# Climate Change

## Section 1: Technical Background – Basics of Climate Science

**Key Terms**

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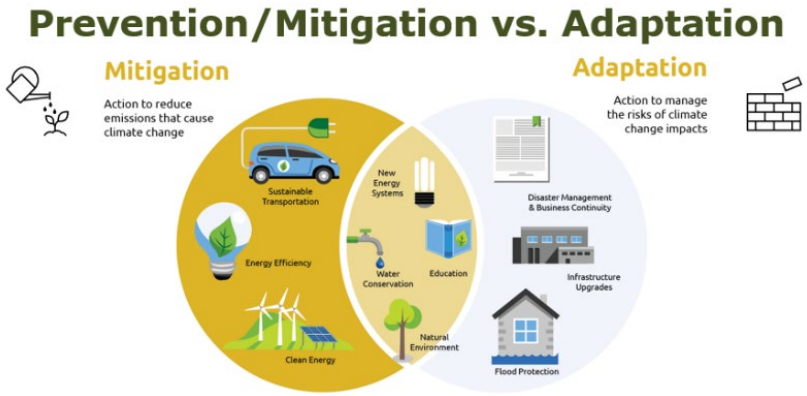
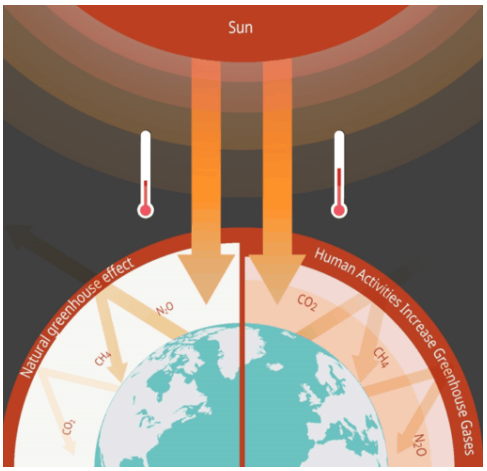
| **Adaptation:** Climate adaptation refers to the reaction or response to those impacts directly occurring from climate change and continuing to prepare for more changes to occur (e.g., flood protection, upgrades in infrastructure and change in land-use). |
| **Climate:** Climate refers to trends in weather patterns over time, such as expecting it to be cold, warm, dry or wet during a certain time of the year. |
| **Climate Change:** Climate Change refers to long-term changes in the average weather patterns in local, regional, and global settings. Climate change can be caused by natural processes but since the industrial revolution and the burning of fossil fuels, human activities are accelerating the rate at which climate change occurs. |
| **Greenhouse gases:** Greenhouse gases are naturally occurring, trap heat in the atmosphere and warm the Earth. The main greenhouses gases are carbon dioxide, methane, and nitrous oxide. |
| **Mitigation:** Climate mitigation aims to reduce the severity of impacts from climate change by attempting to minimize or reduce certain factors that cause it. Some examples of climate mitigation strategies include renewable energy and proactively taking actions to reduce carbon emissions. |
| **Weather:** Weather refers to what conditions we experience outside, locally and on a day-to-day basis. |



**The Basics of Climate Science**

Climate change is a natural occurrence that typically spans over thousands of years. The four main influences of change in Earth's climate are: (1) changes in Earth's orbit around the Sun, (2) variations in the output of energy from the Sun, (3) fluctuations in the upwelling of deep cold ocean water, and (4) changes in atmospheric composition.

The greenhouse effect (see figure 1) is a function of Earth's atmosphere whereby greenhouse gases such as carbon dioxide, trap heat from the Sun and warm the surface of the Earth. Historically, this has made the planet habitable. There are also natural factors such as volcanic activity and forest fires that contribute to atmospheric composition and the concentration of greenhouse gases.




However, over the last 200 years, human activity has resulted in an increased concentration of greenhouse gases in the atmosphere, causing an intensification of the greenhouse effect, which results in accelerated global warming. It is estimated that the global mean temperature (GMT) has already risen approximately 0.87° C above pre-industrial levels (IPCC, 2019).

*Figure 1 The Greenhouse effect. Licensed from Adobe Stock.*

*For further information on climate science, please take our online course: Climate Change 101: An Introduction to climate science.*

**Recognizing the Climate Emergency: Impacts of Climate Change**

The impacts of climate change are being felt today and cannot be compartmentalized to a single event, such as rising sea levels or flooding. Instead, the effects of climate change are interrelated and likely to exacerbate pre-existing environmental and social issues, such as habitat loss and poverty. Extreme weather events are also likely to occur in frequency and with less predictability.

