FINDING COMMON GROUND

SIX STEPS FOR TACKLING CLIMATE CHANGE AND BIODIVERSITY LOSS IN CANADA

CPAWS
CANADIAN PARKS AND WILDERNESS SOCIETY

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SUMMARY

Photo: Mario Beauregard Beaustock / Alamy

Climate change and biodiversity loss are among the most pressing challenges the world faces. Human activity, including industrial farming, logging, mining, hydro-electric development, and oil and gas exploration, have caused these twin ecological crises[1], which are closely interrelated. Climate change is also a significant threat to biodiversity. The Intergovernmental Panel on Climate Change (IPCC) estimates that a 1.5° C average temperature rise may put 20–30% of species at risk of extinction[2].

Canada has already experienced a 1.7° C increase in temperature since 1948—twice the global average. Several recent reports document alarming declines in biodiversity across the country[3]. Canadian governments at all levels have pledged both to reduce the greenhouse gas (GHG) emissions causing climate change and step up measures to protect biodiversity. However, efforts to date have fallen short, in part because policymakers persist in treating the two issues separately. As a result, Canada is missing a critical opportunity to meet its international climate commitments under the Paris Agreement and biodiversity commitments under the United Nations Convention on Biological Diversity (CBD).

About this Report: Making Nature Count in Climate Policy

Canada's vast forests, grasslands, oceans and wetlands are part of the climate change solution. These ecosystems support our everyday wellbeing and, by their existence, have already absorbed greenhouse gas (GHG) emissions and helped mitigate the impacts of climate change on Canadians. But they could do much more. By reducing our industrial footprint on our ecosystems, we could substantially reduce the GHG emissions and biodiversity impacts that result when natural landscapes are changed or degraded and increase their resilience to climate change. Figure 1 provides examples of GHG emissions from land use impacts in Canada.

Figure 1. Ecosystem Emissions in Canada: Too Big to Overlook

Reducing human-driven land use change in Canada's ecosystems, especially wetlands, offers a potential treasure trove of emission reductions with significant biodiversity benefits. For example:

Land use emissions from **converting forests to cropland** in 2015 equaled about 2,658 kilotonnes (kt) CO_2 equivalent (eq)[4], or the equivalent of **512,000 passenger cars being driven for a year**[5].

Since 1990, **Canada's managed forests have sequestered** 860,000 kilotonnes (kt) **less** CO_2 eq, or about 30,000 kt CO_2 eq a year on average, or the equivalent of **5.9 million passenger cars being driven**[6].

To date, at least 1900 km^2 of peatland have been affected by **oil and gas exploration** in Alberta, increasing annual methane emissions by 4.4-5.1 kt above undisturbed conditions and lasting for decades[7]. The annual emissions are equal to **driving around 30,000 passenger cars for a year**.

Oil sands mining and in situ production will disturb an estimated 500 km^2 and 2,400 km^2 of the boreal forest, respectively, between 2012 and 2030[8]. The impacts include up to 182 million tonnes of ecosystem GHG emissions over 18 years, or the equivalent to **driving up to 35 million cars for a year**.

Definition of Terms

Climate change mitigation actions:
Efforts to reduce or prevent GHG emissions or enhance GHG sinks.

Emission reduction actions:
Actions that limit/prevent GHG emissions or enhance removal of GHGs from the atmosphere compared to a set baseline and following accounting rules.

Nature-based climate solutions*:
Managing ecosystems such as forests and wetlands in ways that mitigate climate change and/or its impacts and maintain or increase biodiversity values.

Carbon sink:
A natural or artificial reservoir that absorbs and stores the atmosphere's carbon. Examples include coal, oil, natural gases, and methane hydrate. Biological sinks include peatlands, forests, soils and oceans.

GHG source:
Any natural process or human activity through which a GHG is released into the atmosphere.

Carbon sequestration:
The process of capturing and storing atmospheric carbon dioxide into a sink. This process can be geological or biological.

Ecosystem GHG emissions:
The release of GHGs when an activity disturbs carbon stored in biological sinks, such as soil or trees.

Natural infrastructure:
Ecosystems, such as wetlands, grasslands, and forests that provide multiple ecosystem service benefits that can decrease the need to build more GHG-intensive and costly built infrastructure to protect our communities from climate change impacts. Natural infrastructure can help communities be more resilient to climate change by reducing flood and drought risks, improving water quality, and improving food security. Natural infrastructure projects may also have GHG emission reduction benefits.

** Nature-based climate solutions are actions to manage ecosystems in a way that reduces climate change impacts and improves biodiversity. Nature-based climate solutions may mitigate climate impacts in multiple ways, including increasing human resilience to climate change. This paper, however, focuses narrowly on GHG emission reductions. It is also vital than any proposed solutions also consider Indigenous Peoples rights' and knowledge.*

