coastal Infrastructure: 10.6

**Future Outlook**

- Opportunities to implement solutions identified by the National Institute of Disaster Management climate change response plan.
- Short-Term:** Climate-resilient coastal infrastructure and water resource management.
- Long-Term:** Public expenditure and foreign investment, notably in construction and services to enterprises.

### Philippines

**Current Need**

ND-GAIN 97<sup>th</sup> | GW GCRI 4<sup>th</sup>

- An archipelago country that is among the most exposed to multiple extreme weather events - cyclones, floods, landslides, and drought.
- Spending on adaptation and disaster risk reduction increased six fold between 2008 and 2011, with 2016 spending set at 4% of total budget.
- Current spend focused on water and energy sectors.

**Drivers of Demand**

- Priorities on information services, risk assessment and adaptation planning, and sector-specific solutions.
- Growing risks to aquaculture and fisheries, which currently accounts for ~4% of GDP.
- Overlap of climate change vulnerability and poverty demands climate-resilient economic strategies.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 4.2
- Water and Wastewater: 24.7
- Ocean Technologies: 13.6
- Coastal Infrastructure: 86.8

**Future Outlook**

- The Philippines is a country of focus for Canada's international development activities and a large source of immigration to Canada.
- Short-Term:** Capacity-building via vulnerability/risk assessments, management, technologies, tools.
- Long-Term:** Economic growth and urbanization could drive demand for climate-resilient infrastructure and natural resource management.

### United States

**Current Need**

ND-GAIN 11<sup>th</sup> | GW GCRI 25<sup>th</sup>

- Key sectors most impacted by climate change include as water, energy, transportation, agriculture, health, and ecosystems.
- At the time of writing, total federal government funding for adaptation goods and services across sectors was expected to amount to US\$1.7 billion.

**Drivers of Demand**

- Focus is on understanding, assessing and predicting the effects of climate change.
- Coastal communities are growing by 1.2 million people per year.
- Coastal vulnerability to climate change may drive increased demand for adaptation services.

**Forecasted spending by sector for 2035 (million CAD)**

- Forestry: 667.8
- Water and Wastewater: 5,119.8
- Ocean Technologies: 445.2
- Coastal Infrastructure: 1,649.5

**Future Outlook**

- Canada - US trading relationship is the world's largest, and Canada will benefit from familiarity, proximity, and size of the market.
- Short-Term:** Focus on opportunities in regions with less domestic adaptation expertise (e.g., interior).
- Long-Term:** Build financial / operational strength in the US before entering more difficult international markets.

## For more information

Information in this infographic stems from a 2016 report commissioned by Natural Resources Canada that scopes the need for adaptation goods and services in international markets. The research combines analysis of trade and economic data, literature reviews and the perspectives of sixteen subject-matter experts. The full report is available at <http://www.adaptationlibrary.ca/#/option/482#top>