The impacts on humanity will be all-encompassing and felt at all levels. As such, our collective global response must be equally all-encompassing, for example, increased investment in low-carbon options, new technologies and behavioral changes.

**Climate Change in Canada**

Canada represents roughly 0.5% of the world's population but is annually responsible for approximately 1.6% of global emissions (such as carbon dioxide, from the combustion of fossil fuels). This puts Canada among the top 10 global emitters both in terms of total emissions and on a per capita basis.

Little data exists for greenhouse gas (GHG) emissions from First Nation and indigenous communities in Canada, though it is likely that the GHG contribution from these communities is very small, both in terms of total emissions and on a per capita basis.

Climate change is projected to intensify in Canada:

- Several major areas of risk have been identified, including agriculture and food, water, fisheries, forestry, geopolitical dynamics, governance, capacity, human health & wellness, physical infrastructure, coastal communities, northern communities, and Indigenous ways of life
- Warming in Canada is, on average, occurring at double the rate of global warming
- While precipitation is expected to increase for most of Canada, summer rainfall may decrease in some areas, leading to an increased risk of water shortages in the summer
- Warming is predicted to intensify extreme weather events
- Coastal flooding is expected to increase due to sea-level rise, and areas of the Arctic and Atlantic Ocean will experience longer and more widespread sea-ice-free conditions (Bush and Lemmen, 2019; Council of Canadian Academies, 2019)

## Section 2: Climate Change & First Nation Communities

Ecosystems and indigenous cultures are interdependent. Indigenous people interact with and shape some of the most ecologically diverse landscapes in Canada and throughout the world through patterns of resource use and governance systems. Indigenous peoples have adapted to a changing climate since time immemorial and have struggled with rapid environmental changes since colonization.

Climate change continues to have a growing impact on First Nation communities in Canada, depleting food sources and affecting health. Canada is contributing to the climate crisis, but First Nation peoples feel these impacts acutely, resulting from their reliance on and connection to the land.

We are seeing direct impacts in communities in many different areas. The diversity of impacts is evidence that climate change is not just a lands or resource management issue but has an impact on many different areas, including roads, emergency services, housing & infrastructure, economy, and can exacerbate social inequalities and health.

**What does climate change mean for First Nations?**

Each community is affected differently, but the unpredictability of climate change can make adaptation a challenge. Below are a few areas where First Nations are feeling the effects of climate change:

- **Loss of opportunities and connection**
  Less ability to practice cultural activities such as hunting, harvesting, fishing, and foraging. Rapid

fluctuations and unpredictable changes in the environment lead to a loss of connection with the land.

- **Food sovereignty and ecological risks**
  Less access to wildlife, shifting ecosystems, altered harvesting cycles, impacts to important species and species-at-risk, impacts on water quality/quantity, air quality, increase in invasive species, and decrease in the provision of critical ecosystem services.

- **Health & well-being and the potential for harm**
  Climate-driven changes to the environment are negatively affecting mental health and well-being, Exacerbating existing stresses and problems, such as the suicide crisis. Increase risks from extreme weather, disasters and in performing traditional activities (e.g. Hunting on sea ice or during unpredictable extreme weather).

- **Reliability of traditional knowledge**
  Ecosystem changes are occurring so rapidly that indigenous peoples are finding it more difficult to predict natural processes. Elders report that within one generation, climate change has made the environment unpredictable, decreasing the reliability of traditional knowledge.

- **The economy, housing & infrastructure**
  Need for well-built, energy-efficient and climate-resilient buildings. Services (water, sewer, gas, electricity, solid-waste and wastewater, security & enforcement) will be strained. Transportation, connectivity, and accessibility will be stressed, particularly in remote communities. Impacts on resource development, tourism, energy production and consumption will impact economies.

- **Cultural impact**
  Climate change is affecting the integrity and social cohesion of indigenous cultures and economies. Indigenous languages, traditional activities, intergenerational knowledge transfer, and sacred and heritage sites are all at risk.

To see what climate change looks like in your area, try the Climate Atlas of Canada. This tool combines climate science, mapping, and storytelling together with Indigenous Knowledge and community-based research and video to inspire awareness & action.