Photo: Andre Benz / Unsplash

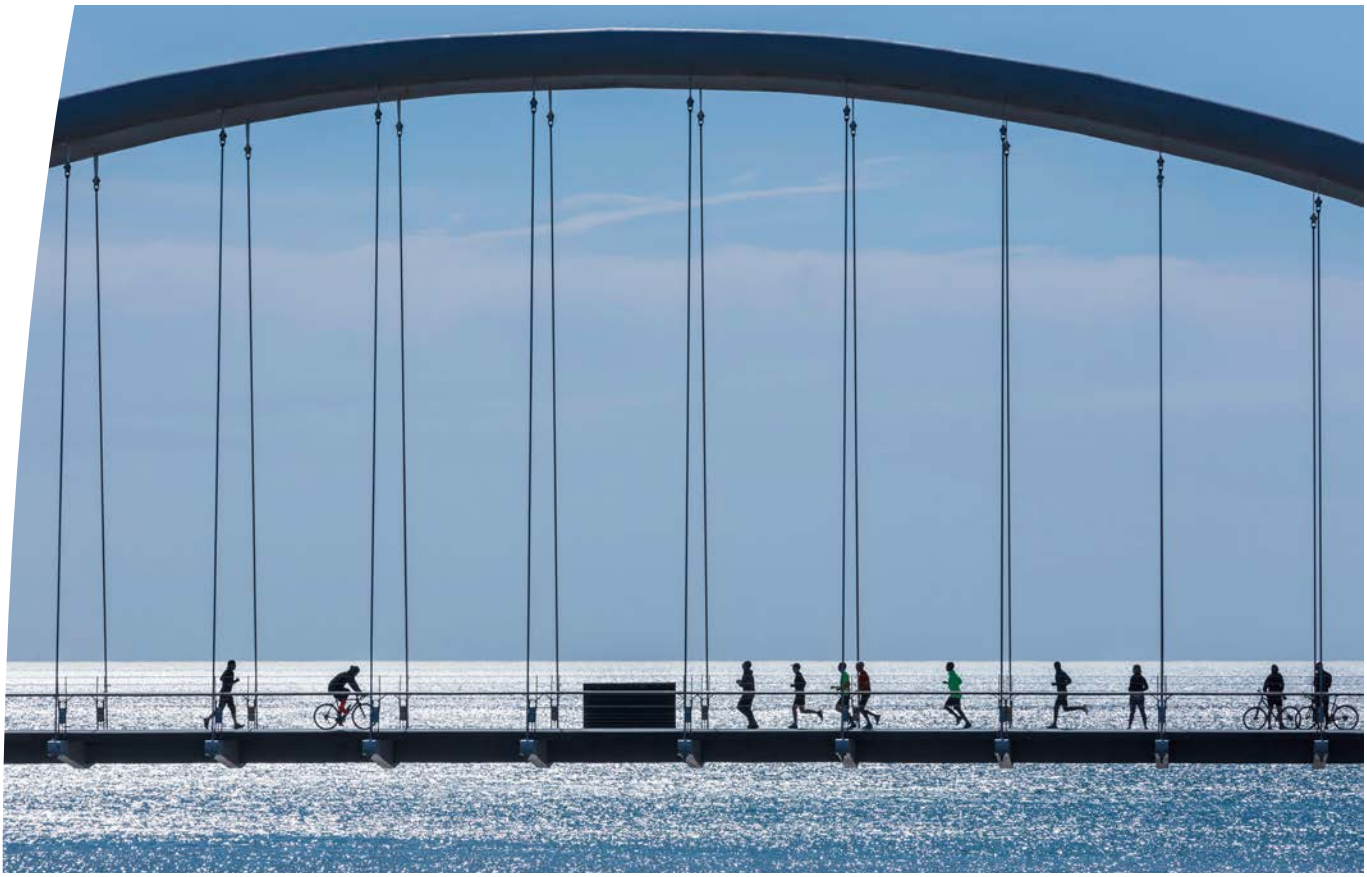


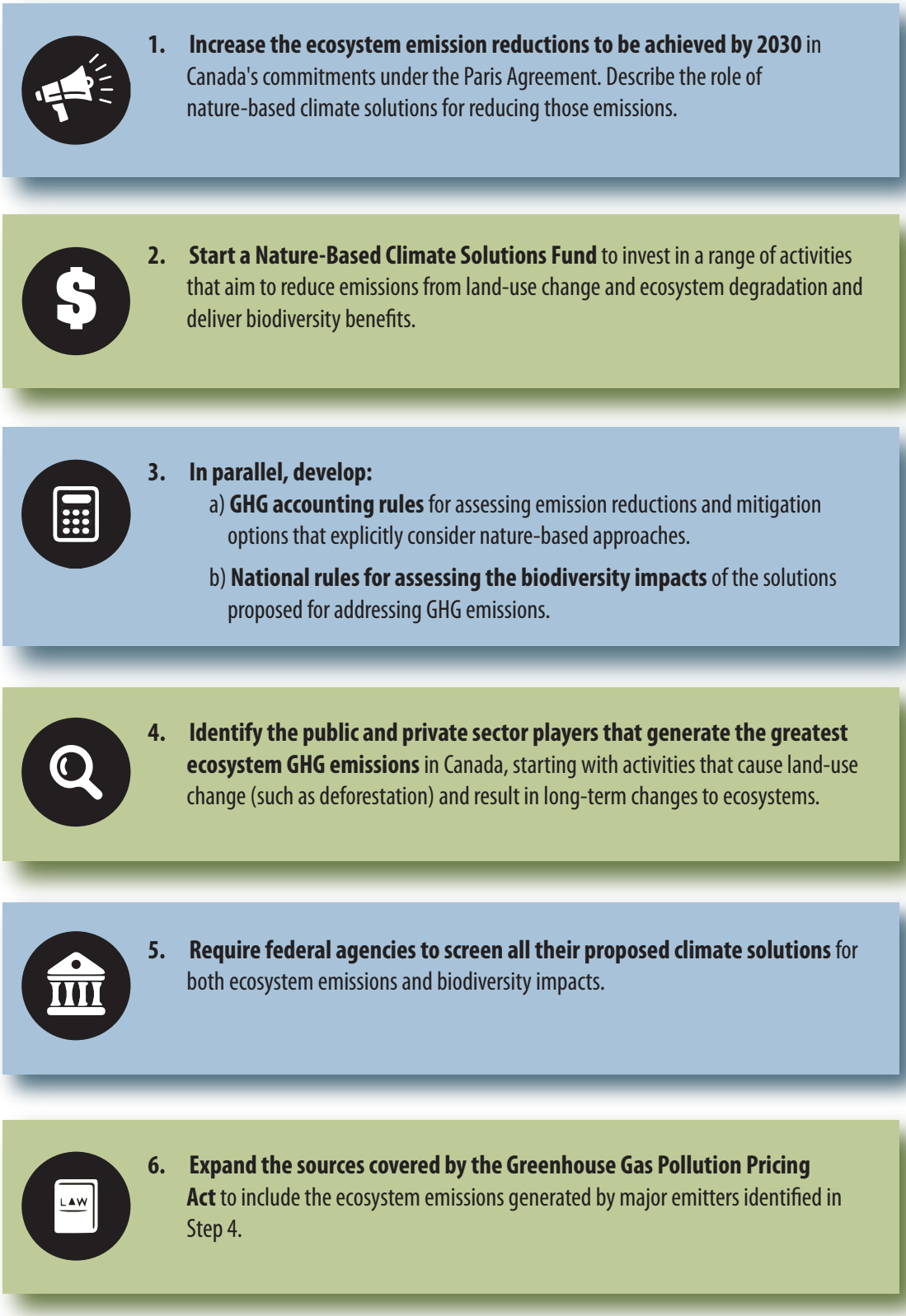
Photo: William Brooks / Alamy

In this brief, the Canadian Parks and Wilderness Society (CPAWS) provides a high-level roadmap for policymakers and scientists to harness ecosystem conservation to deliver win-win climate and biodiversity benefits, summarized in Figure 2. Specifically:

- **Section 1** highlights the imperative and opportunity for nature-based climate solutions—such as protecting and restoring ecosystems—to accelerate climate action in Canada.
- **Section 2** summarizes the policy and technical barriers to deploying nature-based climate solutions. These barriers include: a lack of policies that recognize, and hold responsible, the main players responsible for ecosystem emissions; the challenges policymakers encounter in considering nature-based solutions as mitigation options; and shortcomings in GHG accounting methodologies which may not fully capture the emission reduction potential of such solutions.
- **Section 3** proposes a six-step roadmap for policymakers (Figure 2) to build a bridge between conservation and climate policy in order to capture and promote nature-based emission reductions.

A more detailed analysis of challenges and solutions described in Sections 2 and 3 is provided in a complementary technical report to be published in late 2019.

Figure 2. Bridging Conservation and Mitigation: A Six-Step Roadmap for Federal Policymakers



1. NATURE-BASED CLIMATE SOLUTIONS IN CONTEXT

Photo: Annie Spratt / Unsplash

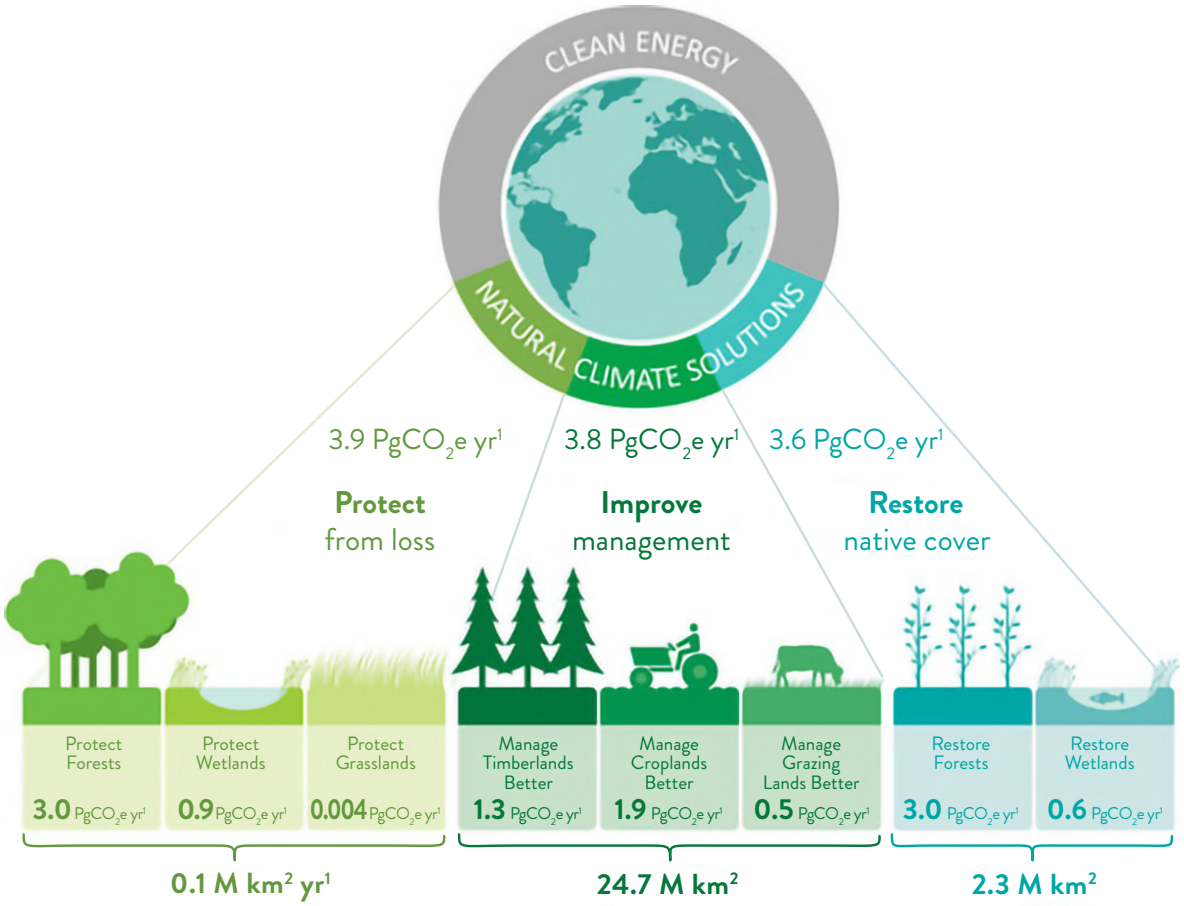
Global Imperative, Conservation Opportunity

