

A Look at the Waste Management-Climate Change Nexus in Indigenous and Northern Communities

By

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UCN TRADITIONAL TERRITORY ACKNOWLEDGEMENT

I would like to acknowledge that I am on the traditional territory and homelands of Opaskwayak Cree Nation, who have existed here since time immemorial. Opaskwayak Cree Nation entered into a treaty relationship with the Crown in 1876 with Treaty No. 5. This land has also become home to other Indigenous peoples.

Outline

- ✓ Climate Change and Greenhouse Gases (GHGs)
- ✓ Solid Waste Management in Canada and GHGs
- ✓ Solid Waste Management in Indigenous and Northern Communities, and Climate Change
- ✓ Cultural Impacts on Solid Waste Management
- ✓ Conclusion





What is Climate Change?

- ✓ "Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (United Nations, 1992).
- ✓ "*Global warming* refers only to the Earth's rising surface temperature, while *climate change* includes warming and the "side effects" of warming—like melting glaciers, heavier rainstorms, or more frequent drought. Said another way, global warming is one symptom of the much larger problem of human-caused climate change" (Kennedy & Lindsey, 2015).

Greenhouse Gases (GHGs)

- ✓ **Carbon Dioxide (CO₂)**: Released through natural processes (e.g., volcanic eruptions) and through human activities (e.g., burning fossil fuels and garbage)
- ✓ **Methane (CH₄)**: Released through natural causes (e.g., breakdown of plant matter in wetlands) and anthropogenic sources (e.g., landfill gas, livestock).
- ✓ **Nitrous Oxide (N₂O)**: Produced and released via farming practices (e.g., organic fertilizer production and use), and burning fossil fuels.
- ✓ **Chlorofluorocarbons (CFCs)**: They result from industrial production (e.g., used as refrigerants, solvents, and spray can propellants).