**Traditional Ecological Knowledge (TEK) in Land Governance & Climate Change**

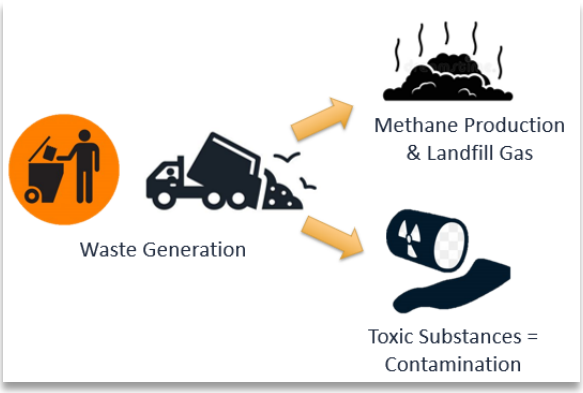
Indigenous knowledge derives from a relationship to the land, cultural values, animals, and the environment. Observing patterns and predicting activities around the intergenerational understanding of how homelands fluctuate throughout the seasons. *How would climate change impact medicine knowledge and access to traditional economies? How do we maintain & adapt food sovereignty & protect Cultural assets?*

There is much uncertainty when it comes to our climate as it becomes less predictable. Landscapes are changing; there are major shifts in the geographical distribution and ranges of wildlife species across the country, which directly impact traditional ecological knowledge. These impacts may alter indigenous languages and worldviews. For example, many place names are descriptive, but if those features no longer exist or match their previous descriptions, how could that change our language over time?

**Climate Change & First Nation Issues in Solid Waste**

Waste contributes to environmental problems such as habitat destruction, surface & groundwater pollution, and other forms of air, soil and water contamination. Incineration (or burning) of waste creates toxic substances, while landfills emit gases, such as methane gas (which is another greenhouse gas, further contributing to global warming).

Landfills have become an issue as there is limited space on reserve, and the land becomes unusable and an environmental risk long after the closing of the landfill. A regulatory gap exists from on & off reserve. Many sites were developed without environmental site assessments and are therefore situated in inadequate locations. Without modern environmental protections like Leachate Collection Systems or liners to prevent contamination, Indigenous lands and people are at risk.




## Section 3: Building Climate Change Resiliency – Tools under the Framework Agreement to Address Climate Change

Signatory First Nations are seeing the benefits of the *Framework Agreement on First Nation Land Management* (FA) as an effective governance tool in response to climate change. Along with recognition of governing authority, the FA offers a unique and well-established means for communities to move away from the *Indian Act* and to exercise their own authority over their lands and resources, with the

added support of the Lands Advisory Board and Resource Centre on important governance issues like climate change.

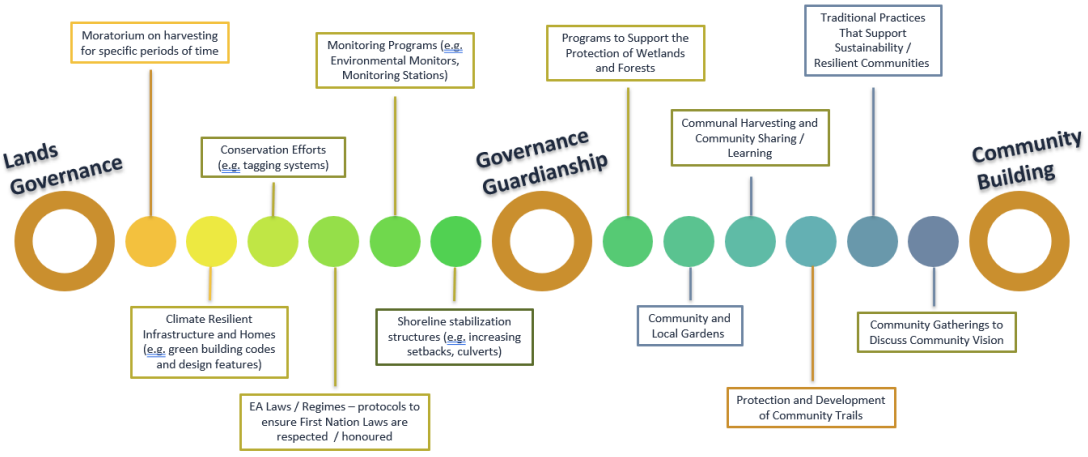
Founded on the principles of community participation, accountability, and transparency, the *Framework Agreement on First Nation Land Management* empowers communities with core governance tools vital to sustainable development in an era of climate disruption.

**Community First – Community Monitoring & Guardianship Governance**

Community perspectives and weaving knowledge systems can strengthen land governance in planning, policy-making and environmental management for Land Code First Nations.


