PROTECTING NORTHERN PEATLANDS:

A VITAL COST-EFFECTIVE APPROACH TO CURBING CANADA'S CLIMATE IMPACT

Policy Brief | NOVEMBER 2021

Photo Credit: Lorna Harris

Protecting and maintaining northern peatlands, which are huge stores and important sinks for carbon, is essential to meeting national and global climate targets. But without mechanisms to measure and account for emissions associated with these areas, we risk losing ground on a significant natural climate solution.

Key words: Northern peatlands, boreal region of Canada, carbon storage, carbon sink, carbon offset, natural climate solutions, irrecoverable soil carbon

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Summary

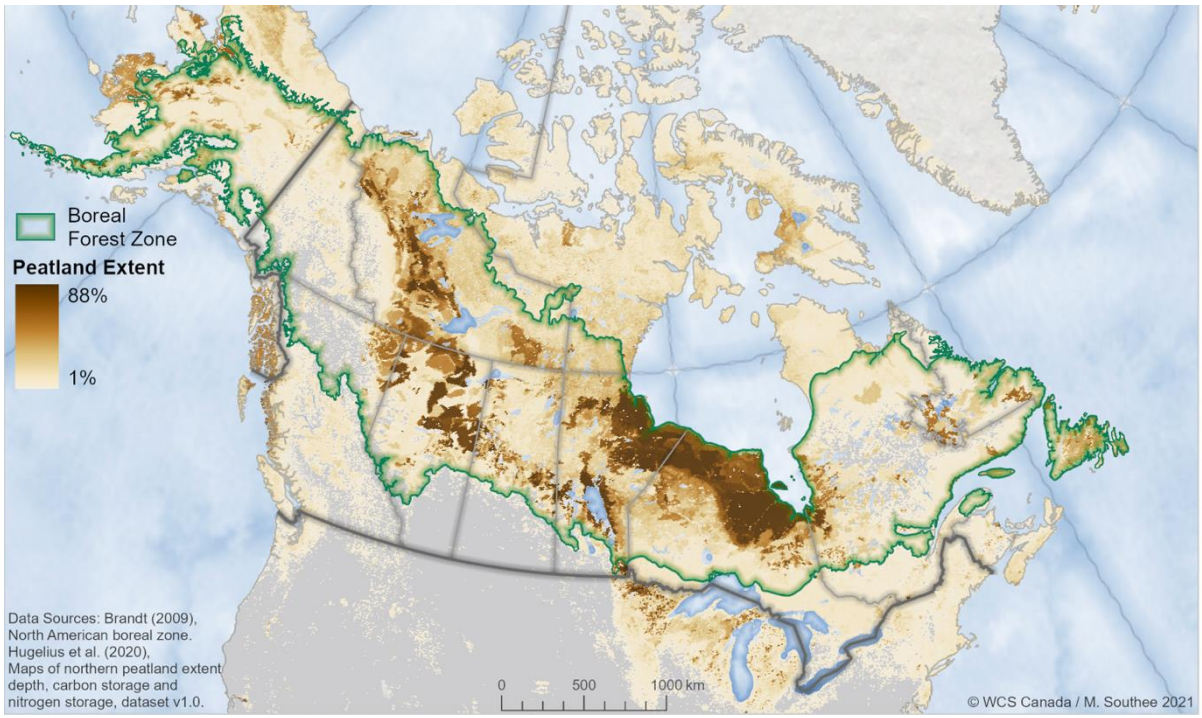
- Peatlands cover only 3% of the Earth's land surface but contain 20-30% of the world's total soil carbon; 25% of all peatlands are in Canada.
- Peatlands in Canada are a globally significant carbon sink; **they store an estimated 150 billion tonnes of carbon,** mostly in the boreal.
- Global models that evaluate emissions reduction pathways for 2050 assume these landscapes will continue to absorb and store carbon at their current extent and rates. However, industrial development, fires, permafrost thaw, and land use change can dramatically influence GHG storage and emissions from peatlands.
- Canada's *National Inventory* and *Nationally Determined Contributions* to the Paris Agreement **do not** include several critical emissions pathways from boreal landscapes.

This prevents a full understanding of carbon flux in the region, undermining the ability to plan, set policy, and effectively manage emissions.