Major Greenhouse Gases and their Lifespan

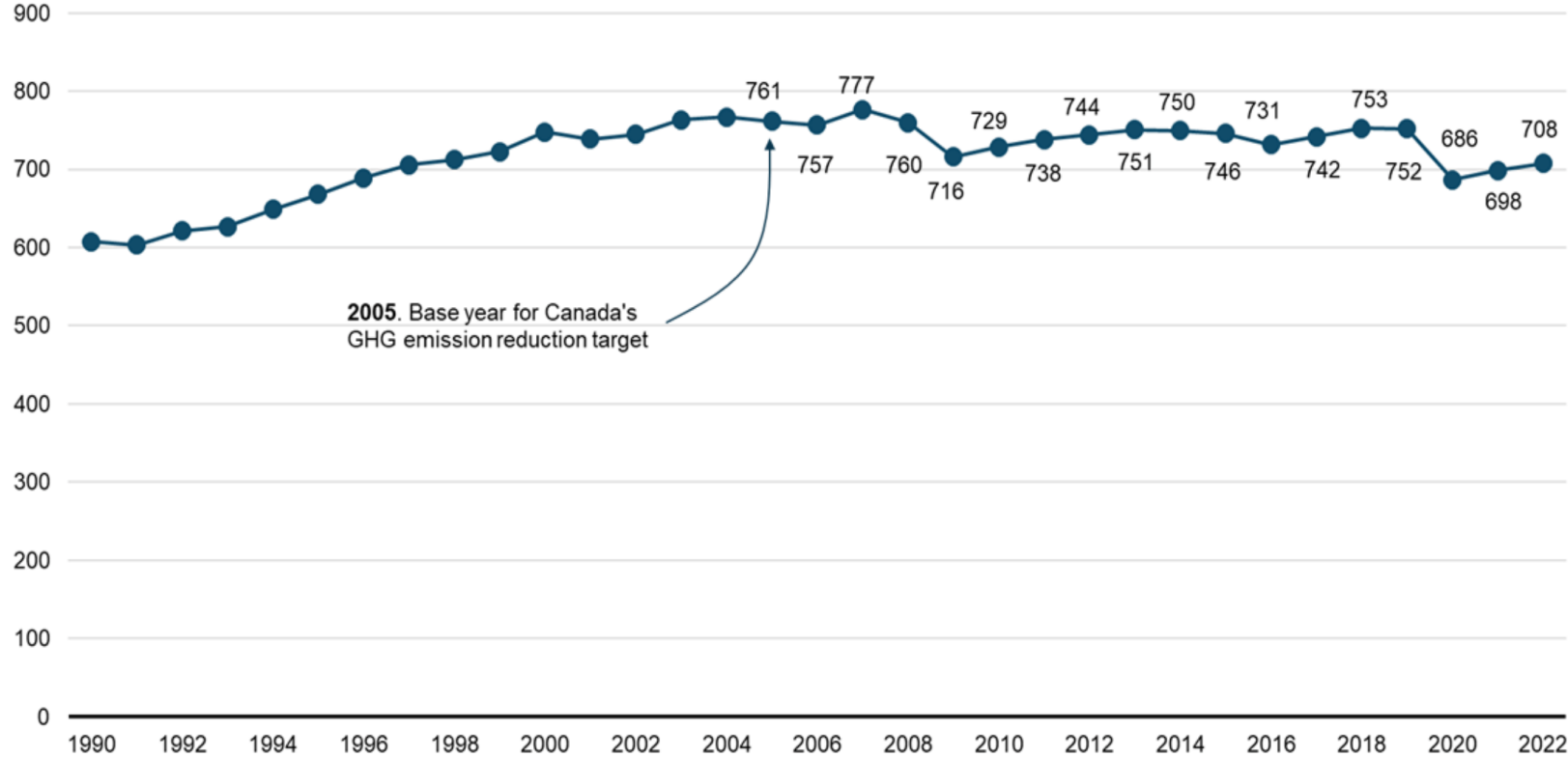
Greenhouse Gas	Average Lifetime in the Atmosphere	Possible Added Heat ("Global Warming Potential") Over a 20-Year Period	Possible Added Heat Over a 100-Year Period
Carbon Dioxide	Hundreds to thousands of years; about 25% of it lasts effectively forever	1*	1*
Methane	About a decade	One metric ton can trap about 80 times the heat of 1 metric ton of carbon dioxide.	One metric ton of methane can trap about 30 times the heat of 1 metric ton of carbon dioxide.
