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Nature-based Solutions: Some of the Answers to Climate Change Come Naturally

Executive Summary

There is a broadly based consensus in Canada that includes governments, Indigenous peoples, environmental groups, industry and other stakeholders that nature-based solutions will play a crucial role as Canada works to meet its climate change objectives. The Energy Future Forum (EFF) believes the agreement presents a rare and unique opportunity – one that Canada must seize as part of its climate change suite of policies.

The International Union for the Conservation of Nature defines nature-based solutions as “actions to protect, sustainably use, manage and restore natural ecosystems.” It notes that, increasingly, governments and business recognize that nature-based solutions are “imperative for addressing the dual global crises of biodiversity loss and climate change.” The Government of Canada agrees, and identified nature-based solutions in its last two throne speeches as an important tool “to fight climate change.” In 2019, the global Nature Champions Summit in Montreal, which involved governments, Indigenous organizations, business and other stakeholders, concluded that nature-based solutions are “a critical tool for fighting climate change and adapting to its impact. A similar nature-based climate solutions summit in Ottawa earlier this year involving a cross-section of 450 participants from government, environmental organizations, business associations, Indigenous leaders and others reached the same conclusion.

Building on that consensus, the EFF held both a nature-based solutions workshop and roundtable, sought input from EFF members and incorporated their comments into this report, which has the support of the signatories.

Canada can be a global leader in unleashing the power of nature to achieve our goals. The breadth, diversity and sheer magnitude of our natural environment is unmatched around the globe. But to tap into nature’s enormous potential goes beyond government policy and programs. Nature-based solutions need to be integrated into business strategies, planning and activities, and become part of the corporate culture. It must

also be done in partnership with Indigenous peoples, who must help design and apply the policies and actions taken.

Crucial components to nature-based policy include forest management; agriculture, soil and grasslands management; oceans, coastlines and wetlands management; and market-based carbon credits. A 2020 Intergovernmental Panel on Climate Change Special Report on Climate Change and Land stated, “Land restoration and rehabilitation measures improve livelihood systems and provide both short-term positive economic returns and longer-term benefits in terms of climate change adaptation, mitigation, biodiversity and enhanced ecosystem functions.”

Forest management

Canada has the world’s largest boreal forest, covering 647 million hectares. The federal government has already committed to plant 2 billion trees over the next 10 years. With each tree having the potential to consume 6 tonnes of carbon, forests are a powerful tool in offsetting carbon emissions. But proper forest management must be done in a holistic and coordinated fashion to include Indigenous knowledge, avoid conversion of existing forests, and encourage the expansion of urban forests.



The Energy Future Forum recommends that the Government of Canada advance, broaden and accelerate its efforts to the use of forest management in its climate change portfolio. The commitment to plant 2 billion trees is a good first step. It should be expanded with additional investment in natural infrastructure to foster job creation as part of economic recovery, involving provinces, territories, Indigenous peoples and the private sector so that it becomes an all-of-society initiative.

Agriculture, soil and grasslands management

With 55.2 million hectares of Canadian land in the agriculture sector, the sustainable management of farmland, which includes increasing carbon sequestration, is key to effective nature-based solutions climate policy. But after years of increasing soil carbon, since 2006, agriculture lands have been losing soil carbon due to conversion to annual from perennial crops, more intense tillage practices and conversion of wetlands to agriculture. Grasslands also have carbon sequestration benefits and need to be protected from incursions by urban growth, agriculture or industry.



The Energy Future Forum recommends that the Government of Canada increase its financial commitment to the \$3 billion Natural Climate Solutions Fund announced in 2019 and the \$1.3 billion Canada Nature Fund, which supports protection of Canada's ecosystems, landscapes and biodiversity, including species at risk. The government has announced its intention to conserve 25 percent of Canada's land mass and 25 percent of its oceans by 2025. Those are objectives the Energy Future Forum fully supports.

