Preparing for the future:
Climate Change and Water Treatment

November 20 2024

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AFNWA

Presentation Overview

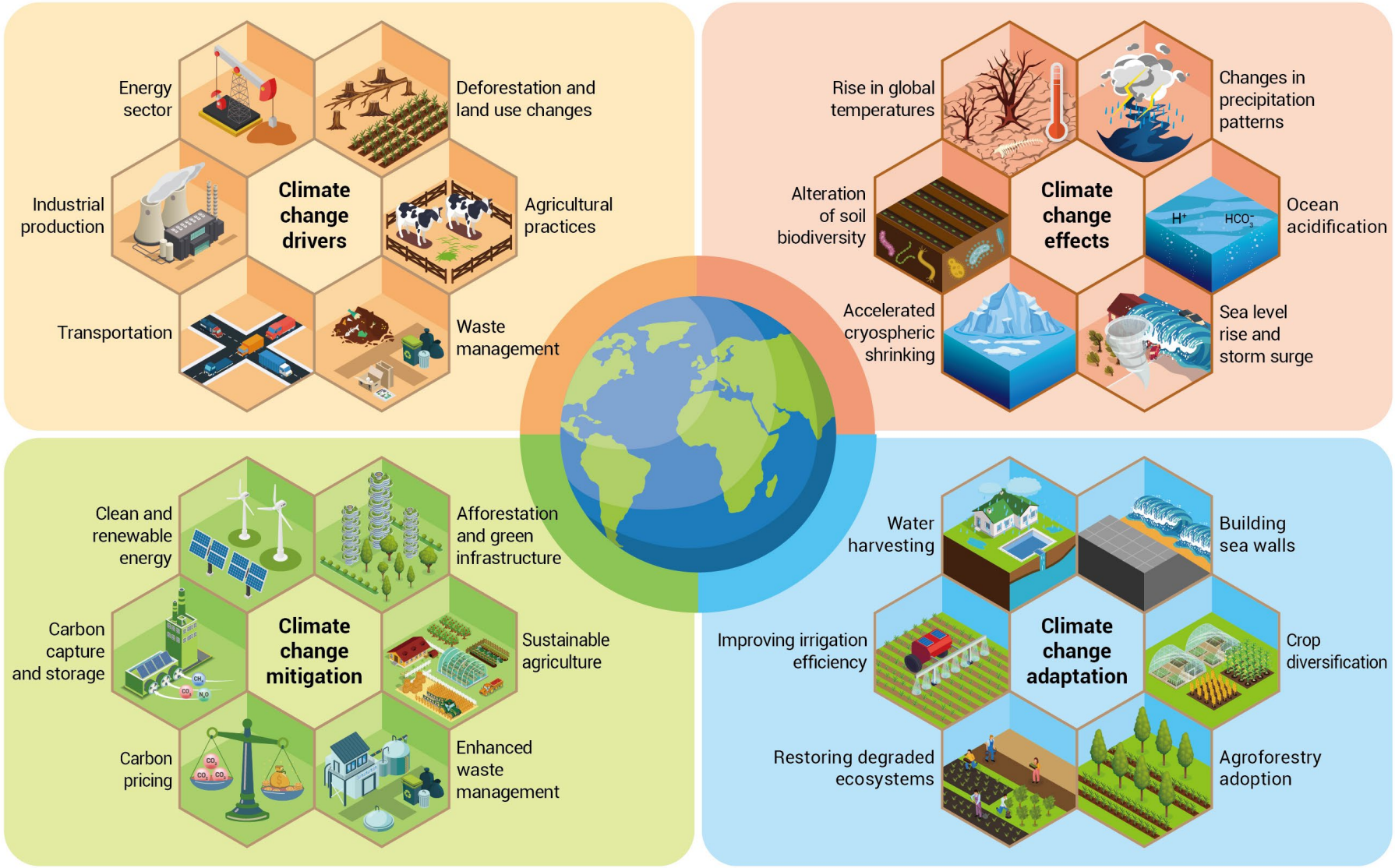
- Climate change
- Expected and Observed Changes
- IDF Curves
- Climate Change and Water Sector Impacts with local examples
- Adaptation and Mitigation
- AFNWA Initiatives

What is Climate Change

Climate change refers to a significant change in weather patterns as observed over decades or longer time periods.