Nitrous Oxide	About 110 years	One metric ton can trap 273 times the heat of 1 metric ton of carbon dioxide.	One metric ton can trap 273 times the heat of 1 metric ton of carbon dioxide.
Chlorofluorocarbons	About 52 to 93 years	One metric ton can trap thousands to tens of thousands of times the heat of 1 metric ton of carbon dioxide.	One metric ton can trap thousands to tens of thousands of times the heat of 1 metric ton of carbon dioxide

*Carbon dioxide is used as a reference point for other greenhouse gases, so its possible added heat is set at 1.

Source: Adapted from National Aeronautics and Space Administration (2023)

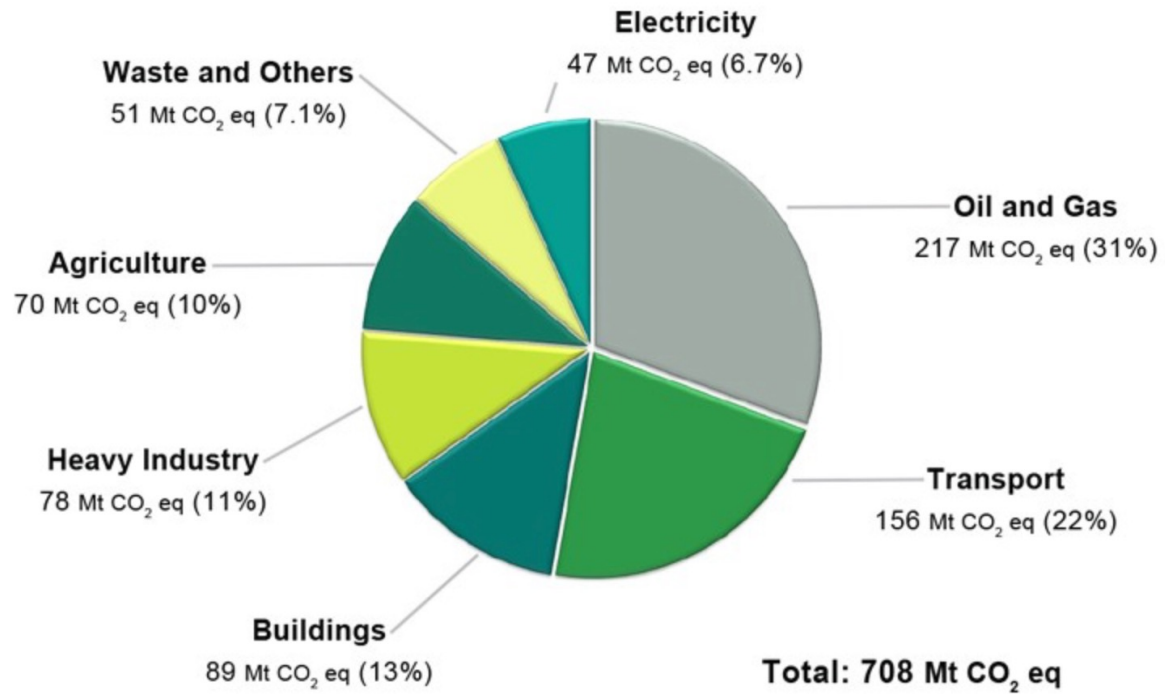
Greenhouse gas emissions, Canada, 1990 to 2022