Oceans, coastlines and wetlands management

Totalling 243,000 kilometres, Canada's marine coastlines are the world's largest. The associated wetlands and peatlands create biodiverse ecosystems that must be protected. In many cases Indigenous people live along the coastlines and must be partners in policies to protect and enhance those areas. Beyond adaptation, coastal ecosystems such as salt marshes and sea grasses play a crucial role in carbon storage, as do inland freshwater wetlands.



The Energy Future Forum recommends the expansion of policies to protect and restore both coastal and marine ecosystems. Canada has the world's largest coastlines which are an important tool to be used in efforts to address climate change. The Energy Future Forum fully supports the federal government efforts to work with provinces, Indigenous peoples, and territories along Canada's coastlines, to advance policies and initiatives that increase the capacity of nature to be an important ally in addressing climate change.

Carbon offsets

A tradeable carbon credit market is a critical tool in mobilizing investment in nature-based solutions. The creation of a carbon price in Canada, coupled with Article 6 in the Paris Agreement, which promotes holistic, integrated climate solutions as part of nationally determined solutions to reaching climate objectives, has set the stage for an offset credit market in Canada. The federal government is committed to such a market in 2016 and draft regulations are being developed.



The Energy Future Forum recommends the creation of incentives through an integrated and harmonized national regulatory system that delivers certainty and predictability for the market, offering compliance choices for regulated emitters and the voluntary market. It should reduce the cost of natural carbon removal to enable more participants to take climate action; support clean growth and stimulate innovation; provide clarity on credit verification standards and rules, as well as protocols for project developers to follow credits that are credible and verifiable; ensure alignment between jurisdictions; and, provide the foundation for Canada's engagement in an anticipated international offsets market.

Nature-based Solutions: A Unique Opportunity for Canada

Three keys to successfully addressing climate change are consensus, commitment and cooperation: the “three C’s.” When those are in alignment among crucial stakeholders, specific goals are within reach. As one suite of tools for Canada in addressing climate change, nature-based solutions offer a rare and arguably unique opportunity to move forward because the “three C’s” are positioned such that actual progress through collective action is possible.

The International Union for Conservation of Nature (IUCN) defines nature-based solutions as “actions to protect, sustainably use, manage and restore natural or modified ecosystems, which address societal challenges, effectively and adaptively, providing human well-being and biodiversity benefits.”¹ Simply put, nature-based solutions foster a healthy and biodiverse natural environment that sequesters carbon from the ambient air. In its paper, *Global Standard for nature-based solutions*, the IUCN notes that, increasingly, governments and business recognize that nature-based solutions are not only useful tools, but “imperative for addressing the dual global crises on biodiversity loss and climate change,”² a view that was also expressed in the 2015 Paris Agreement. It was a point underscored in June 2020 by Organization for Economic Co-operation and Development Secretary-General Angel Gurría, who said, “We need to promote nature-based solutions as part of national and international policy frameworks. This includes placing them front and centre in countries’ climate and biodiversity strategies, and in the post-2020 global biodiversity framework.”³

As a tool in addressing climate change and reaching Canada’s national goal of a 30 percent reduction in greenhouse gas (GHG) emissions by 2030, and a net-zero reality by 2050, nature offers a particularly compelling opportunity. Quite simply, Canada has more nature than most nations. On the negative end of the climate impact spectrum, vast quantities of Arctic ice in Canada are being exposed and lost. On the positive end, our geographic bounty provides a special opportunity through careful stewardship and management of

our abundant land mass – forests, farmland, grasslands, peatlands, coastlines, wetlands etc. As an outsized nation, and using the experience and knowledge of provinces and Indigenous peoples, Canada can make an outsized contribution to our nationally determined carbon goals, and to biodiversity and the good of the global commons.

Canada is a major producer, exporter and consumer of energy and has a significant GHG emissions gap to close if it is to meet its Paris commitments. To achieve our goals, we must use all the tools at our disposal. Nature-based solutions are part of the solution set, complementing but not minimizing the need to aggressively reduce GHG emissions. Canada has the scientific knowledge and capacity for innovation to leverage and enhance natural solutions that form a well-designed and holistic strategy and action plan.