- Changes in average conditions
- Changes in extreme conditions
- Changes will vary by location

Climate Change – Overall



http://www.the-innovation.org/geoscience/article/10.59717/

Types of changes expected /observed

Increasing temperatures

Changing precipitation patterns

Less in some areas, more in others

Frequency and magnitude of extreme precipitation events

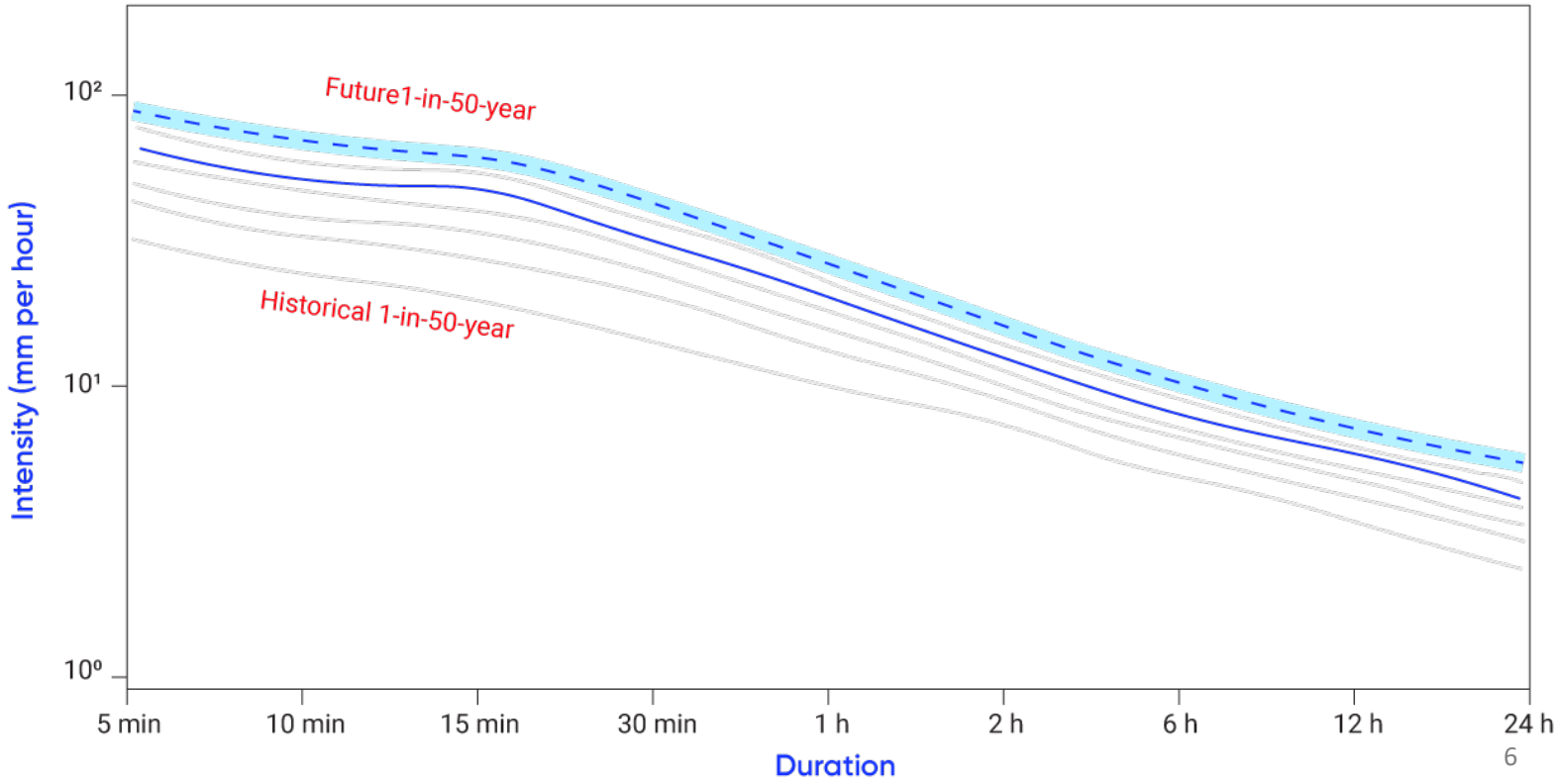
Changes in snowfall and snowpack

Changing patterns of extreme weather events

Rising sea level

IDF Curve Changes

An intensity-duration-frequency (IDF) curve is a mathematical function that shows the relationship between the intensity, duration, and frequency of an event. IDF curves are used to assess rainfall events, design urban drainage systems, and manage the risks of extreme rainfall