In October 2018, the IPCC concluded that the world must take wide-ranging and aggressive action by 2030 in order to stabilize global warming well below 2°C and avoid its worst impacts[9]. Meeting this deadline will require rapid scaling up of measures both to reduce GHG emissions caused by human activity and to increase carbon sequestration and storage. At the same time, the natural world is facing an unprecedented risk of species extinction due to human activity, requiring urgent efforts by governments to scale up action to protect and restore ecosystems[10]. Scientists estimate that species are disappearing at up to 10,000 times the natural extinction rate[11].

In the face of these twin global challenges, many countries are turning to nature-based climate approaches to reduce GHG emissions and capture atmospheric carbon while slowing the loss and degradation of species-rich ecosystems. Conservation scientists claim that these types of solutions—protecting and better managing forests, wetlands and grasslands, peat restoration and improved crop management—could provide around 30% of near-term climate mitigation needs if adopted globally[12] (see Figure 3).

Around the world, governments are designing such interventions to deliver multiple benefits for people and the environment, including climate mitigation and adaptation, biodiversity conservation and sustainable natural resource management. To date, 40 governments have committed to protecting forests, slowing deforestation and/or restoring forestlands in national climate plans submitted under the Paris Agreement[13].

Figure 3. The Global Potential for Nature-Based Solutions



Source: Griscom et al, Wiley online library, March 2019; https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.14612

Where Canada Stands

To its credit, Canada was an early signatory to the Paris Agreement. Canadian governments at all levels have recognized the urgent need to address climate change and have focused on reducing industrial GHGs. As of April 2019, they had implemented measures that place 80% of fossil fuel emissions under either federal or provincial price caps. However, Canada is not currently on track to meet its Paris Agreement goals. The latest UN Emissions Gap Report warns that the country's GHG emissions trajectory is "well above" its pledged target of a 30% reduction below 2005 levels by 2030, while Canada's Auditors General

estimate that 2020 emissions will be "nearly 20 per cent above the target"[14]. This shortfall may be even worse than it appears. The GHG emissions assessed when setting the national target do not include the growing emissions from changes occurring to ecosystems due to climate change, such as increased fires occurring in unmanaged forests and melting permafrost[15]. As a result, unless Canada strengthens climate action, the UN-led global stock take in 2023[16] will likely find that efforts to meet national goals have been insufficient.

On the nature conservation side, Canada has a critical role in protecting global biodiversity, housing approximately 30% of the world's boreal forest, 20% of its freshwater resources, the world's longest coastline and one of the largest marine territories[17]. Over the past four years, Ottawa has made significant progress on conservation. Achievements include increasing marine protected areas from 1% to 13.82% of Canada's ocean and launching significant initiatives such as the Pathway to Target One on land. This initiative brings together federal, provincial, territorial and local governments, and Indigenous peoples tasked to implement an effective network of terrestrial protected areas. This process is backed by a "Nature Fund". However, there is still much work to be done. Based on mounting scientific evidence, the global conservation community is pressing for 30% of lands and oceans to be part of networks of protected areas by 2030 as a critical milestone towards reversing the biodiversity crisis.

Photo: Marc Bruxelle / Alamy

As Canada struggles to meet climate and conservation targets, the reality of biodiversity loss and climate change is hitting home. Rising temperatures and sea levels are bringing droughts, floods, record-breaking forest fires and higher storm surges to communities from British Columbia to Nova Scotia[18]. Canada's far north is experiencing even greater warming than the rest of Canada[19]––its annual average temperature is already 2° C higher since 1948––resulting in widespread melting of permafrost, with subsequent release of GHGs. Around the country, native species from butterflies to walruses face shrinking or shifting habitats. Species are facing significant declines caused by multiple pressures, led by habitat loss due to industrial footprint[20]. Given that Canada's average temperatures may soar a further 6.3 °C on current emissions trends, its people and ecosystems will face devastating impacts without greater national and global action[21].

Against this alarming backdrop, many Canadians recognize the need to broaden efforts to reduce both GHG emissions and biodiversity loss, and to prioritize actions where these two goals align. Time is of the essence, since intensifying climate impacts are increasing stress on the ecosystems that house biodiversity, store carbon and support people.

Photo: Mario Beauregard Beaustock / Alamy

Embracing Nature-Based Climate Solutions

In principle, federal, provincial and territorial governments have all endorsed ecosystem-based approaches as a strategy to combat the climate challenge.

Photo: Sergey Pesterev / Unsplash

Under the 2016 Pan-Canadian Framework on Clean Growth and Climate Change, the governments committed to "protecting and enhancing carbon sinks including in forests, wetlands and agricultural lands"[22]. In Canada's 2018 GHG emissions projections, the authors estimate that ecosystems should provide 24 Mt of emission reductions towards meeting the 2030 climate goal. While there are a few initiatives that combine mitigation and biodiversity objectives, such as British Columbia's Great Bear Rainforest Agreement[23], these remain few and far between, and there are no clear initiatives to generate emission reductions beyond the current trends.

Part of the challenge is that federal, provincial and territorial policymaking for climate and biodiversity continues to take place on twin tracks. To translate the Pan-Canadian framework into wider on-the-ground action, Canada needs legal frameworks that recognize emissions from ecosystem degradation and loss, and establish how conservation approaches and the associated climate mitigation benefits will be measured. Until this occurs, industrial activities that impact ecosystems and release GHGs will continue apace.

2. MAKING NATURE COUNT IN CLIMATE POLICY: KEY CHALLENGES

Photo: Ryan Stone / Unsplash

To unlock progress on nature-based solutions for climate mitigation, policymakers must overcome a series of interconnected policy and technical challenges, including gaps in science and GHG accounting methodologies. These challenges include: (1) lack of accountability for GHG emissions from exploiting forests, wetlands and other ecosystems; (2) recognizing that not all biodiversity conservation measures will deliver GHG emission reduction outcomes and vice versa; and (3) the need to address how, despite an uncertain future, ecosystems can still provide mitigation and biodiversity benefits. These challenges are explored briefly below.

Challenge 1: Lack of accountability for GHG emissions from exploiting forests, wetlands and other ecosystems deters nature-based climate policy solutions and creates perverse incentives.