Community-based monitoring supports a First Nation's ability to connect the community to the land while collecting valuable information on how it is changing to improve management strategies. The benefits of community monitoring are:

- Engaging community members in ways that improve land governance strategies
- Identifying areas of prioritization across the landscape, such as water systems, wetlands, harvesting resources and the habitat that supports them.
- Developing an understanding of changes across time, identifying areas of prioritization in relation to climate change strategies.
- Monitors can act as the "eyes" and "ears" on the ground for a Lands Department
- Informed Land-Use Planning and Environmental Management Planning just from being on the land and knowing what it needs
- Development of laws and policies to support areas of prioritization identified by the community
- Support natural assets by identifying how environmental function supports the health of the community
- Improving a Nation's overall environmental function & resilience to climate change



**How Can Planning under a Land Code help?**

Since climate change is going to impact virtually every aspect of our lives, we need a holistic approach to planning and a broad recognition within our organizations of the value and need for planning. Planning under a Land Code can be a unifying planning process that brings together all staff, all departments, leadership, and the community. We must plan across disciplines, departments, and jurisdictions. Land Code reinforces First Nations as governing authorities with their own plans, which can assist in promoting regional collaboration with other governments. Below you can see some areas where Land Code can assist:

Moving beyond the *Indian Act:*

- Recognition of the value of planning as a core function of government
- Clearer planning structures & processes, community engagement requirements, law-making
- Revitalizing Indigenous Planning practices
- Community-driven and empowering planning informed by Western and Indigenous science

Rapid climate change will make existing issues worse and cause new ones:

- Holistic “systems” approach needed
- Adaptive planning, "ecosystem-based" approach
- Integrated and collaborative planning – planning across disciplines, departments, jurisdictions

Opportunity for innovation in the transition to a low-carbon economy:

- Renewable Energy
- Green building practices and smart growth
- Strong development regulations
- Environmental Protection, Monitoring, Restoration and Enhancement
- Natural Infrastructure
- Economic opportunities

**Planning Tools & the Framework Agreement**

Land Use Planning, Environmental Management Planning and other planning tools can help prepare for and respond to impacts from climate change through the creation and continuance of resilient Communities.

***Land Code First Nations are well-positioned to respond to climate change.***

A land code may assist with the building of climate-resilient communities by:

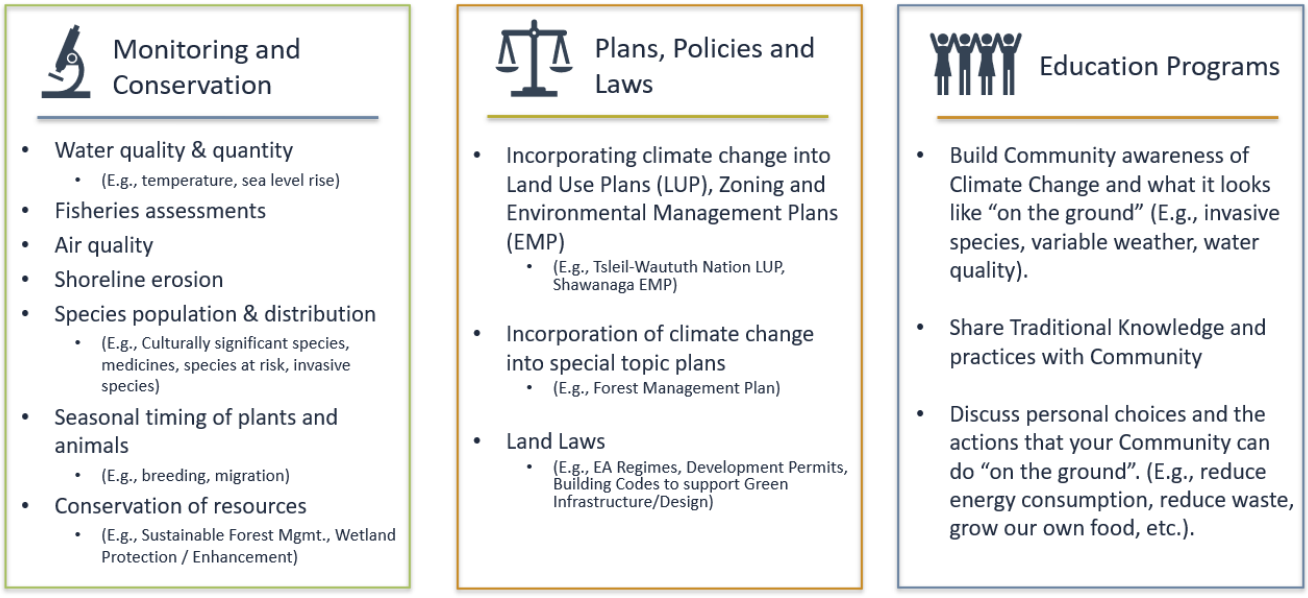
1. **Creating enforceable guidelines in direct response to climate change-related issues for your community.**

- E.g., design guidelines to support green design, resilient infrastructure, active transportation, etc.
- Opportunities for collaboration with regional partners and First Nations in the development of guidelines (e.g., Guardianship Governance).