Megatonnes of carbon dioxide equivalent



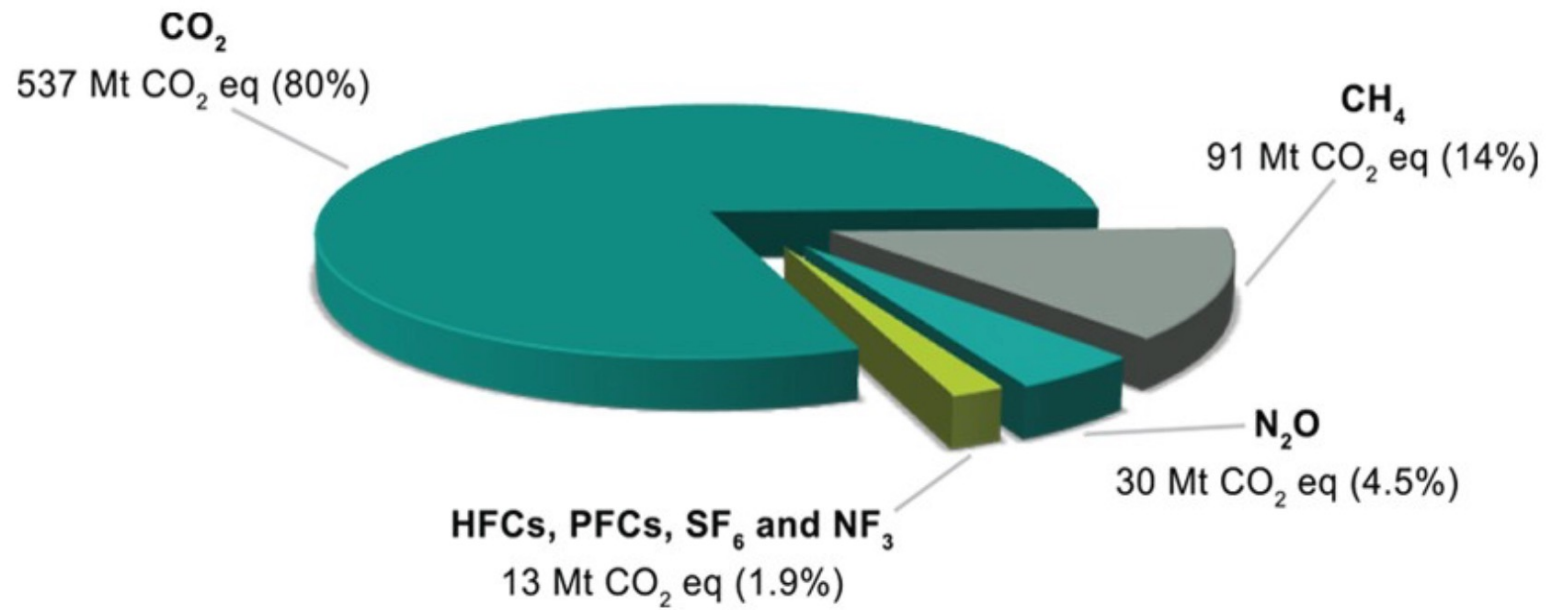
Source: Environment and Climate Change Canada (2024a)