The first, and biggest, stumbling block to more effectively harnessing Canada's natural systems to combat climate change is a lack of policies that hold to account those whose actions release GHG emissions by destroying or degrading ecosystems. These emitters include both private sector actors such as mining and oil and gas companies and public sector agencies responsible

Photo: Design Pics Inc / Alamy

for infrastructure such as roads, power lines and hydro development in wilderness areas. This failure means that these emissions will continue. In some cases, this lack of accountability could also create perverse incentives in climate policy. For example, if the Clean Fuel Standard did not capture emissions from land use changes when assessing the mitigation value of the alternative fuels—now included in the latest draft—the full impact on GHG emissions from the alternative fuels would be underestimated[24]. Documenting the ecosystem GHG footprint of players that have a significant impact on Canada's ecosystems, as has been done for fossil fuels, would support the development of appropriate new policies, regulations and initiatives to cap and reduce these emissions. This, in turn, would open the door to scaling up conservation-based climate mitigation solutions and reducing perverse incentives that may harm biodiversity and abet climate change.

Canada's national system for tracking GHG emissions (the National Inventory Report) already captures many of these ecosystem emissions (see Table 1).

Table 1. National Inventory of GHG emissions: Land Types and Tracked Activities

Types of land	Activities considered when quantifying the emission or sequestration effects
Forest land	Managed forests and lands converted to forests; includes forest growth and anthropogenic disturbances related to forest management but excludes fire and most insect disturbances
Cropland	Management practices on land in annual crops, summer fallow and perennial crops (forage, specialty crops, orchards); immediate and residual emissions from lands converted to cropland
Grassland	Managed agricultural grassland (including tundra)
Wetlands	Peatlands disturbed for peat extraction or land flooded from hydro reservoir development
Settlements	Forest and grassland converted to built-up land (settlements, transport infrastructure, oil & gas infrastructure, mining, etc.); urban tree growth
Harvested wood products	Use and disposal of harvested wood products manufactured from wood coming from forest harvest and forest conversion activities in Canada

Source: Reproduced from Canada–National Inventory Report 1990-2016–Part 3 Table A9- 1 (Environment and Climate Change Canada 2018, p.9)

The inventory provides a starting point for policymakers to assess where emission reductions are needed. In addition, policymakers should use the best available information to quantify emissions from other known carbon pools and human activities, making use of available estimation approaches, whether or not they are included in the national inventory. For example, emissions from mosses when harvesting forests[25] and from activities in saltmarshes and on peatlands other than peat extraction[26] represent emission sources that are not currently included in the national inventory. Where there is existing or potential industrial activity in areas currently considered "unmanaged forests", these should also be considered using the best available information.

Challenge 2: To achieve legitimate win-win benefits, policymakers must recognize that not all biodiversity conservation measures deliver GHG emission reduction outcomes and vice versa.

Assessing nature-based climate solutions alongside other mitigation options is not a simple task. Where conservation measures prevent, stop, or mitigate human activity that degrades an ecosystem and/or the diversity of species it houses, such measures often deliver a climate benefit, since human activity releases the carbon stored in a forest or wetland or reduces an ecosystem's ability to sequester carbon. Calculating whether conservation measures will reduce GHG emissions overall, and for how long, however, is more complicated, and dependent in part on the rules for how the emission reductions will be estimated.

For example, creating a protected area to preserve native grasslands from clearing for agriculture may mean a reduction in emissions if no additional lands are cleared, thereby reducing the total rate of land use change and the

Photo: Brandon Smith / Alamy

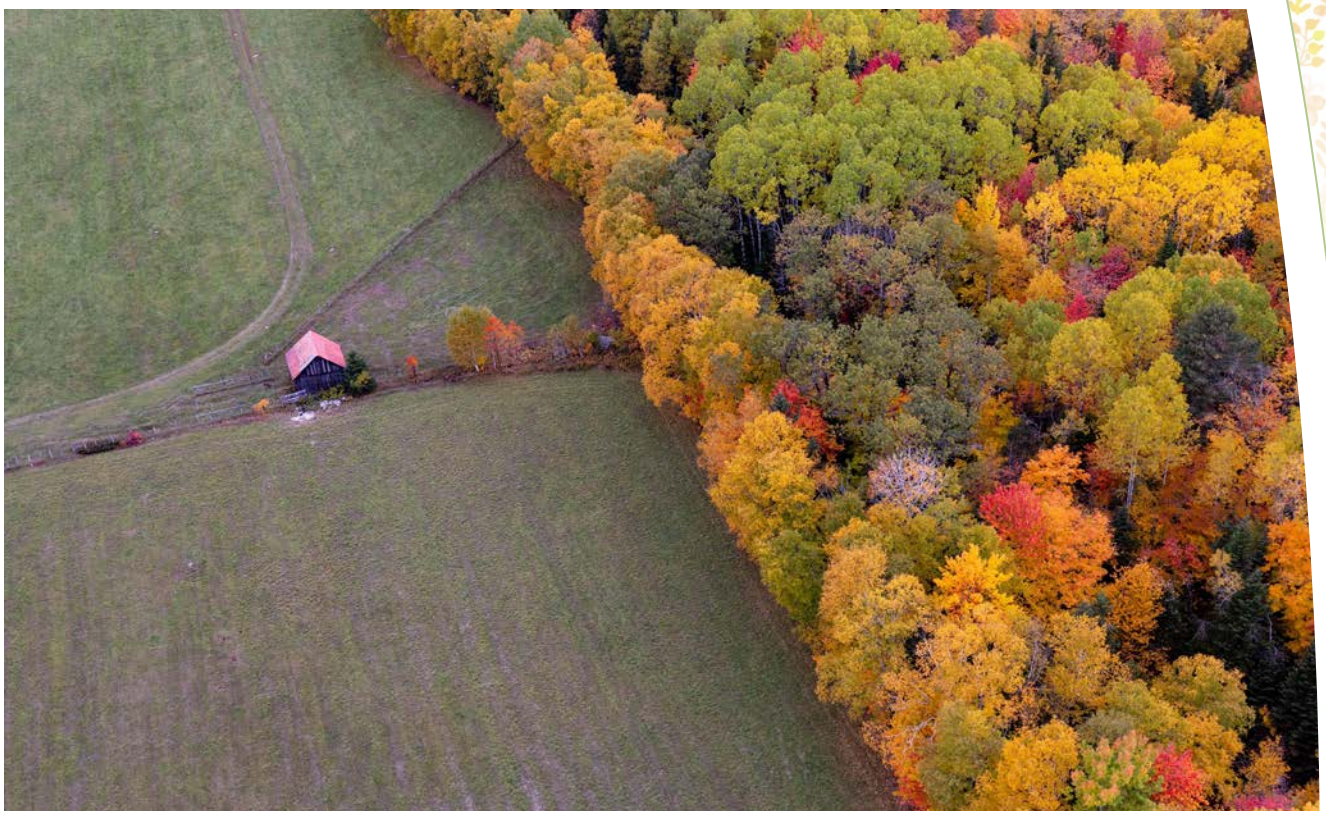


Photo: Hemis / Alamy

related emissions. However, if measures to address food needs are not addressed concurrently, one area of grassland may be protected only to see another cleared for food production, resulting in fewer or no GHG emission reductions. From a biodiversity perspective however, there may be specific value related to one place being protected instead of another. This risk of shifting activities is why some studies have found that, unless demand-side issues are addressed, reducing ecosystems emissions to or below historic levels, may be impossible[27].

Similarly, initiatives to reduce GHG emissions can end up having a negative impact on biodiversity, which in turn can generate emissions down the road. For example, some academics and forest product companies advocate using trees as fuel for heat or power instead of fossil fuels. While academics disagree about whether this approach would reduce GHG emissions[28], there would also be adverse biodiversity impacts. Since healthy ecosystems are critical to Canada's ability not only to mitigate but also to adapt to climate change, such initiatives could undermine our wider climate and biodiversity goals and commitments.