Clearly, the Government of Canada agrees. In its December 2019 speech from the throne, the government made clear its intention to use nature-based solutions as a means to meet the nation’s climate goals. It spoke of how it intended to “preserve Canada’s natural legacy” and to “use nature-based solutions to fight climate change.”⁴ Underscoring that commitment to nature-based solutions were the mandate letters of both the Ministers of Environment and Climate Change and Natural Resources Canada. The two ministers were instructed to work together “to operationalize the plan to plant 2 billion incremental trees over the next 10 years, as part of a broader commitment to nature-based climate solutions that also encompasses wetlands and urban forests.”⁵ The commitment was reiterated in the September 2020 throne speech that pledged the government would be “using nature-based solutions to fight climate change.”⁶

But, while there is general acceptance of the idea that nature mitigates carbon emissions, there remains a lack of coordination between regulators and levels of government on the alignment and details of implementation.

The Energy Future Forum believes that Canada needs to achieve or exceed its climate change emissions reductions in the most efficient manner possible. There are some who decry nature-based solutions as somehow letting the fossil fuel industry off the hook. But they do not, and this viewpoint cannot be used as an excuse to avoid GHG reductions. The point of the Paris Agreement is to reduce emissions on the way to net zero, and for nations to determine their own paths based on their own circumstances. For Canada, the principle must be to do as much good as necessary for a safe environmental future, while doing as little harm as possible to our economy and unity.

This paper is focused on compliance protocols by governments. It also recognizes that, to be effective, policy must be shaped in a manner that can integrate with both a voluntary market and development of an international offset market.

There is no doubt that Canada needs to act. The Energy Future Forum recently published a paper on carbon capture utilization and storage that argued it is one component of many. The same is true of nature-based solutions. In both cases, Canada can be a global leader. We can marshal nature for the public good. Given the

emergence of consensus, commitment and cooperation around nature-based solutions in Canada, the window of opportunity is open. To seize the moment, the Energy Future Forum held an experts' nature-based solutions workshop and a subsequent roundtable to refine and focus the discussion leading to this paper.

So what about the three C's?

Consensus

The breadth of agreement is impressive. From environmental groups, to energy companies, to Indigenous peoples, there is a consensus that nature-based solutions form an integral part of Canada meeting its climate change objectives.

The Task Force for a Resilient Recovery, a diverse group providing advice on how governments can build a resilient economic recovery, identifies nature-based solutions as a key policy ingredient in Canada reaching its climate change objectives. In its final report, released in September 2020, the Task Force said that nature "is one of the most cost-effective ways to fight climate change" and called for expanded federal investments in nature-based solutions as part of \$55.4 billion in green recovery investments.⁷ Similarly, the Smart Prosperity Institute says nature-based solutions can "address 30 percent of the global GHG reduction" set out in the Paris Agreement.⁸ The International Institute for Environment and Development says nature-based solutions "are indispensable for both climate change mitigation and adaptation."⁹

The scope of the consensus was on display at a 2019 global Nature Champions Summit in Montreal when governments, Indigenous organizations, business, foundations and non-governmental organizations came together to explore the power of nature in dealing with climate change. The summit concluded that nature-based solutions are "a critical tool for fighting climate change and adapting to its impact."¹⁰ The same opinion was evident again this year at the Nature-Based Climate Solutions Summit in Ottawa when 450 participants gathered, spanning environmental organizations, industry associations, Indigenous leaders, labour representatives, and federal, provincial and municipal governments. The depth of the consensus includes major oil producers, with Canadian Natural Resources and Shell among those that have committed to a net-zero GHG emission future by 2050. Outside of the energy sector, Maple Leaf Foods has also committed to net-zero. In each case, one key part of reaching our climate goals involves investing in nature-based solutions initiatives.¹¹ Environmental groups such as Climate Action Network, the World Wildlife Fund for Nature and the David Suzuki Foundation are also pursuing nature-based solutions as part of a portfolio of actions that will bring down GHG emissions and enhance biodiversity.