Greenhouse Gas Emissions by Economic Sector (2022)



Source: Environment and Climate Change Canada (2024b)

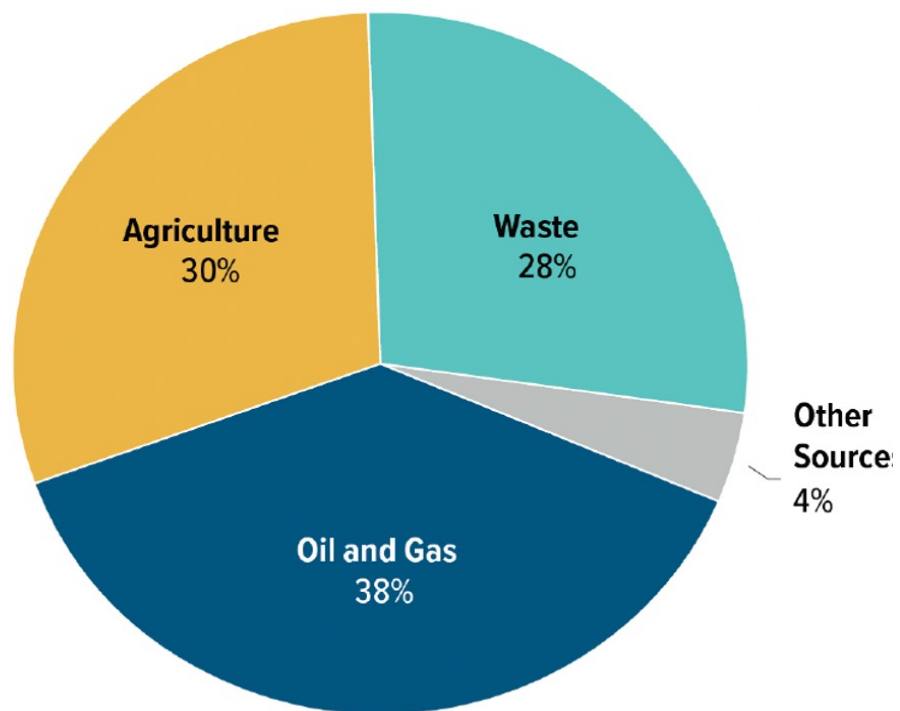
Emission by Greenhouse Gases (2021)



Source: Environment and Climate Change Canada (2023)

Why Focus on Solid Waste?

Canada's Total Methane Emissions by Sector (2020)



Source: Environment and Climate Change Canada (2022)