- **Only an estimated 10% of boreal peatlands are formally protected in Canada**, meaning hundreds of thousands of square kilometres of these ecosystems are vulnerable to disturbance and development. By enabling development in a system where not all emissions are accounted for, Canada's climate targets could quickly become out of reach.
- To overcome these challenges Canada requires:
    - **Improved data collection and data availability** related to carbon stores and GHG fluxes, especially in the north and including all disturbances
    - **Carbon accounting practices that capture the full range of activities and impacts in the boreal** to include all development activities that influence carbon stores and sinks
    - **Increased disincentives for projects and activities that can directly and indirectly cause emissions from boreal peatlands**, as informed by more holistic impact assessments.
    - New incentives for industry, Indigenous communities, and governments to **protect and conserve carbon-rich landscapes.** Most attention and incentives are devoted to restoration activities, which while also important, are far costlier.
    - **Clear rules and regulations for carbon tenure** especially as it relates to Indigenous communities that wish to safeguard carbon storehouses.

Why is Peatland Protection Critical for the Climate?

Peatlands across Canada are one of the largest long-term terrestrial carbon sinks in the world, storing approximately 150 Gt C over one million square kilometers[i,ii]. As seen in the map below, most peatlands are concentrated in the ecologically intact areas of the boreal biome, with the majority spread across northern Québec, Ontario, Manitoba, and the Northwest Territories.



Peatlands in the Hudson Bay Lowlands store more carbon (~30 Gt C) than all of the 'managed' boreal forest in Canada (~28 Gt C)[iii].

A Crucial Long-Term Sink

Greenhouse gas (GHG) accounting in peatlands is critical for climate and land use planning. Northern peatlands have cooled the global climate for thousands of years by continuously and persistently removing CO_2 from the atmosphere and storing it in deep peat soils, where it has remained for close to 10,000 years. Degradation of this long-term carbon sink releases large quantities of stored carbon to the atmosphere and therefore has the potential to have a major impact on global climate. Peatland C losses from land use change, fires, drainage, and thawing permafrost – are effectively *irrecoverable*, since carbon in northern peatlands accumulates slowly and recovers on the order of decades and centuries, but not on the timescale of 2030 or 2050 climate targets[iv,v].

Peatland ecosystems are not only important for carbon storage. They provide numerous ecological functions – watershed regulation, critical wildlife habitat, and they support food security. Peatland landscapes also hold immense cultural value for Indigenous communities.

Emissions Risks

Northern peatlands in Canada store around five times more carbon per square metre than the Amazon rainforest.[vi] While this is efficient for carbon storage, degrading these northern landscapes is more consequential per unit area. Along with increased CO_2 emissions, disturbed peatlands can also produce higher levels of other potent GHGs such as methane (21x the global warming potential of $C0_2$), which is emitted when permafrost thaws or when peatlands are flooded, increasing the climate impact of disturbance. Mining and other industrial development can lead to further emissions. While unearthing peatlands directly causes C loss and increases CO_2 emissions, associated activities such as road construction and drainage also release GHGs, and in permafrost peatlands, can accelerate thaw and increase emissions.

Wildfires across northern Canada present a major added risk to the carbon stored in peatlands, including in permafrost peatlands where wildfires can increase thaw and release carbon locked in deeper soil layers[vii,viii]. Fire risk is growing thanks to both direct and indirect impacts on peatlands. Direct activities on the land such as drainage for infrastructure development (roads, mining) increases the vulnerability of non-permafrost peatlands to fire. Indirect effects of climate change include more extreme weather and a warmer and drier climate, which also increases vulnerability to more frequent and severe wildfires. Together this leads to an estimated *annual* loss of ~5 Mt C attributed to wildfires in western Canada[ix]. This annual carbon loss is equivalent to emissions from 278,000 cars over their lifespan.

What are the critical Policy Gaps?

Direct human-caused emissions that are not counted

Canada reports its Nationally Determined Contributions annually to meet UNFCCC guidelines, as part of global tracking for the Paris Agreement. Canada is obligated to report on emissions from "managed" lands. However, many direct human-caused emission-generating activities that take place in managed lands are not accounted for in carbon reporting. Within the agreement, **the only peatland emissions that are counted are horticultural peat extraction and flooding for hydroelectricity production**. In 2019, these two activities accounted for ~2.6 $MtCO_2$ eq of GHG emissions, representing less than one percent of human caused GHG emissions in Canada[x]. **Direct emissions from human activity on peatlands that are not counted include drainage and flooding, and other industrial activities such as forestry,**

seismic lines, and mining[xi]. Other direct activities that are not counted include soil carbon losses from peatlands (wetlands) in agricultural settings, as well as soil carbon emissions in deforested peatland landscapes. The carbon losses associated with removal of above ground biomass (mostly trees) are counted, but the soil carbon emissions that are more easily released from peatlands once trees are removed are not[xii].