These complexities demonstrate that the metrics of success for a conservation activity and a GHG mitigation activity do not always perfectly align and may even drive incompatible outcomes. To address this paradox, CPAWS proposes that federal, provincial and territorial agencies screen climate solutions that affect ecosystems for biodiversity impacts and establish national rules to assess such biodiversity impacts, as well as explicitly consider nature-based climate solutions as a potential mitigation option when assessing how to reduce GHG emissions.

Challenge 3: The uncertain future of ecosystems undermines support for nature-based climate solutions.

Forests, wetlands and other ecosystems are not static. They change over time and are subject to natural disturbances such as pest outbreaks and wildfires, as well as human activities like logging and development, which can intensify future natural disturbances. Draining peatlands to replant trees, for example, may leave those ecosystems more vulnerable to fires. The impacts of climate change on Canada's ecosystems add another layer of uncertainty in predicting how our ecosystems will look in the future. For example, one hundred different models seeking to quantify the future of fires in the Canadian boreal forest came up with a wide range of predictions[29]. This variation presents a challenge for estimating the effectiveness of nature-based solutions for reducing GHG emissions over time and for assessing the extent to which efforts to store the carbon off the land base (e.g. in harvest wood products) would result in an emission reduction in the future.

Photo: Stefano Politi Markovina / Alamy

Often this uncertainty is used to argue against relying on ecosystems to sequester and store carbon, or to emphasize the limits to which they can be part of the solution. In some cases, it is also used to help justify increased impacts on the ecosystem in the name of climate mitigation. For example, the forest products industry and its supporters point to increased natural disturbances as a reason to focus on storing carbon in harvested wood products and substituting wood in construction industries for more energy-intensive products such as concrete.

Sceptics of nature-based climate solutions also use uncertainty in three other related arguments. The first is that Canadian ecosystems, especially forests, no longer sequester carbon at the same scale as before, or may even be a source of emissions due to increases in natural disturbances or the forest age. The second is that nature-based solutions may not be permanent since future natural disturbances, such as fires, may release GHGs and undo the benefits of curtailing human activity. The third is that forests and other ecosystems untouched by industrial activities have a slowing rate of sequestration due to their maturity. These arguments have led to calls to harvest mature forests, store the carbon in wood products, and leave younger forests to start again to sequester carbon.

These arguments and the related proposed solutions are misleading. Scientific

assessments have shown that even if wood substitution—taking into account numerous assumptions—does lead to emission reductions, it would often do so decades into the future. Inversely, taking measures to lessen forest disturbance and deforestation reduces emissions immediately, especially if supported with demand-side measures. Whether such emission reductions will later be impacted by fires or other disturbances is, of course, a risk. However, there are policy means to address these risks, such as limiting nature-based climate mitigation initiatives in ecosystems that are especially vulnerable to pests or fires.

Moreover, while it is important to know whether a forest, tundra or peatland is currently a GHG source or sink as a result of natural disturbances when considering the scale of action required, that does not change the responsibility to curtail the human activities that exacerbate GHG emissions and restrict the ecosystem's ability to recover and sequester carbon again in the future.

Critics of nature-based solutions also ignore the broader ecological impacts and long term GHG implications of their proposals. For example, uncertainty also surrounds how Canada's ecosystems will recover from industrial activities and display future resilience to climate change once impacted by human activities. Conservation scientists have found, for example, that some older forests are more resilient to climate change[30] and that there are potential resilience benefits for ecosystems evolving due to natural disturbances rather than industrial activities[31].

Photo: Cavan / Alamy

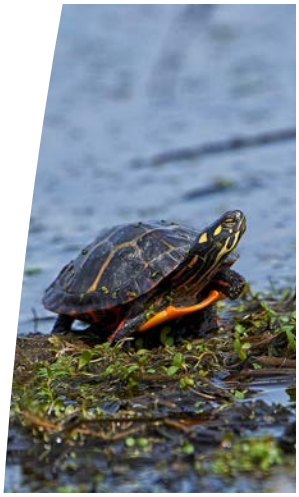


Photo: Peter Llewellyn (L) / Alamy

One additional, and undoubted complication in embarking on ecosystem-focused climate mitigation is that the emissions impacts often occur over lengthy time periods. When land is disturbed—compressed when used as a winter road, for example—the full GHG emissions impact may continue for decades if the ecosystem's ability to sequester carbon is impaired. On the flip side, when a tree is planted or a wetland restored, it takes many years before such actions reduce GHG emissions from the atmosphere.

The lesson for policymakers is that avoiding ecosystem emissions—for example, by reducing industrial activity—is a more immediate climate solution than ecosystem restoration. However, common accounting methodologies such as lifecycle GHG assessments often overlook the timing of potential emission reductions, which can lead to flawed decision making.

None of these challenges are arguments against nature-based climate solutions, but rather for improved GHG emissions and sequestration accounting. In the next chapter, we propose the development of ecosystem accounting rules with specific tools to address the uncertainties described above.

Photo: Bill Brooks / Alamy

3. BUILDING A BRIDGE BETWEEN CONSERVATION AND MITIGATION: A SIX-STEP ROADMAP

How can the federal government overcome these challenges? CPAWS is proposing six steps that would allow policymakers to implement actions that would support both climate and biodiversity goals. Many of these actions could be taken in parallel.

Photo: Design Pics Inc / Alamy

Step 1: Increase the ecosystem emission reductions to be achieved by 2030 in Canada's commitments under the Paris Agreement. Describe the role of nature-based climate solutions for reducing those emissions.

Canada states in its Nationally Determined Contribution (NDC) to the Paris Agreement that carbon sequestration may help the country meet its 30% by 2030 GHG emissions target. However, to date efforts have focused on reducing emissions generated by fossil fuel use. Increasing our goals for reducing ecosystem emission reductions by 2030 beyond what is listed in our current projections[32] would focus long overdue attention on activities that cause such emissions. Committing to nature-based climate solutions would indicate a willingness to find and advance activities where biodiversity and climate mitigation benefits intersect. The timing for announcing the intent to achieve these additional emission reductions is ideal, since all countries must submit enhanced NDCs to the UNFCCC in 2020.

In addition, clarifying Canada's approach to meet its climate commitments using nature-based solutions would:

- Demonstrate to the international community that Canada is taking specific actions to reduce land use, land-use change, and forestry emissions in addition to fossil fuel emission reductions. This will strengthen the country's standing and approach over the next dozen years.
- Send a signal to domestic stakeholders, including the sectors responsible for significant ecosystem emissions, that ecosystem emission reductions are a national priority.
- Flag that Canada will consider both biodiversity and climate change needs when assessing climate actions that impact forests, grasslands, wetlands and other ecosystems.

CPAWS proposes that the federal government establish and pursue actions to reduce ecosystem-based emissions reductions in parallel with those to reduce fossil fuel emissions. This separation would enable the development of policies that recognize the distinct role of ecosystems in the carbon cycle and increase the overall ambition of our climate actions. This approach will also bring opportunities to reduce overall emissions more quickly and in ways that support the national agenda to protect biodiversity.

Photo: Ashley Cooper pics / Alamy

Step 2: Start a Nature-Based Climate Solutions Fund to invest in a range of activities that aim to reduce emissions from land-use change and ecosystem degradation and deliver biodiversity benefits.

Implementing a federal fund that targets nature-based climate mitigation solutions would be a vital step in advancing policy to reduce ecosystem emissions and protect biodiversity. A one billion dollar fund would allow Canada to generate emissions reductions beyond those currently projected that would help us meet our 2030 target. Early estimates are that such a fund could generate an additional 20 Mt of ecosystem emission reductions (further information is available at www.cpaws.org). While the criteria for eligible projects should focus on GHG emissions reductions and biodiversity benefits, they would likely deliver additional outcomes, such as bolstering climate resilience for people and ecosystems.