The International Emissions Trading Association, which represents 130 companies globally and several major Canadian corporations, believes a pan-Canadian carbon market will unlock the private investment necessary to fund natural climate solutions. It forms a marriage of smart business practice with immovable environmental

goals. As with carbon capture, utilization and storage, what's still needed is stable policy frameworks and a unified national approach.

Commitment

The imperative, both environmentally and economically, to address climate change is now widely understood. Beyond the commitment of governments, both federal and provincial in Canada, industry recognizes the need and has the will to act. The major energy companies in Canada all have strategies in place to reduce their GHG emissions. For example, Suncor CEO Mark Little calls climate change “one of the biggest challenges of our time” and that it remains “a critical focus” as Suncor works to meet a low-carbon future.¹² The Canadian Association of Petroleum Producers says climate change “requires actions by individuals, governments, organizations and industry.”¹³ For its part, the Canadian Chamber of Commerce “is committed to supporting members to take action on climate change.” It goes on to say “businesses will have to start thinking about carbon costs the same way they think about labour, energy or the other costs of doing business. Managing this new cost line well will lead to a competitive advantage. Managing it poorly can hurt the bottom line and leave opportunities on the table.”¹⁴ The Business Council of Canada, which represents 150 of the nation's largest corporations, in 2007 began calling for a carbon price as part of climate policy that includes emissions trading.¹⁵

Cooperation

The scale of the climate challenge for Canada is such that if substantial and sustainable progress is going to be made it requires cooperation. This is not an issue for government alone to address. Canadians, Indigenous communities and business value nature and recognize its benefits in addressing climate change. It requires business, households and individuals to work in common cause. What's required is a systems-wide approach, where government policy, business strategy and practices, Indigenous communities and individual behaviours all become part of the solution. In each of those cases, nature forms part of the answer.

The key point is that, with respect to fashioning effective public policy, it is difficult to imagine a more supportive public reality. With the foundation of consensus, commitment and cooperation in place among governments, business, Indigenous peoples, environmental organizations and other stakeholders to establish a national strategy, the challenge is to identify the policies and obligations that will spur action from all stakeholders.

But there is also reason for caution. While there is significant support for nature-based solutions at the conceptual level, there still is not a great deal of practical experience. As a 2019 Oxford University study noted, “the potential of nature-based solutions to provide the intended benefits has not been rigorously assessed.” The study goes on to state that “it is essential that enthusiasm for nature-based climate change mitigation does not curtail or distract from the urgent need to rapidly decarbonize our economy, including through radical

systemic change.” Beyond measuring the effectiveness of nature-based solutions, the Oxford paper also lists mobilizing investment and overcoming governance challenges as other obstacles that need to be addressed.¹⁶

Role of Indigenous peoples

Indigenous peoples in Canada have long been stewards and defenders of the land, air and water, gaining extensive knowledge and experience working with nature over millennia. If nature-based solutions are going to be effective against climate change, Indigenous peoples need to be equal partners in the design and application of the proposed policies and actions. Many high carbon density forests and peatlands are found within the traditional territories of Indigenous nations, illustrating the need to uphold Indigenous rights to lands and resources in addition to respecting Indigenous governance and knowledge.¹⁷ Indigenous peoples need to be involved as nature-based solutions measures related to forests, protected areas and other natural environments could negatively affect their rights and the exercise of those rights. If not done properly, measures can lead to the displacement of Indigenous peoples, and harm their livelihoods, ways of life and customs. As such, nature-based strategies and implementation must be designed and implemented with the participation and engagement of Indigenous peoples to ensure they are partners in the economic opportunities that nature-based solutions can present. There are vast opportunities to develop, transform and manage protected and conserved areas through Indigenous-led conservation and management.