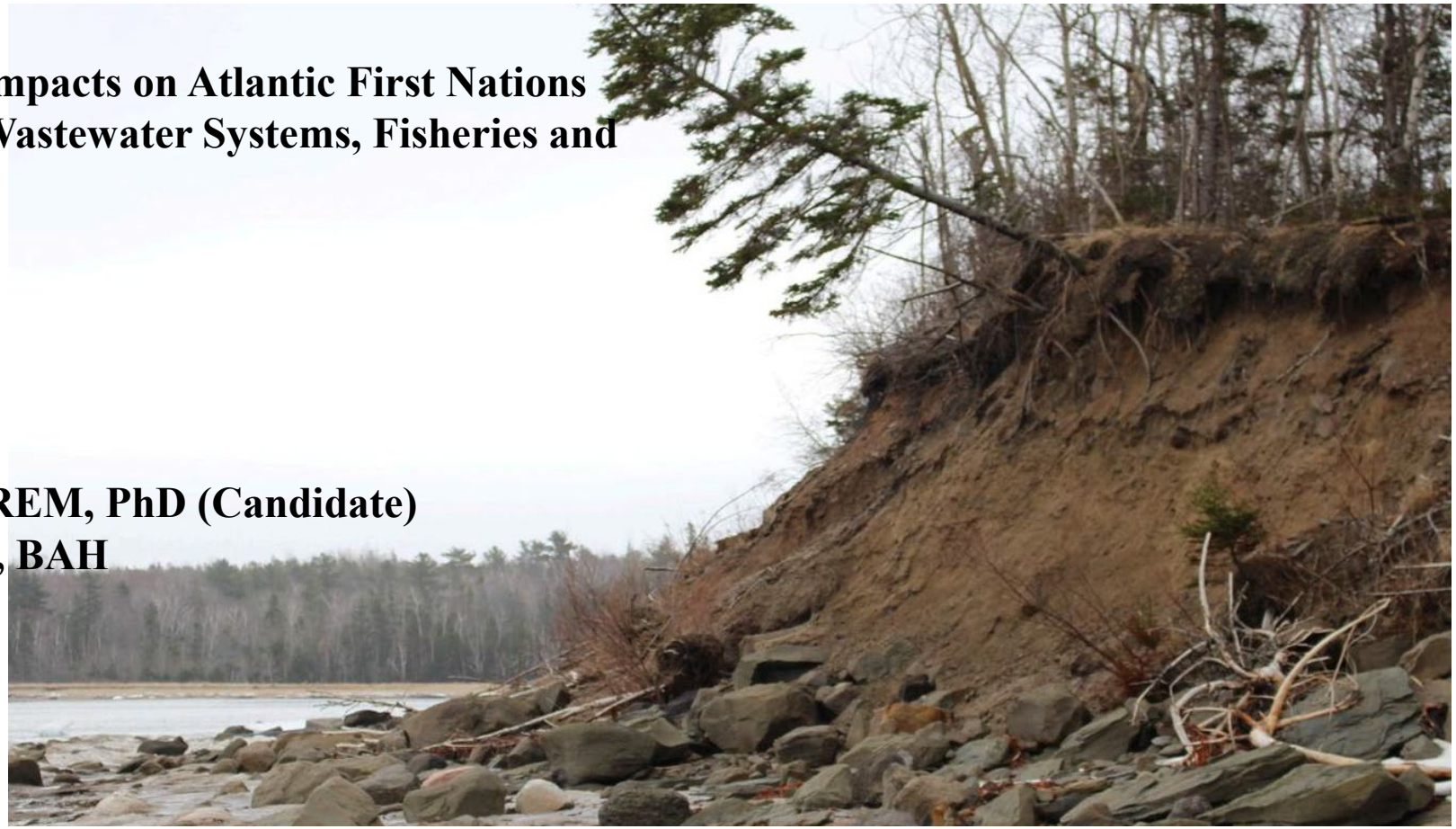


Climate Change and the Water Sector

- Degraded water quality and treatment challenges
- Lower reservoir levels and water shortages
- Increased residential demand
- Stormwater management challenges
- Coastal flooding from storm surges
- Loss of wetlands and coastal ecosystems
- Increased frequency and extent of floods
- Earlier spring runoff
- Reduced groundwater recharge
- Saltwater intrusion into coastal aquifers