Unmanaged landscapes, Indirect Losses, and Disasters

For accounting and reporting purposes, forests and peatlands are divided into "managed" and "unmanaged" categories to further segregate emissions that result from human activities. It is a useful distinction to recognize how management strategies influence emissions, but by not accounting for emissions from "unmanaged" lands, we are left with an incomplete and inaccurate picture of the role of peatlands emissions in global carbon budgets and for global climate[xiii,xiv]. Wildfires already lead to significant GHG emissions in boreal regions and have compounding effects as discussed above. Because such "natural" events may not be directly human caused, these emissions are not part of national or international reporting requirements, despite the tremendous climate impacts.

Lack of Peatland Protection

The 25% by 2025 and 30% by 2030 conservation targets point to the importance of intact natural land and seascapes in Canada; however when it comes to peatlands, policy discussion is more often focused on restoration than proactive conservation[xv]. Harris et al. (2021) estimate that **at least ~12,200 km^2 of peatland in Canada has already been lost to conversion for agricultural and other direct human disturbance**, which is likely a huge underestimate due to the paucity of records and research on the topic. The same study estimates that **only ~10% of Canadian peatlands are within protected areas**, leaving vast areas vulnerable to land use change from agriculture, mining, hydroelectricity, and oil and gas development[xvi]. Relative to other climate mitigation strategies, it is far less expensive to protect intact ecosystems than to resort to restoring them once they are degraded or lost, as has been the case throughout much of Europe. Undervaluing and uninvesting in peatland protection and restoration is a global phenomenon -- new economic analyses highlight the need to scale peatland investment now to yield the most benefits for people, climate, and biodiversity[xvii].

Accounting for Interacting and Cumulative Effects

The prevailing mechanism for development planning is project-level impact assessment. When calculations of potential carbon losses and GHG emissions from peatland conversion are included, they tend to be small. However, the **cumulative and interacting effects of individual developments on soil carbon, water quality, and local communities can be very large**. For example, the Ring of Fire, a proposed mining development in a 2127 sq km region of the Hudson Bay Lowlands, could lead to a loss of 130-250 MtC from peatlands[xviii], the equivalent of the emissions from 1.3 million cars over the course of their lifetime. Without a national GHG inventory that records and tracks peatland disturbance, and considers cumulative and collective effects of regional development, environmental impacts will continue to be severely underestimated and compounded once a remote region is opened to development activities.

A Further Challenge – Carbon Offsets and Peatlands

Carbon Offsets

Carbon offsets are frequently mentioned as an approach to direct funding and protection for nature-based climate solutions. However, there are three major challenges that limit the applicability and benefits of carbon offsets for boreal peatlands and carbon storage in general.

1) **Offsets and carbon sinks**. An essential premise of carbon offsets is "additionality". A project that is additional is one that can demonstrate new sequestration results from new funding. It is an important safeguard to prevent payments being made and credit being given for actions (and ultimately tonnes of CO_2 e) that would have otherwise taken place without subsidy. Additionality is much clearer with afforestation – the trees would not otherwise be planted. For soil carbon, offset protocols focus on management practices that increase soil carbon uptake. Existing carbon stores are already present and consequently not additional. As a result, carbon offsets cannot be generated for protecting carbon rich landscapes -- despite their tremendous importance for global climate -- unless they are deemed to be under imminent threat.

2) **Protecting valuable sinks first, not last**. Most of the funding flowing to nature-based carbon offsets are from regulated industries, where the purchase of offsets and credits support the achievement of internal GHG targets. The "mitigation hierarchy"[1] illustrates how organizations seeking to reduce emissions should prioritize operational changes. Critically, the first step must be avoidance; offsets are only to be applied as a last step to those emissions that are the hardest to mitigate. Climate-rich intact landscapes should be a priority for protection, making it risky to rely on the specific circumstances that offsets apply to motivate investment.

3) **When Offsets Enter the Planning Process.** Estimating emissions from new developments -- such as areas with critical mineral deposits -- is challenged by the fact that necessary details about a project are not available until planning is well advanced, at a point when options tend to be relatively baked in. This means that most projects will define offset needs as part of a project-based assessment, rather than examining a suite of options and their associated GHG impacts before selecting a site.