2. **Ensuring a timely response**
    - Although Climate Change is typically viewed as a 'Long-Term' issue, there are various efforts that can be taken immediately to begin addressing impacts relating to climate change (e.g., protection of wetlands, forests and cultural lands, reduction in energy consumption, recycling, Community gardens).

3. **Ability to create Land Use Plans, Environmental Management Plans, and associated Laws in response to direct issues**
    - Create plans and associated laws to address Climate Change issues
      E.g., Active Transportation Plans, Community Energy Plans, Forest Management Plan, and Disaster Management Plans / Policy
    - Create plans and associated laws on special topics that are relevant to your community
      E.g., Storm Water Management Plan, Wetland Protection Plan, Invasive Species Response Plan, Cultural Heritage Plans, Development Permits / Policy

**Key Planning Tools to Address Climate Change**



**Developing Clime Change Strategies for Resilient Communities under the Framework Agreement**

**Infrastructure & Development**

With climate change, we're seeing more frequent and extreme weather events. These events challenge our ability to use, operate and maintain community developments and infrastructure. With this, there are wide ranging impacts beyond damage to physical structures. There are also public health and safety concerns, large economic costs to repair or even replace damaged structures, and there can also be disruptions to the services that are provided by schools, hospitals, recreation facilities and other community buildings.


The incorporation of sustainable development policies, practices and tools can help to reduce the greenhouse gas emissions that are contributing to climate change, and they can also help set the stage for adapting and building community resiliency. Climate resilient developments and infrastructure can also bring added benefits – they play a role in protecting ecosystems and biodiversity, they can help to improve the quality of our air and water, and they can support community health and well-being.

Climate-informed planning can assist in mitigating the impacts of climate change and provide adaptive measures to build resiliency.


**Risk and vulnerability assessments**

- Can help identify climate risks that threaten community infrastructure
- Proposes adaptation strategies to reduce identified risks.

**Emergency Management Planning**

- Can help identify strategies to protect community buildings, facilities and infrastructure (i.e., hospitals, roads, water and wastewater facilities), so that they can operate during an emergency

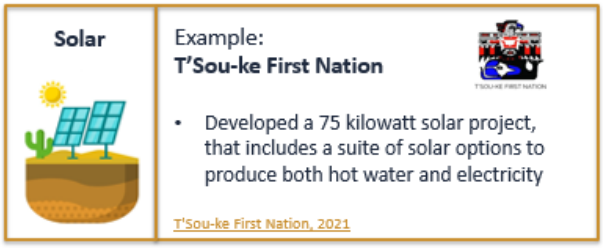
**Hazard Mapping**

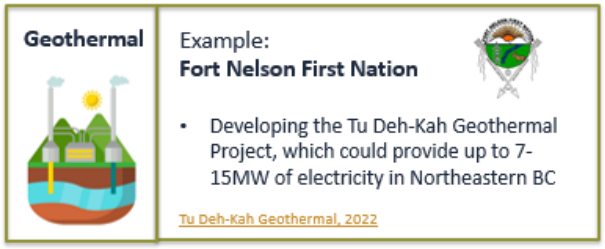
- Can help identify areas where hazards, such as floodplains exist.
- Hazard mapping can help inform appropriate building setbacks and suitable areas for future development.

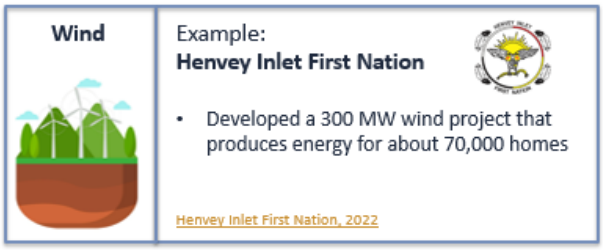
**Land Use and Environmental Management Planning**

- Can help identify laws, policies and tools that will guide sustainable development
    - Development and zoning laws
    - Environmental laws
    - Energy efficient design
    - Fire Smart design
    - Riparian setbacks Emergency Planning & Response

Investing in clean energy infrastructure helps to reduce greenhouse gas emissions, and air pollution. These projects also help us transition to a greener economy, while also bringing a suite of socio-economic benefits such as job creation, reduced energy costs, reduced electricity bills and even health benefits. These projects can also create reliable energy sources that communities can depend on during emergency situations. An example of this could be harnessing solar energy in a system that is also configured with battery storage.