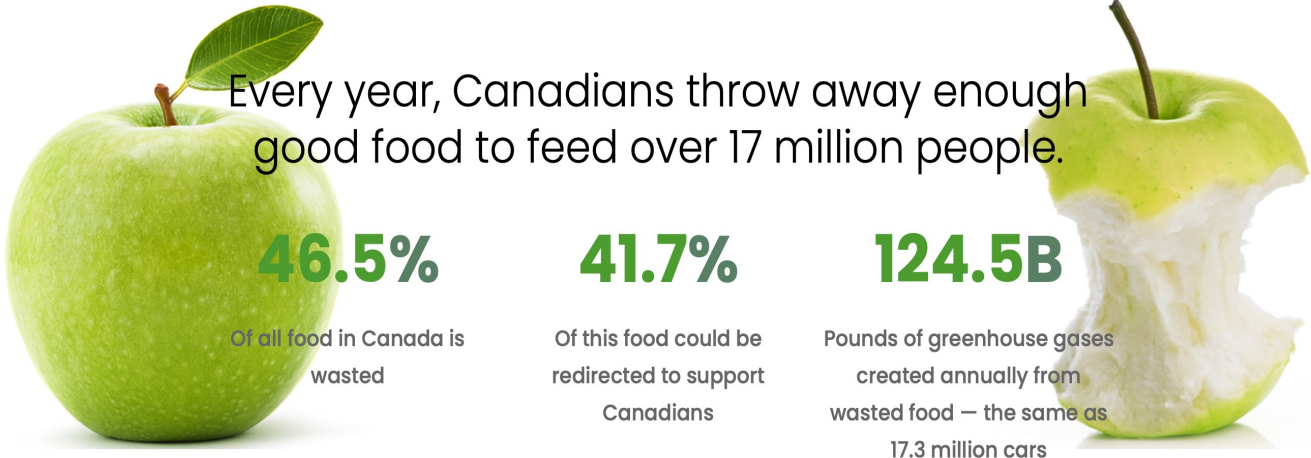


Canada's Solid Waste Management Challenge

- ✓ Total solid waste generation from 2002 to 2022 is 36.5 million tonnes
 - ✓ 5.8 million tonnes (or 19%) increase
- ✓ Solid waste disposed in landfills or incinerated increased by 2.5 million tonnes (or 11%) to reach 26.6 million tonnes
- ✓ In 2022, 27.1% of solid waste generated in Canada was diverted, while the remaining 72.9% was sent for disposal
- ✓ Approximately 97% of waste meant for disposal is landfilled and 3% is incinerated
- ✓ These statistics show a preference for waste disposal

Source: Environment and Climate Change Canada (2024c); Government of Canada (2024).

Food Waste In Canada



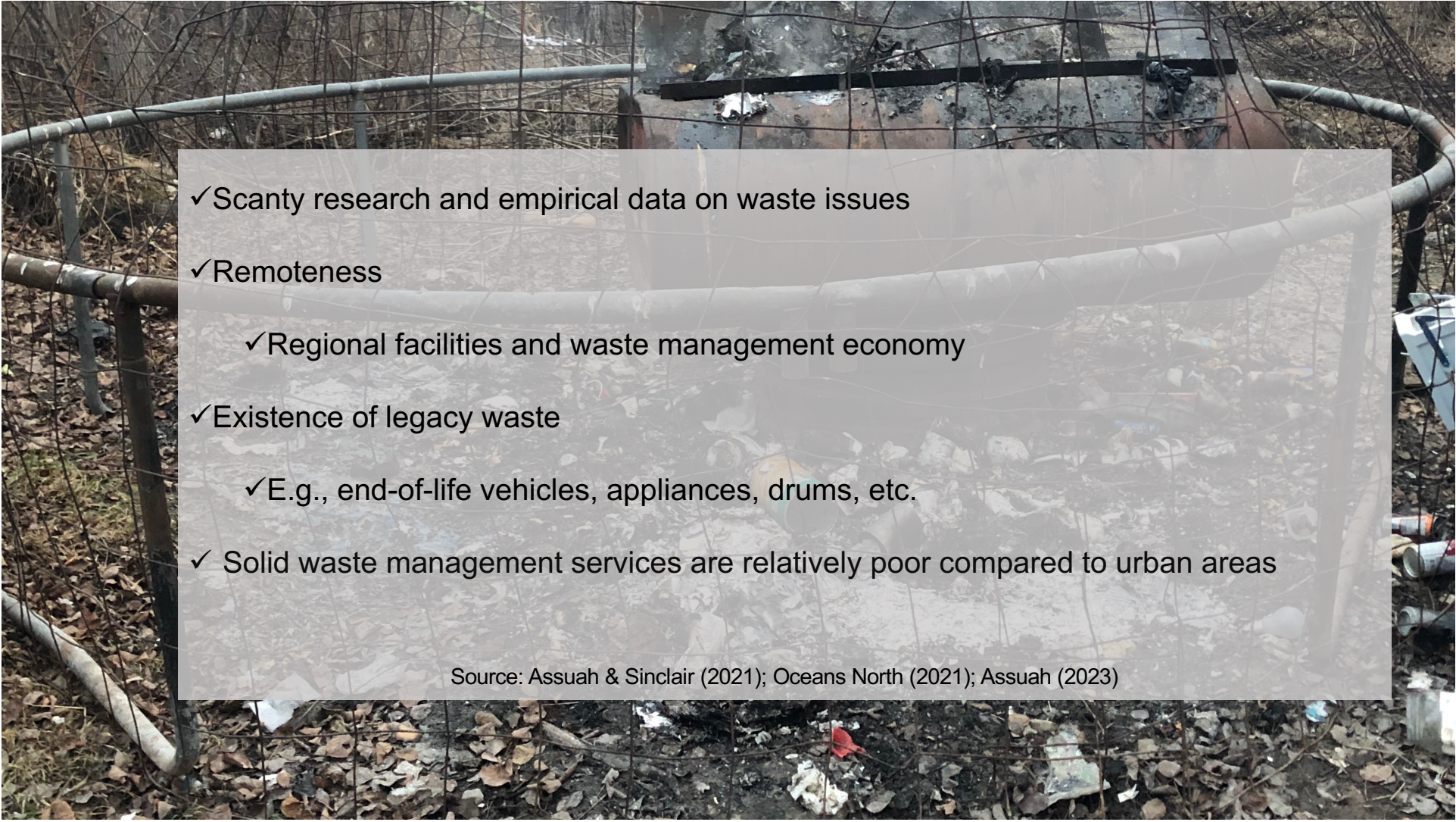
Source: Second Harvest (2024)