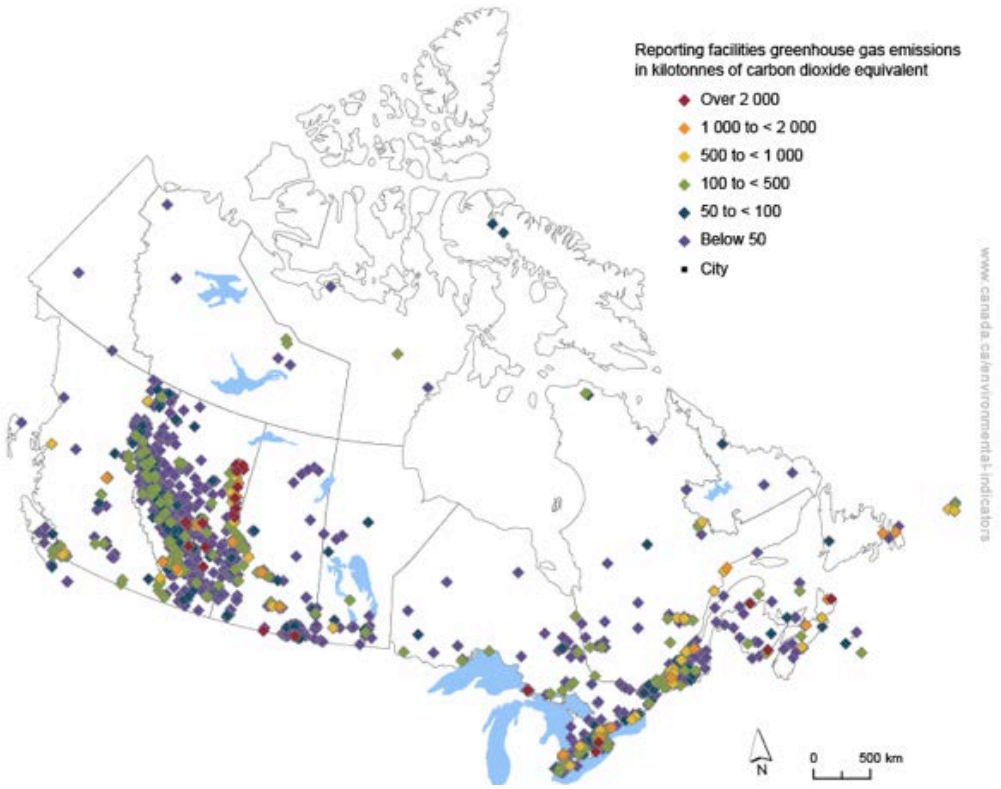
Photo: Andrew Coleman / Alamy

CPAWS proposes that Environment and Climate Change Canada manage and finance such a fund. Its mission should be to identify and support public and private sector players seeking to pilot a range of viable approaches for reducing emissions from land-use change and degradation. Sample schemes might include solutions to reduce or prevent road development in wetlands and peatlands, or adapt farm activities or food management practices to reduce agricultural spread into grasslands and forests. On a bigger scale, the fund could enable municipalities to work together to implement policies to protect and restore natural infrastructure in a watershed. To be effective and to provide meaningful results, these solutions should be implementable at a landscape scale and on a long-term basis. Consideration should also be given to projects seeking to reduce GHG emissions by addressing the demand for food, fuels, and other goods that drive land-use change.

The goal of the fund would be to demonstrate that such activities can effectively perform the services required both for addressing climate change impacts and protecting biodiversity. This, in turn, would build confidence in the value of such approaches compared to other types of GHG mitigation or adaptation options. In addition, these pilot projects would support development of assessment criteria needed to help such activities become more mainstream (see Step 3).

To generate momentum for nature-based climate action across Canada, the fund should be additional to existing finance options. It should therefore be designed so that it does not overlap with potential funding for ecosystem-related emissions reduction projects through the upcoming federal offset program.

Figure 4. Potential Model for Registry of Ecosystem GHGs Major Emitters: Greenhouse Gas Emissions from Large Facilities, Canada, 2017



Source: Environment and Climate Change Canada, Canadian Environmental Sustainability Indicators, GHG Emissions from Large Facilities.

Given its dual climate and biodiversity focus, the fund should not overlap overmuch with the more biodiversity-focused projects financed by the Nature Fund or large ($20 million minimum threshold) adaptation projects supported by the Disaster Mitigation and Adaptation Fund (DMAF), where GHG emissions reductions and biodiversity are not explicitly considered. Instead, the Nature-Based Climate Solutions Fund should provide opportunities to trial complex nature-based GHG mitigation projects that do not fit neatly into the criteria of other programs. Finances should also be channeled into scientific and policy research to support the development of innovative nature-based climate mitigation projects that could inform future approaches, regulations and policy.

Step 3: In parallel with implementing the fund, develop:

a) GHG accounting rules for assessing emission reductions and mitigation options that explicitly consider nature-based approaches.

As described in Section 2, assessing the mitigation value of actions that impact ecosystems can be challenging. Some methodologies may overlook and/or may be inadvertently biased against nature-based climate solutions, leading to an underestimation of their value. It is critical that Canada's federal agencies, led

Photo: Desmond Simon / Unsplash

by Environment and Climate Change Canada, continue to develop and apply improved tools and methodologies to address the specific accounting challenges presented by potential climate solutions that impact ecosystems. Solutions are available, but need to be thought through carefully and build on internationally recognized methodologies, as has been done for our national inventory.

Government officials and project developers could use these accounting requirements in many policy contexts and sectors, raising the level of comfort and certainty around both the biodiversity and emission reduction values of GHG mitigation actions under consideration. However, while improved accounting methods will facilitate better decision making, policymakers will still face trade-offs in deciding between different emissions reduction options.

Key topics that accounting rules for assessing GHG emissions in the context of nature-based solutions must address include:

i) Baselines. In deciding whether to adopt a potential nature-based solution, should activities only be recognized if they immediately reduce emissions? Or should conservation activities that will reduce emissions in the long-term also be counted? These questions will be important, for example, when considering if the creation of new protected areas will have an emissions reduction value.

ii) Accounting boundaries. These need to be set in ways that do not bias decision makers against nature-based solutions. Many current models encompass wide-ranging indirect effects of mitigation activities, which are based on numerous assumptions and lead to uncertainty about emissions reduction impacts. These models also tend to focus on the human changes resulting from a given action, such as the emission-generating activities simply shifting to another location, but do not consider the ecological impacts of activities on the ecosystem. As a result, both the positive impacts of nature-based solutions and the negative impacts of industrial solutions are often underestimated.

Photo: Sculpture Qode / Unsplash

iii) Permanence. As highlighted in Section 2, the changing nature of ecosystems, and the prospect of natural disturbances such as pest outbreaks and wildfires, present a challenge for estimating the long-term impacts of nature-based climate solutions. However, policymakers can take advantage of numerous risk-mitigation methods to address this concern. As a first step, all levels of government could set separate fossil fuel and ecosystem emissions reduction targets. Having a separate ecosystem emissions reduction target would ensure that the ecosystem emission reductions would be in addition to, and not a substitute for, fossil fuel emission reductions. At the project level, additional risk management approaches, such as creating buffer GHG emissions pools as an insurance strategy, could be added. Such approaches and safeguards will help persuade those focused on GHG emissions reduction values to take nature-based solutions and strategies seriously.