**Emergency Planning & Response**

We plan to help improve decision-making by identifying priorities, alternatives, analyzing values, and assessing risks. The impacts of climate change are felt in very real ways for First Nation communities, affecting the way that community members access food, health services, community services, employment, etc. These interruptions can last for days, months, or sometimes years.

There is no denying that the impacts of climate change are felt acutely by First Nation communities. Adding to this, First Nations are disproportionately impacted when compared to non-indigenous communities.

An emergency plan specifies procedures for handling sudden or unexpected situations. The objective is to be prepared to:

- Prevent fatalities and injuries to community members and people in the region.
- Reduce damage to buildings, community lands, infrastructure and community equipment.
- Protect sensitive environmental lands and community infrastructure.
- Provide a framework for rapid and comprehensive response to an emergency situation

Although emergencies by definition are sudden events, their occurrence can be predicted with some degree of certainty. The first step is to identify which hazards pose a threat to your community.

An Emergency Plan is:

- An evaluation/identification of community risks
- A description of responsibilities for key positions and who will fill these positions (including 24-hour contact information)
- A system for notifying officials/agencies who must respond
- A description of the communications system to be used
- A list of resources for finding information
- Contacts and equipment in a hurry

There are several benefits to developing an emergency plan:

- In the event of an emergency, everyone knows their role
- Your community will be better able to respond to and recover from an emergency or disaster
- Your community will have identified evacuation routes and resources
- Provides your community with the opportunity to identify and prioritize community needs in advance.
- Supports effective communication in the moment so people know where to get updates / news from Leadership

What are the elements of an Emergency Plan?

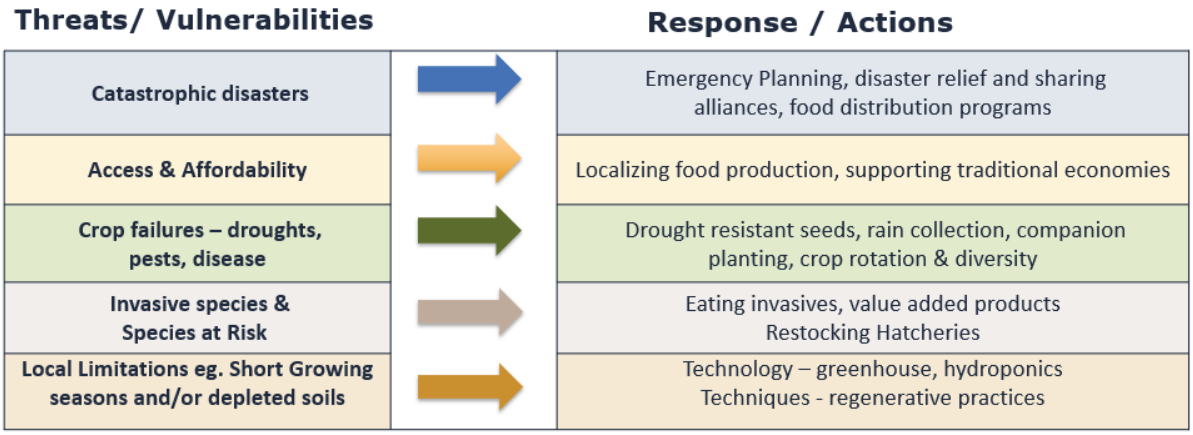
1. Identified possible emergencies, required actions, written procedures, and the resources available.
2. Detailed lists of emergency response personnel including their cell phone numbers, alternate contact details, and their duties and responsibilities.
3. Quick reference chart with next steps and who to contact.
4. Large scale maps showing evacuation routes and service conduits (such as gas and water lines).

Partnerships

Some First Nations have signed mutual support agreements with neighbouring communities for service delivery in the event of an emergency. By sharing services such as fire departments and first responders, the aim is to have both groups work together on emergency management.