APC Report

Climate Change Impacts on Atlantic First Nations Drinking Water, Wastewater Systems, Fisheries and Aquaculture
Final Report



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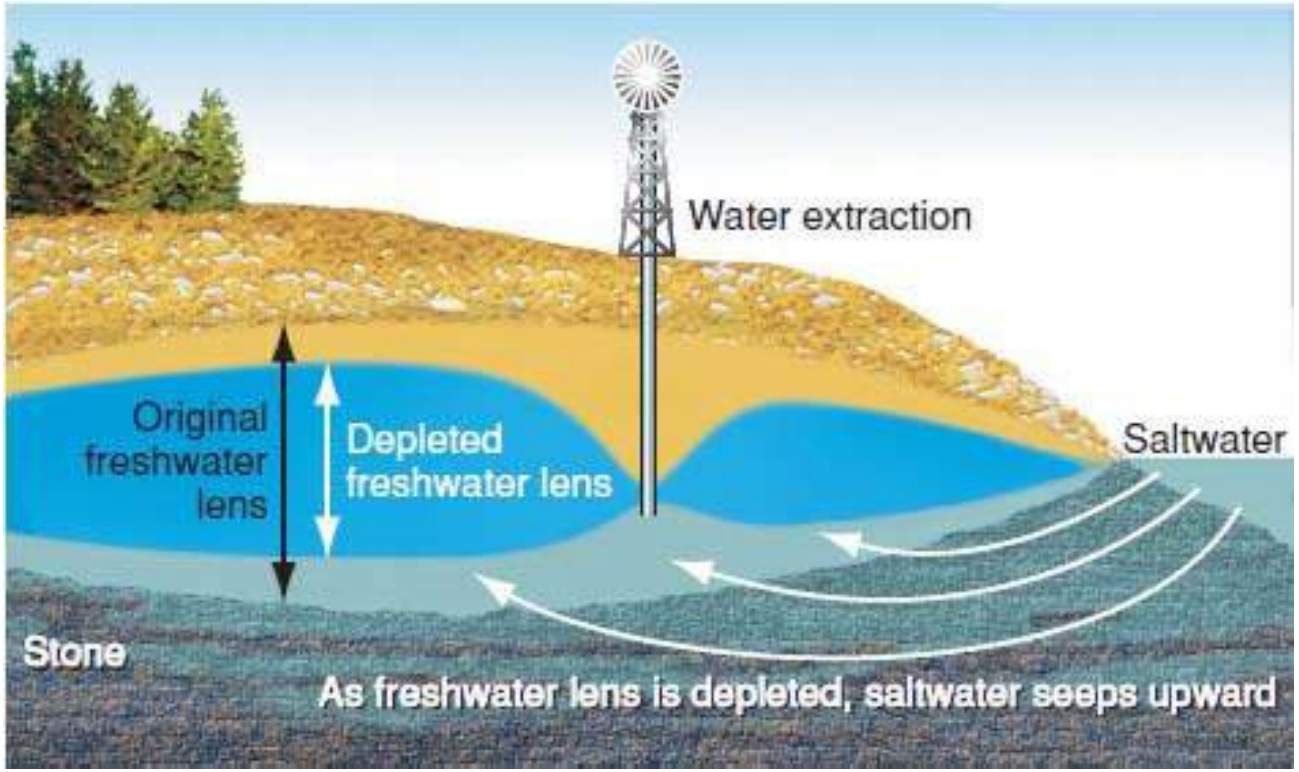
March, 2017