Photo: Adobe

iv) Timing. Since not all climate mitigation solutions deliver the same impact, it is essential that national requirements for assessing mitigation options favor those that maximize climate and biodiversity benefits. For example, reducing activities that fundamentally change a carbon-rich ecosystem delivers an immediate positive impact for climate and biodiversity. Restored wetlands, on the other hand, need time to become a carbon sink again. As a result, restoring wetlands will not deliver immediate mitigation impacts, but can have immediate benefits for biodiversity and mitigating climate impacts by reducing flooding.

v) Addressing uncertainty. Any model used to help assess the emission reduction potential of a given strategy or action must make best-guess assumptions about likely changes in human behavior and resulting effects on emissions. Models must also consider how ecosystems might change or react to management strategies over time, adding an additional layer of complication to the assessment. In considering any strategy that impacts ecosystems, modelers should therefore provide clear information to decision makers on how assumptions and uncertainty (such as the frequency of future fires) may affect findings and potentially change the selection of a mitigation strategy.

vi) Assessing issues related to demand. One of the main arguments against nature-based solutions is the finite nature of Canada's lands and the need to use these resources to produce essential goods, such as food and fuel. One common assumption is that demand for these goods will increase and that the key question facing policymakers is how to deliver an increasing amount of food, fuel and other necessities in the least GHG-intensive way possible. However, research has shown that, to reduce ecosystem GHG emissions to the extent needed to meet climate goals, countries must consider alternative strategies for addressing demands that impact land-use change or management, such as reducing food waste[33]. In order to implement nature-based solutions to reduce ecosystem GHG emissions at a large scale, it will be vital for policymakers and project managers to mitigate concerns related to such demands. While not strictly an accounting issue, failing to consider this issue risks leaving society unable to find adequate and lasting solutions to climate change mitigation and biodiversity loss.

Photo: Karen Burgess / Alamy

b) National rules for assessing the biodiversity impacts of the solutions proposed for addressing GHG emissions.

The above recommendations seek to build a bridge between conservation and climate mitigation through the lens of GHG accounting. How a mitigation activity affects biodiversity should be assessed separately, since not all conservation actions deliver the same biodiversity outcomes, and climate actions that affect ecosystems do not all produce the same biodiversity impacts. It is not in this report's remit to propose what such requirements should look like. Rather, CPAWS urges the federal government to develop such rules on the grounds that they would improve the biodiversity outcomes of all climate mitigation activities that impact land-use in Canada.

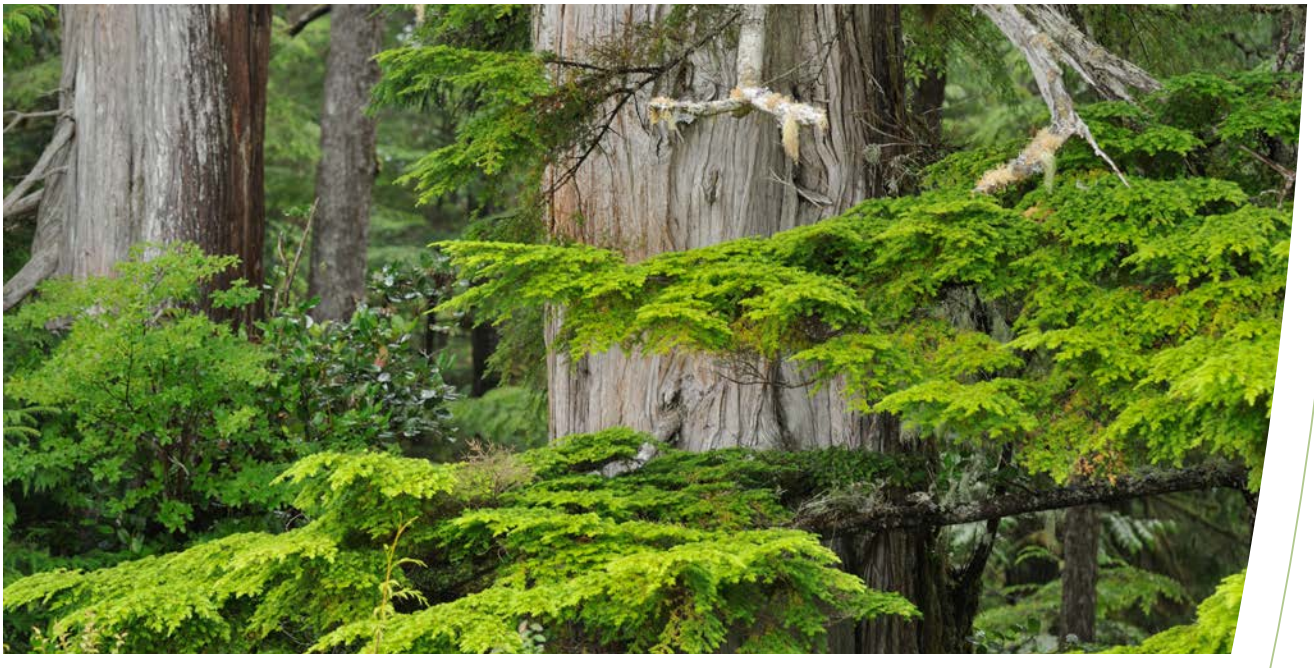


Photo: Tim Ennis / Alamy

Step 4: Identify the public and private sector players whose activities generate the greatest ecosystem GHG emissions in Canada, starting with activities that cause land-use change (such as deforestation) and result in long-term changes to ecosystems.

Once an ecosystem emission reduction target has been set, federal, provincial and territorial strategies for reaching them must center on reducing emissions from the most significant GHG sources. As shown in Table 1 (see page 13), Canada's national GHG inventory already identifies the land-use changes and activities generating ecosystem emissions, and in some cases which sectors are responsible at a national scale. These activities include forest management; conversion for settlements, transport, and oil, gas and mining infrastructure; peatland extraction; flooding for hydro reservoirs; and the use and disposal of harvested wood products.

However, the national inventory does not specify the actors responsible for these emissions around the country, nor their scale on a case-by-case basis. To help develop laws, regulations, and policies that will generate emission reductions, the federal government should categorize individual sources, such as companies or public sector agencies, by volume of ecosystem GHG emissions. Environment and Climate Change Canada's existing system for categorizing facilities producing significant fossil fuel emissions could serve as a model (see Figure 4). This information would support setting emission thresholds for land-use change and management for the actors identified, as well as setting an appropriate cap and price on terrestrial GHG emissions (see Step 6).

Photo: Christopher Kolaczan

When pinpointing high-level emitters and their activities, CPAWS recommends that governments separate GHG emissions from land-use change or conversion* (such as road construction) and land management (such as forest harvesting). This separation is useful because quantifying emission reductions from land management activities is a more complicated exercise, due to the time-scale challenges discussed earlier. Efforts to identify and address both categories of emissions could proceed in parallel, allowing time to develop appropriate and effective accounting approaches to address these challenges. In addition,

** Note, the definitions of deforestation and land-use change used in the national inventory may be too coarse for domestic policy implementation, and may not capture some of the finer-scale land-use changes occurring that may still result in significant GHG emissions, such as emissions from peatlands being disturbed by the creation of winter roads and seismic lines.*

Photo: Dominik Vanyi / Unsplash

assessments should identify whether the activities generating ecosystem GHGs are stand-alone or continuous. For example, a forestry company may harvest trees over decades, whereas a mining company might implement several infrastructure projects, but not on an annual basis. This identification is necessary because it impacts how high-level emitters are defined and helps determine which tools would be most effective for managing emissions.

Step 5: Require federal agencies to screen all their proposed climate solutions for both ecosystem emissions and biodiversity impacts.

As highlighted in Section 2, not all GHG mitigation activities that involve land-use change or land management benefit biodiversity. Sometimes, the metrics of success for a conservation activity and a GHG mitigation activity do not align well and may even drive incompatible outcomes. Given the imperative for Canada to meet both its climate and conservation commitments, safeguards are needed to ensure that policies, programs, and projects for reducing ecosystem emissions deliver win-win outcomes for nature and climate. To this end, CPAWS proposes that the federal government, together with relevant provincial and territorial counterparts and individual experts, including Indigenous Peoples with traditional knowledge, develop rules to assess such biodiversity impacts. In addition, we recommend that relevant federal agencies screen all climate solutions for biodiversity impacts. These steps are essential for maintaining the healthy ecosystems that are critical to Canada's wellbeing and prosperity, as well as for mitigating and adapting to climate change.