**Organic Waste Diversion & Food Security**

Indigenous food systems are diverse and offer sustainable harvesting and natural techniques. Unfortunately, climate change can pose a threat to food security, but there are ways to plan for these vulnerabilities. Please see the chart below:

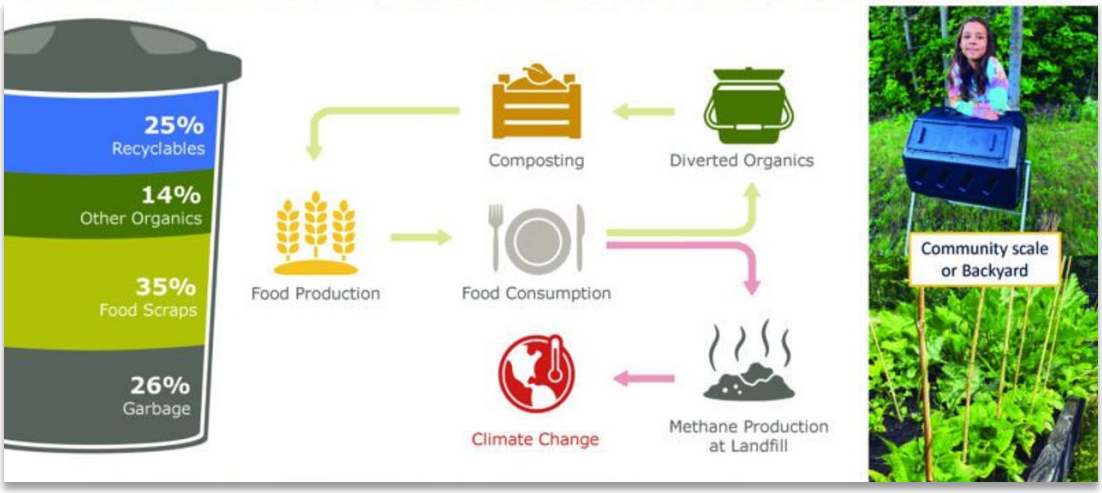



Below are some practical solutions to food security:

- Relearning & teaching traditional practices ex. harvesting, food and medicine preservation and preparation
- Indigenous-led land management and conservation
- Working with nature – biodiversity, permaculture, restorative practices
- Food sovereignty – culturally appropriate, Country Foods, Indigenous seed saving
- Closed loop – circular systems of resource recovery – composting -> soil enhancement – > garden

**Organic Waste Diversion**

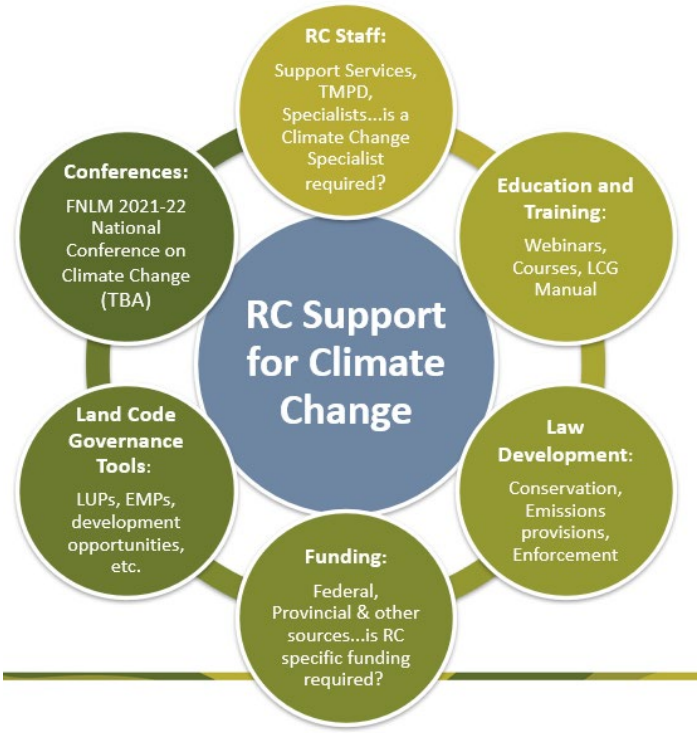
Approximately half of all household waste is organic. Food waste in landfills is one of the leading generators of methane gas, which significantly contributes to climate change. Most of this waste can be diverted through composting, turning waste materials into a rich soil supplement for use in gardens and food production. By composting, not only can you help to reduce the amount of waste that goes into landfill, but you can also help to reduce contamination and greenhouse gases and increase food security.




**What Can the RC Do to Support First Nations' Climate Change Initiatives?**

Our staff here at the RC is always willing to assist – reach out to your RC Land Code Governance advisor at any time. Our TMPD group provides webinars, training, and other materials to help improve your general understanding of what climate change is and how climate change considerations can be incorporated into your planning and development initiatives.