An example is the First Nations Climate Initiative (FNCI). Determined to make things happen, and acting on their own authority, a group of First Nations in British Columbia has launched a nature-based solutions project as part of their comprehensive climate change mitigation policy implementation efforts. The project aims to restore priority habitats for First Nations, to absorb GHGs, expand the capacity to exercise Aboriginal and treaty rights and title, and create economic opportunity across a target area of one million hectares of land and aquatic ecosystems prioritized by the Indigenous groups across northern B.C. Also applying Indigenous knowledge to nature-based solutions is Coldstream Nature-Based Solutions, a B.C.-based Indigenous-owned company that “assists communities in the application of robust science, innovation, and technology, combined with traditional local knowledge to monitor, understand, protect, and restore their environment.”¹⁸ The recent surge in Indigenous-led conservation and management can provide considerable insights into the development and implementation of nature-based solutions policies and measures. Governments need to consider nature-based solutions as part of Canada’s commitment to reconciliation by recognizing and upholding the rights of Indigenous peoples, embracing Indigenous knowledge and experience to inform the way forward, and guide the use of nature to help reach our collective climate goals.

Canada as a global leader

Canada has the necessary ingredients to be a global leader in using nature-based solutions as a crucial strategy in dealing with climate change. There are two primary reasons why:

1. As part of its Paris commitments, Canada must take advantage of the cost-effective, largescale opportunity presented by nature-based solutions if it is to meet its targets.
2. The diversity, breadth and subsequent potential of Canada's natural environment to mitigate and reduce GHG emissions, while joining with Indigenous communities to protect and enhance biodiversity, creates employment and economic opportunity.

Both factors are deeply interrelated and demonstrate compelling economic and environmental reasons why nature-based solutions need to be deployed as part of Canada's climate change strategy. They also reflect that nature-based solutions reach far beyond government policy and programs. It's about much more than government planting trees. To fully marshal nature's potential requires that the private sector integrate nature-based solutions into its business strategies, planning and activities. It needs to become part of the corporate culture. But it also has to make sense financially, which is why a carbon price is integral to mobilizing public and private stakeholders.

Science and innovation

Another key for Canada is its capacity for the application of scientific innovation to advance nature-based solutions. An "invention catalyst", which allows for an invention to be applied in reimagined ways, can have a profound effect on the scope and capacity of reforestation. For example, the use of drone technology can be a game-changer. As Tom Chi, an environmental entrepreneur and former head of product experience at Google X explained at a nature-based solutions workshop held by the Energy Future Forum, a single drone can plant seeds for 120 trees per minute, each with proper nutrients included in the soil, at a tenth of the current cost. To put that in context, six drones can plant 1 million trees in five hours.

Another illustration is the use of genomics and engineering biology to create bio-products that replace those with harmful environmental effects. As the IUCN states, nature-based solutions "can be implemented alone or in an integrated manner with other solutions to societal challenges (e.g. technological and engineering solutions)."¹⁹ In effect, as Jordan Thompson of Genome Ontario explained at the nature-based solutions workshop, it is about using the DNA of living cells as a "platform to make any material we want." An example is common materials such as nylon, which is petroleum-based and, through genomics, can be made from sustainable sources, such as sugar. As well, by using engineered organisms as a manufacturing platform, enzymes can be used to degrade petroleum-derived plastics and create a biological recycling product. Food waste can even be used to produce novel materials. As well, a growing clean-tech sector in Canada is helping to find ways nature can be used in addressing the challenge of climate change. With the support of Sustainable Development Technology Canada, which funds the development and demonstration of new environmental technologies and assists in commercialization, new clean technologies are being integrated across the economy.

Nature-based solutions provide one among a number of tools that forge a pathway to a net-zero future. The potential of using nature to meet climate change and biodiversity objectives was identified early in the Energy Future Forum process by its members.