Step 6: Expand the sources covered by the Greenhouse Gas Pollution Pricing Act, during its upcoming review, to capture the ecosystem emissions generated by major emitters.

Once the government has pinpointed key sources of ecosystem emissions (Step 4), the next step is to work with relevant industries and public sector agencies to identify low-cost methods for reducing their carbon footprint. One approach would be for provinces and territories to implement their own laws

and regulations to mandate emission reductions. Corporate-level caps could be set for GHG emissions from land-use change and/or management and a cap-and-trade system could be established for emitters. Alternatively, provinces and territories could adapt existing laws and policies to generate systemic emission reductions. For example, provincial and territorial governments could develop regulations that would limit the development of new roads on peatlands, require alternative road and roadside practices by forestry companies, or stop any activities that would degrade wetlands. They could also require that any project with a significant ecosystem footprint be assessed, and its owners held responsible for any GHG emissions that would result. In addition, governments could require developers to assess whether projects that impact ecosystems would reduce ecosystem services downstream, such as water quality or flood control. If so, the developer could also be required to estimate the GHG emissions that would result from replacing these ecosystems services with built infrastructure and be held responsible for those emissions.

Photo: Mckenzie Toyne / Unsplash

All these policy tools would require clear accounting rules for assessing mitigation options that have an ecosystem GHG emissions impact and methods for quantifying the GHG emissions resulting from the loss of ecosystem services (see Step 3 above).

However, if provincial and territorial actions are insufficient to meet the goals of reducing ecosystem GHG emissions to achieve the Paris Agreement, the federal government could also expand the sources covered by the Greenhouse Gas Pollution Pricing Act. The legislation currently addresses GHG emissions from the largest fossil fuel emitters by requiring them to meet a benchmark for tonnes of GHG emissions per unit of output and putting a price on emissions beyond that benchmark. While this represented a major step forward in tackling national GHG emissions, there is more to do. CPAWS believes that expanding the Act to cap ecosystem GHG emissions caused by land-use change and significant ecosystem degradation and generated by high-level emitters would have an enormous impact. By fundamentally changing how land-use management decisions are made, this step would help to more systematically address Canada's climate change and biodiversity crises. The mandatory review of the Greenhouse Gas Pollution Pricing Act in 2022 presents ideal timing to implement this expansion, enabling policymakers to incorporate the lessons learned from the steps above in revising the Act's provisions.

CONCLUSION

Photo: Peter Mather Photography

While nature-based solutions are not the only approach to reducing Canada's carbon footprint, they offer a valuable and overdue strategy to help combat climate change while protecting our nation's unique biodiversity. Given the pressing climate change challenge, taking action to reduce GHG emissions from ecosystems, alongside existing and new steps to reduce fossil fuel emissions, would strengthen Canada's prospects for meeting its commitments under the Paris Agreement.

In particular, reducing land use change that destroys forests, grasslands and wetlands would bring direct, immediate and quantifiable positive impacts for biodiversity and addressing climate change. Restoring natural environments and their ecosystem functions, meanwhile, would deliver significant mid-to-long-term value for both climate change mitigation and adaptation. Making this happen will require conservation and climate focused actors in the public and private sectors, academia and civil society to work together to identify and prioritize solutions that deliver dual climate and biodiversity benefits.

To pursue and scale such solutions, policymakers must continue to generate improved and more comprehensive information on the ecosystem GHG emissions from industrial activities. This will enable them to set ecosystem targets that support and expand Canada's current climate goals, to factor such emissions into how they regulate land use and extractive industries, and to create incentives to reduce emissions.

Collaboration on common approaches for GHG accounting and biodiversity assessment rules will deliver frameworks to clearly assess where actions that impact our lands will bring mitigation and biodiversity benefits.

The roadmap laid out in this report provides the federal government with a way to bridge the climate-conservation gap. By bridging this gap, the federal government will be able to deliver effective, quantifiable nature-based climate mitigation solutions that the country urgently needs.

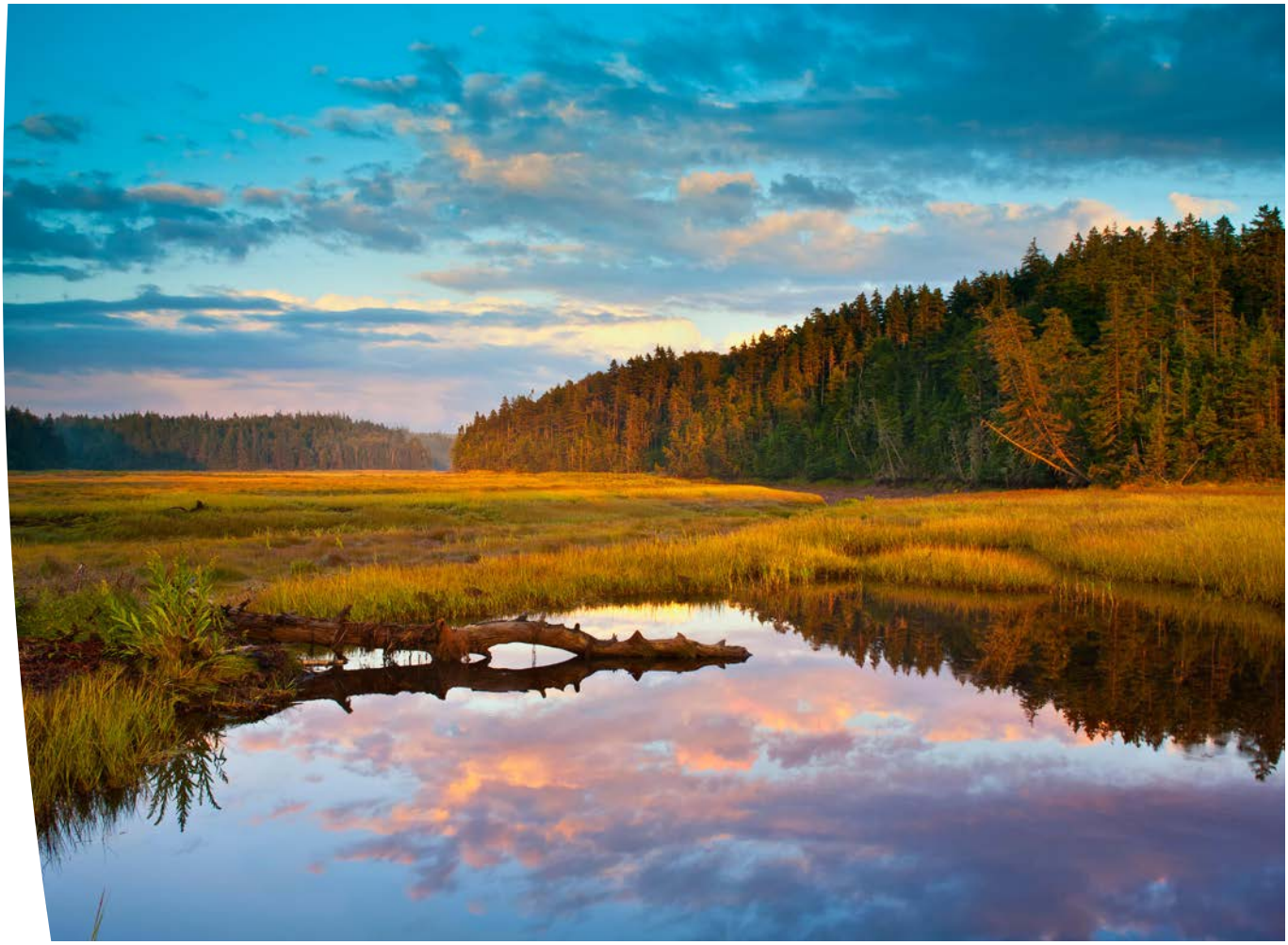


Photo: Design Pics Inc / Alamy

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