Our Environment and Enforcement team can assist you in developing laws that specifically address climate change issues, such as laws to establish conservation areas (carbon sinks), to regulate and limit emissions of greenhouse gases, incorporating climate change into your Environmental Assessment laws and processes, and to help ensure your laws include appropriate monitoring and enforcement provisions to ensure compliance.




Our planning team, along with our environmental specialists, can assist with funding opportunities and integration of climate change in your land use and environmental management plans. We can also provide funding and assistance to implement climate change specific strategies and monitoring programs that were identified as important to your community in your environmental management plan.

## Section 4 – Community Led Actions

First Nations continue to lead the way on climate resilience and adaptation. Utilizing the tools of the Framework Agreement, the following communities provide a small snapshot of the projects being undertaken by First Nations in response to climate change.

**Magnetawan First Nation**

"Integrating Aboriginal Traditional Knowledge and Science to Monitor Climate Change"
A community-driven project that embodies the principle of "Two-Eyed Seeing" by bringing together the knowledge of the elders with modern science. With funding from Indigenous Services Canada (ISC), a partnership was formed between Magnetawan First Nation, McMaster University, Laurentian University, Boreal Water Futures and Anishinabek/Ontario Fisheries Resource Centre to learn about the impact of climate change on significant, at-risk indigenous lands and species. The project will involve elders and youth (Mosna, 2018).

**George Gordon First Nation**

"Climate Observatory"
With funding from ISC, George Gordon First Nation constructed a weather station in the winter of 2018 that will inform the community in real time of environmental changes occurring in their territory. Data will be collected from the weather station to initiate and inform a community conservation strategy (CIRNAC/ISC 2019).

**Katzie First Nation**

"Long-Term Hydrological Monitoring Program to Measure Climate Change Impacts"
Katzie will be developing a long-term hydrological monitoring program to study changes in water quality and quantity, the distribution and breeding of plants, fish, amphibians and birds and their association with climate change (ibid).

**Tsleil-Waututh Nation**

"Land Use Plan"
Tsleil Waututh Nation recently completed and adopted their Land Use Plan utilizing their Land Code. The LUP references the TWN Stewardship Policy, a territorial declaration of Aboriginal Rights & Title for TWN which guided TWN's independent Environmental Assessment of the proposed Trans Mountain Pipeline Expansion project. The LUP also contains a section on climate change and commits TWN to further planning to mitigate against and adapt to climate-related impacts and vulnerabilities of TWN Reserve lands, setting targets, milestones and measurable indicators of success, reducing TWN's contributions to climate change, engaging and educating TWN members about climate change, and conducting continual monitoring of both climate impacts and TWN's responses.

**Henvey Inlet First Nation**

"Wind Farm"
Henvey Inlet First Nation (HIFN) partnered with Pattern Canada to jointly develop a 300 Megawatt wind project, the largest of it's kind in Ontario and the largest First Nation wind partnership in Canada. The project created more than 1000 on-site jobs during construction, 20 permanent jobs for operations and

maintenance, annually produces enough electricity to power over 100,000 homes and provides annual, stable revenue for HIFN (Henvey Inlet 2019).
These are just a few examples of what FA signatory communities are doing to respond to and prepare for climate change. While more and more communities move out of the Indian Act into self-government and start to think about and plan for climate change, the impacts associated with climate disruption will become more severe and opportunities for meaningful action will be missed unless drastic action is taken both in the spirit of climate resilience and reconciliation.

## Section 5 - Resources for Further Learning

- **Climate Change Starters Guidebook: An Issues Guide for Education Planners and Practitioners**
  Published by UNEP, UNESCO, WHO and others. An excellent resource for educating about climate change, climate science, adaptation and mitigation.

- **NASA – Climate**
  Features up to date information, news, and indicators related to climate change.

- **Pacific Climate Institute Climate Insights**
  Provides free short courses on climate change.

- **Canadian Climate Atlas**
  Features Canadian-specific information on climate change, including climate change projections, high resolution maps, and local data for download.

- **Indigenous Climate Action Network**
  A Canadian-based not-for-profit organization focused on indigenous-led climate justice organization.

- **Federation of Canadian Municipalities toolkit**
  A toolkit for Municipalities and First Nations to work together on economic partnerships.

- **Canadian Institute of Planners Policy on climate-informed planning**
  The Canadian Institute of Planners (CIP) has developed a climate change policy for its members, to help better define the role of planners in meeting the complex challenge of climate change and building resilient communities.

- **Understanding Climate Science Denial**
  Short course on understanding climate science denial.

- **Climate Change and First Nations: Recommendations for Action**
  Report prepared by the Centre for Indigenous Environmental Resources for the Assembly of First Nations, 2006.