The following are critical policy components that should be included in a nature-based policy framework. The Energy Future Forum urges the federal government to embrace each as part of its plan to address climate change.

Land management

With a geography that includes among the world's largest boreal forest of 647 million hectares, as well as vast agriculture land and peatlands, the importance for Canada of land management to retain and expand biodiversity as part of addressing climate change is obvious. A co-benefit resulting from the proper stewardship of land is protecting species at risk. In global terms, The Nature Conservancy says in a study published in the Proceedings of the National Academy of Sciences, that more than "11.3 billion tonnes of GHGs per year could be avoided or offset by natural climate solutions including planting more trees, reforesting degraded forests, engaging in responsible forest management, and improving cropland and peatland management."²⁰

In the 2020 Special Report on Climate Change and Land, the Intergovernmental Panel on Climate Change studied both the positive and negative roles that land plays with respect to climate mitigation – particularly forests, agriculture and grasslands – as both a source and a sink of GHG emissions. Thus, how land is managed is integral to a portfolio of nature-based solutions and pivotal to maximizing its GHG mitigation potential.

"Investments in land restoration and in drylands can result in global benefits and have benefit-cost ratios of between three and six in terms of the estimated economic value of restored ecosystem services," the report stated. "Land restoration and rehabilitation measures improve livelihood systems and provide both short-term positive economic returns and longer-term benefits in terms of climate change adaptation and mitigation, biodiversity and enhanced ecosystem functions and services ... Land restoration and rehabilitation measures improve livelihood systems and provide both short-term positive economic returns and longer-term benefits in terms of climate change."²¹ It is a view reflected in the federal government's December 2019 Throne Speech, which said it would "act to preserve Canada's legacy" by protecting 25 percent of Canada's land by 2025.²² The use of nature-based solutions can play a crucial role in protecting intact ecosystems that store carbon.

Forest management

Recognizing the positive GHG mitigation of forests, the Government of Canada has committed to plant 2 billion trees over 10 years. Beyond expanding the capacity of forests to serve as a major source of carbon storage, the commitment includes a broader nature-based solutions commitment to wetlands, grasslands and urban forests. While each tree has the potential to consume 6 tonnes of carbon, forests also emit carbon as they decay, burn or are harvested for various types of wood products. In fact, during the past 16 years, Canada's forests have

emitted more carbon than they have consumed due to forest fires, insect infestations and harvesting for commercial purposes.

Canada does a relatively good job of managing its forests, but there are opportunities to enhance efforts and provide economic opportunities that come with managing a forest for timber as well as carbon reductions. By protecting some areas in partnership with Indigenous communities, improved forest management techniques such as reduced impact logging, or planting trees and linking the markets created for these resulting carbon reductions, the government can enable private investment in forest management. Nature4Climate estimates that 88 MT CO₂e/yr of cost effective reductions could come from these activities alone in Canada.²³

But proper forest management goes beyond simply planting trees. It needs to be done in a holistic and coordinated fashion that includes Indigenous knowledge, that applies the right principles by taking into consideration the genetic type and location of trees and the category and use of harvested wood products (HWP), and that properly measures and verifies the GHG mitigation effects. For example, the use of HWP as fuel for sources of biomass energy quickly releases the stored carbon back into the atmosphere. Conversely, if the wood is used for the construction of larger buildings, the carbon remains stored for many decades and offsets the use of cement or steel, which requires large amounts of carbon to be created. Aside from reforestation, introducing trees where they would not naturally regenerate – known as afforestation – is also an important tool to increase carbon sequestration of trees. So too is avoided conversion, which protects forests and natural terrain from the expansion of agriculture, urban sprawl and resource extraction.