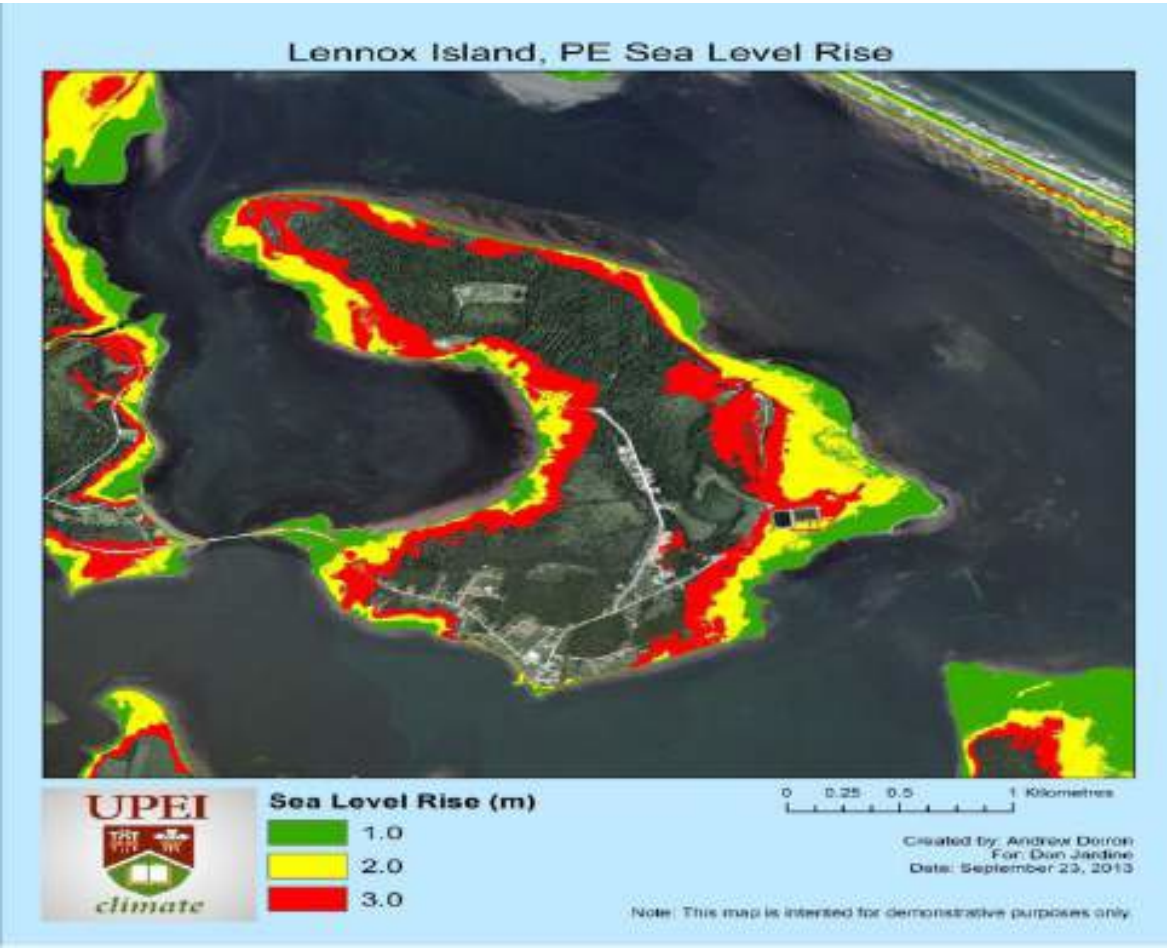
https://www.apcfnc.ca/wp-content/uploads/2020/07/Final_Report_APC_Climate_Change_Impacts_-_D_Lewis.compressed.pdf

Local Context – Water Quality and Quantity

Atlantic Canada will experience drier summers, affecting water supplies, which can lead to saltwater intrusion into groundwater Reductions in summer stream flow could affect freshwater fisheries, tourism, and municipal water supplies (Horton & McKenzie, 2009). The Annapolis Valley watershed, for example, is expected to see a decrease in groundwater flow in streams as the ratio of evapo-transpiration to precipitation increases over the next century



Local Context – Storm Surge and Rising Sea Levels



Storm Surge: Southern Gulf of St. Lawrence, where a storm surge in excess of 3.6 above mean sea level occurs once every 40 years, and is predicted to occur annually by 2100 . Storm surge in excess of 4.0 m would occur every 10 years Storm surge becomes even more problematic when it coincides with high tides.

A severe storm that impacted Lennox Island in 2010, brought a storm surge which threatened the sewage treatment plant and associated lagoons (Jardine, 2016). There are also two dozen homes, as well as their associated drinking water and wastewater infrastructure, that are vulnerable to flood and erosion hazards (see Figure). As most of the northern coast of PEI is highly sensitive to sea level rise, if Lennox Island were to experience a 1 - 3 m potential rise in sea level, it will have a serious impact on their water and wastewater infrastructure as well.

https://www.apcfnc.ca/wp-content/uploads/2020/07/Final_Report_APC_Climate_Change_Impacts_-_D_Lewis.compressed.pdf

Adaptation and Mitigation Strategies – UN Climate Promise

Indigenous Peoples are custodians of unique knowledge and practices that emphasize the balance between humans and the natural world.