As new carbon offset protocols are developed by the federal government, attention should be given to addressing the unique circumstances associated with boreal peatlands. However, the application of offsets for peatlands is likely to still be limited. Because carbon storage is so critical, **there is a need for further incentives to protect peatlands for their climate, ecological, and cultural benefits, even if carbon offsets are not generated.**

[1] https://www.forest-trends.org/bbop/bbop-key-concepts/mitigation-hierarchy/

The Time to Act is Now – Opportunities for Action

The path to net zero emissions by 2050 assumes that marine and terrestrial carbon sinks, including peatlands, will continue to remove about half the CO_2 emitted annually from fossil fuel combustion and land-use change[xix]. Ensuring peatlands continue to serve this essential function, while maintaining their existing carbon stores, requires a fundamental shift in how boreal peatlands are assessed and managed in Canada. Steps that can be taken now include:

Investment in National Database for Carbon Storage and Fluxes

Full accounting of carbon fluxes in peatlands requires a national inventory of peatlands and associated disturbance. Expertise and tools are already present, including peatland carbon models in development, but require enhanced investment to extend the reach beyond "managed" ecosystems and to increase accuracy. An extensive database with consistent measures enhances the capacity to produce more accurate impact assessments, provide needed data to support strengthened national obligations and incentives to protect peatlands and other C sinks, and can allow for more accurate reporting and modelling to support evidence-based decision making at national and international scales.

Include all Relevant Carbon Fluxes in the National Inventory

The National Inventory's limited inclusion of peatlands severely hampers our ability to account for and develop strategies to minimize peatland emissions, as well as incentivize peatland protection and restoration. By mandating the tracking of all industrial activity, indirect, and non-human induced emissions, we can provide a better global picture of climate change. Even if not all emissions are deemed Canada's responsibility to mitigate, a full picture of carbon flux is necessary to inform carbon budgeting in Canada and globally.

Expand peatland inclusions as part of improving Nationally Determined Contributions to the UNFCCC

At the international level, while peatlands are a key focal area for the UNFCCC, Canada's unique circumstances -- large tracts of intact and 'unmanaged' peatlands -- are not well captured by the rules associated with NDCs. Canada's NDCs should recognize all categories of anthropogenic GHG emissions. Emissions resulting indirectly from anthropogenic GHGs (e.g., fire and permafrost thaw effects of escalating climate change) should be included in global calculations of mitigation needs, which would have only an indirect effect on expectations for NDCs.

Increase the scope of Impact Assessment and associated mitigation and enhancement measures

Development will continue in the boreal region, including in currently intact areas. At the project level, better carbon data and accounting, as well as more stringent mitigation, restoration, compensation and no net loss requirements can help project proponents and decision makers internalize the cost of emissions, and signal where the climate risk of development is too high. Data on both direct and indirect losses of land-based carbon in project assessments and reviews would provide the necessary basis for ecosystem-scale land use decision-making and effective regulation and enforcement to minimize and reverse those losses. Regional assessment processes, such as those included in the federal Impact Assessment Act (2019), can be applied to set a preferred direction and strategy for achieving sustainability in a region through proactive and scale-appropriate evaluation of risks. These are most appropriately applied where there is high interest for multiple development projects and where cumulative effects cannot be adequately addressed in piecemeal, proponent-driven project-level processes.

Incentivize and Prioritize Peatland Protection

Protecting intact ecosystems is more cost effective and delivers more climate benefit than restoration and other mitigation activities. New federal funding streams for natural climate solutions identify high carbon-storage ecosystems at risk of loss through conversion to other uses as one of three priority areas, but specific recognition of peatlands as a key carbon store and sink needs to be operationalized. Potential pathways to do so include:

- **Global Designation.** UNFCCC recognition of peatlands as a globally unique and critical carbon store can attract international engagement and funding support (e.g. Areas for action for COP26 commitments like the $100 billion climate finance delivery plan).

- **Meeting 2025 and 2030 Conservation Targets**. Protecting the boreal region's intact ecosystems can support both biodiversity and climate-related conservation objectives. Identify priority peatland ecosystems (as informed by data process highlighted above) for protection, with associated funding commitments.

- **Supporting Indigenous-led Conservation and Guardians Programs.** Numerous emerging Indigenous Protected and Conserved Areas, many of which have received financial support from the federal Nature Fund, are in the boreal peatlands of Canada and will require sustained support and commitment to move to fruition, with sustainable financing. Associated Indigenous Guardians programs can serve vital roles in monitoring changes and impacts over time.

- **Carbon Tenure.** Leadership and coordination is required to determine the ownership and management of carbon within landscapes including crown land, land with long standing resource rights, or other arrangements. Clarity on rights and regulations associated with 'carbon tenure' could create a path for Indigenous communities and indigenous-led conservation efforts to benefit financially from protecting high-value carbon sinks.

- **Voluntary Biodiversity Credits** are under development in the federal government and should consider design factors that will provide financial incentives to boreal communities to protect peatlands.

Develop a National Peatland Strategy

A pan-Canadian peatland strategy designed to address data gaps, improve accounting, and identify conservation and restoration priorities can bring cohesion and clarity to the range of stakeholders operating and living in the boreal region of Canada. An effective strategy would require participation from Indigenous Nations, multiple levels of government, resource industries, the impact assessment community, NGOs, and academia.

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