Municipal Solid Waste Management in Indigenous and Northern Communities

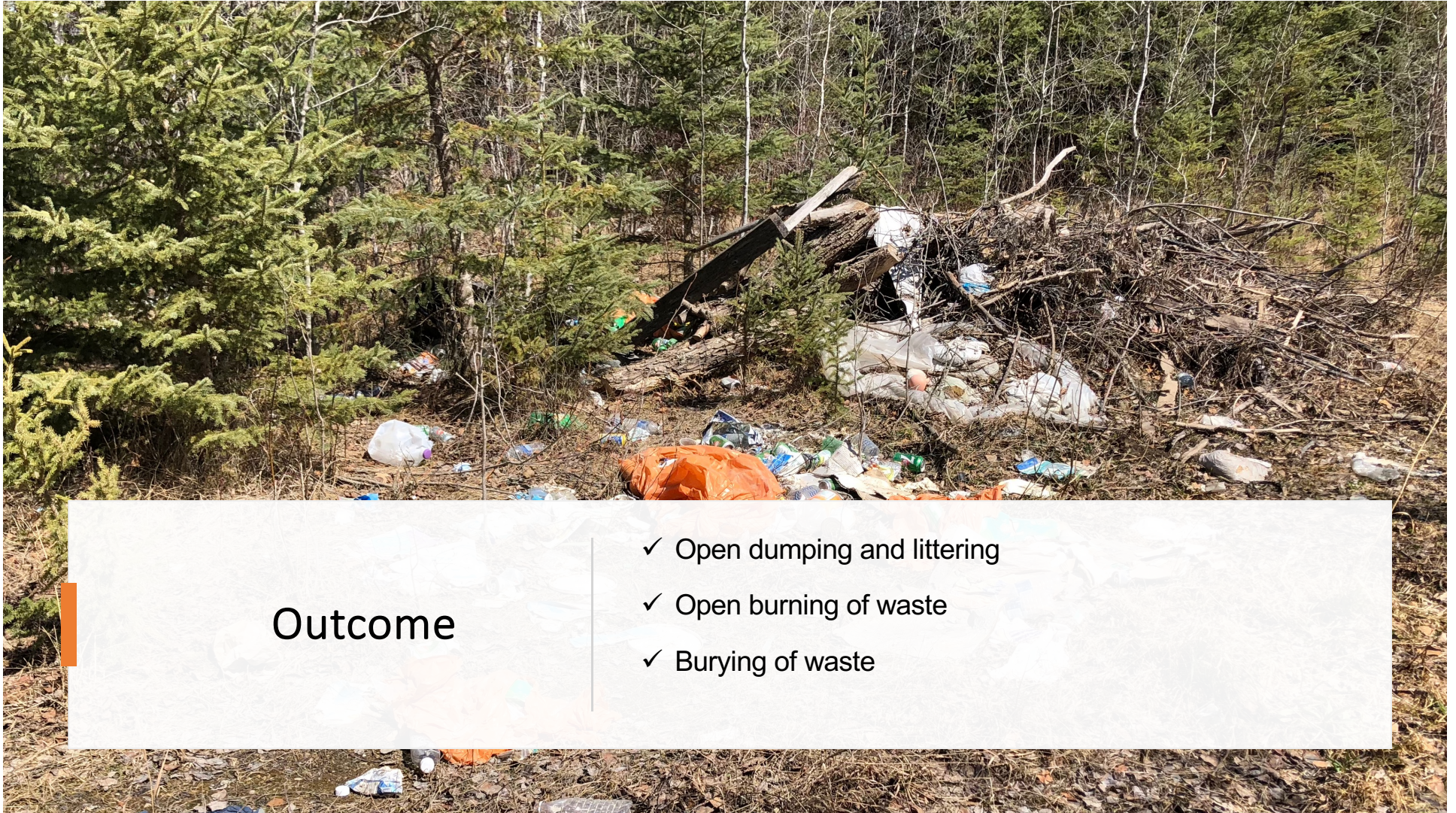
Major concerns/issues

- ✓ Inadequate infrastructure/facilities
 - ✓ E.g., dumpsite
- ✓ Lack of or inadequate financial resources
- ✓ Inadequate capacity
- ✓ Lack of regulations and bylaws
- ✓ Lack of waste diversion programs
 - ✓ E.g., recycling and composting

Source: Bharadwaj et al. (2008); Zagozewski et al. (2011); Keske et al. (2018)

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- ✓ Scanty research and empirical data on waste issues
 - ✓ Remoteness
 - ✓ Regional facilities and waste management economy
 - ✓ Existence of legacy waste
 - ✓ E.g., end-of-life vehicles, appliances, drums, etc.
 - ✓ Solid waste management services are relatively poor compared to urban areas

Source: Assuah & Sinclair (2021); Oceans North (2021); Assuah (2023)



Outcome

- ✓ Open dumping and littering
- ✓ Open burning of waste
- ✓ Burying of waste

Impacts of Improper Solid Waste Practices on GHGs and Climate Change



Methane from solid waste disposal (dumpsites)

Carbon dioxide, methane, and nitrous oxide from incineration and open burning of waste

Source: Environment and Climate Change Canada (2024d)

GHG Source Category	GHG Emissions (Mt CO ₂ eq)						
	1990	2005	2018	2019	2020	2021	2022
Waste	21.3	24.2	23.4	23.5	23.0	23.1	23.4
Solid Waste Disposal (Landfills)	18.1	20.4	19.5	19.6	19.1	19.2	19.5
Industrial Wood Waste Landfills	1.0	1.1	0.8	0.8	0.8	0.8	0.8
Biological Treatment of Solid Waste	0.1	0.2	0.4	0.4	0.4	0.5	0.5
Incineration and Open Burning of Waste	0.3	0.3	0.2	0.2	0.2	0.1	0.2
Wastewater Treatment and Discharge	1.9	2.2	2.6	2.5	2.5	2.5	2.5
Note: Totals may not add up due to rounding.							

Source: Environment and Climate Change Canada (2024d)

How Culture Can Impact Solid Waste Management

- ✓ Avoiding waste: Taking just what one needs and not wasting anything taken from the environment or land. For example, community members use all parts of a hunted animal.
- ✓ Taking care of one another: Sharing items, particularly food, with others and not hoarding prevents waste.
- ✓ Protecting the land: Eschewing contamination and pollution of the environment or land and keeping it clean.
- ✓ Respecting the land: Adhering to protocols about Mother Earth because it sustains life.
- ✓ Connection to the land: Experiencing and having knowledge of the environment and land.

Source: Assuah (2023)



Conclusion

- ✓ Solid waste-climate change relationship should be given more attention in Indigenous and northern communities
 - ✓ Improper solid waste management results in increased GHG emissions
- ✓ Uncaptured GHGs
 - ✓ Methane, carbon dioxide, and nitrous oxide
- ✓ Finding appropriate solid waste management strategies and solutions
 - ✓ Funding, infrastructure, programs
- ✓ One-way communities can contribute to reducing GHGs and climate change impacts

THANK YOU!



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Questions and Answers