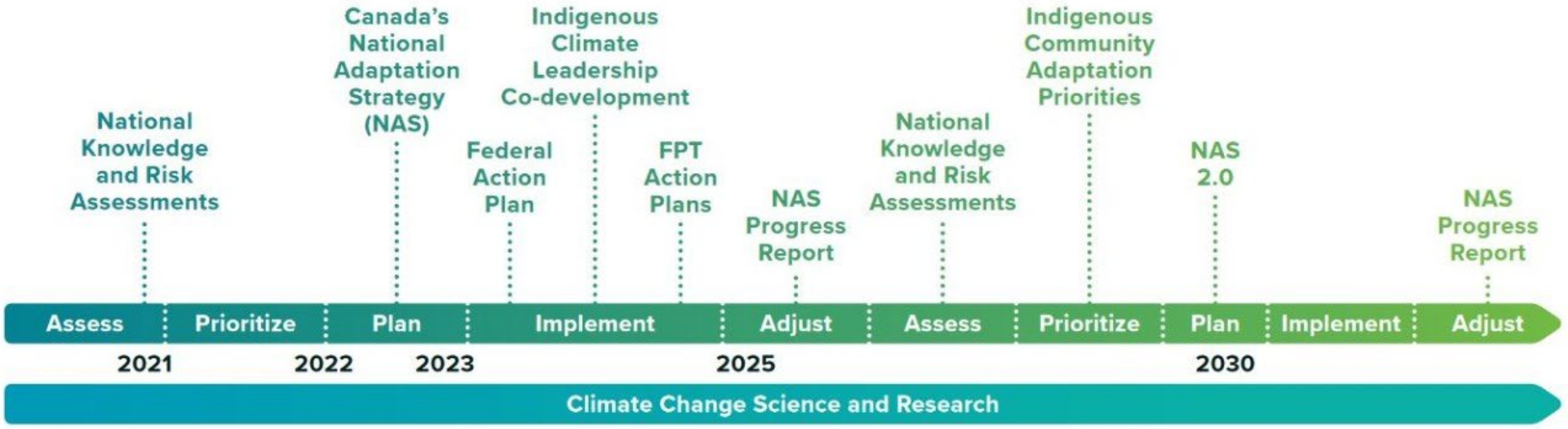
Many Indigenous traditional practices offer effective climate solutions, such as sustainable agriculture systems and climate-resilient water management.

By safeguarding key ecosystems that act as carbon sinks and protect biodiversity, Indigenous Peoples provide an environmental service to the rest of the world. However, they are frequently excluded from decision-making processes and their rights to lands and resources are not always respected.

It is impossible to achieve the goals of the Paris Agreement without full and effective participation of Indigenous Peoples and their free, prior and informed consent.

Governments must fully recognize the rights of Indigenous Peoples, provide them with direct access to climate finance and capacity building, and integrate Indigenous knowledge into climate policy.

Canada's National Adaptation Strategy



https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/full-strategy.html

Adaptation and Mitigation Actions

- Construct New Infrastructure – Flood Barriers, Storage capacity, Alternate water sources, Upgrade piped infrastructure
- Increase System Efficiency – Optimize operations, energy, water use
- Model Climate Risk – Modeling water and wastewater and understanding for future preparation
- Modify Land Use – manage ecosystems and watersheds through landuse planning
- Modify Water Demand – reduce water use and energy demand
- Monitor Operational Capabilities – stress testing of systems, monitor water, wastewater quantity and quality
- Plan for Climate Change – Emergency planning, Identify and protect vulnerable systems, contingency planning
- Repair and Retrofit Facilities – Increase supply and treatment, stormwater capacity, backflow prevention, flood proofing

Active AFNWA Initiatives

- Water Safety Plans and Watershed Management
- Integrated Resource Plan with a Climate Change lens
- Hydraulic Modeling of our systems
- Water Loss Control and Wet Weather Management Programs (Inflow/Infiltration)
- Emergency Planning and Training
- Water and Wastewater system Upgrades
- GIS, SCADA and Information systems upgrades
- Enhancing system back ups (power and equipment) and resiliency
- Working with communities to understand growth and land use

Wela’lioq!
Woliwon!