The challenges and potential of proper forest management are described in a paper entitled *Climate change mitigation through forest sector activities: principles, potential and priorities*, which is a version of a paper delivered to the World Forestry Congress. Its co-author is Werner Kurz, a senior research scientist with the Canadian Forestry Service. Kurz was also co-author of the Intergovernmental Panel on Climate Change Special Report on Climate Change and Land. The paper concludes that results of studies in Canada, Sweden and Switzerland all demonstrate that the national forest sector can make meaningful contributions to climate change mitigation efforts, and that these are derived to a large extent through the use of HWPs to achieve emissions reductions in other sectors. But it also notes that positive mitigation effects take time to accumulate, with the greatest positive GHG mitigation benefits occurring after 2030.

In its conclusion, the study clearly states the importance of forest management as a means to address climate change. “Analyses that apply sound forest carbon accounting principles to quantify the potential of the forest sector to contribute to climate change mitigation in Canada demonstrate the importance of sustainable forest management, maintaining or enhancing carbon stocks, increasing carbon retention in long-lived HWPs, and the use of HWPs to maximize the displacement of emissions from other sectors,” the authors write.



The Energy Future Forum recommends that the Government of Canada should advance, broaden and accelerate its efforts to use forest management in its climate change portfolio. The commitment to plant an incremental 2 billion trees is a good first step. It should be expanded with additional investment in natural infrastructure to foster job creation as part of economic recovery, involving provinces, Indigenous peoples and the private sector so that it becomes an all-of-society initiative.

Agriculture, soil and grasslands management

In Canada, approximately 55.2 million hectares are in the agriculture sector. As a major carbon sink, the proper management of farmland can be a vital factor in helping Canada achieve its climate change objectives. University of British Columbia Professor Sean Smukler, in a 2019 paper for the Canadian Agri-Food Policy Institute says, “There is increasing evidence that agriculture, among other economic sectors, must be a critical component of our near-term strategy to mitigate climate change, primarily through the capture and sequestration of CO₂ in soils.”

Soil carbon

Soils, and how they are managed, are critical to managing climate change. In fact, the earth’s soils contain two to three times more carbon than the atmosphere. Plants circulate CO₂ from the air to soils, and consume about one-third of the CO₂ that humans produce. Of that, about 10 to 15 percent ends up in the earth.

This is a position echoed by researchers with Yale Environment 360. They call soil a “carbon storehouse” and “a new weapon in the climate change fight” as part of a sustainable agriculture strategy. “Many scientists say that regenerative agricultural practices can turn back the carbon clock, reducing atmospheric CO₂ while also boosting soil productivity and increasing resilience to floods and drought. Such regenerative techniques include planting fields year-round in crops or other cover, and agroforestry that combines crops, trees, and animal husbandry.”²⁴ The potential of soil carbon sequestration was identified in Nature magazine, which reported “increasing the carbon content of the world’s soil by just a few parts per thousand (0.4 percent) each year would remove an amount of CO₂ from the atmosphere equivalent to the fossil fuel emissions of the European union.”²⁵

For a time, Canadian farmers made significant progress increasing soil carbon sequestration. But, according to Agriculture and Agri-Food Canada data, the carbon content of farmland has been decreasing since 2006. It has been the result of increased conversion from perennial to annual crops, the intensity of tillage practices, and conversion of wetlands to agricultural lands.

The gains in soil carbon sequestration have been reversed by the intensification of agriculture production practices. For example, annual cropping practices, which require greater inputs of fertilizer and pesticides, and the expansion of intensive livestock operations, all add to GHG emissions. Among the benefits of nature-based solutions is helping reduce the carbon intensity of agriculture feedstocks in the biofuels market. With Clean Fuel Standard (CFS) regulations being drafted, nature-based solutions need to be considered as part of meeting compliance obligations or generating credits under the CFS.

Grasslands

Often overlooked are the carbon sequestration benefits of natural grasslands. A study by the University of California, Davis found that grasslands and rangelands in California are more resilient carbon sinks than forests, largely because they are less impacted by fires and drought as they store carbon underground in their root systems.²⁶ In a study on grasslands and soil carbon storage in the journal *Rangeland, Ecology and Management*, the authors argue greater attention needs to be focused on protecting existing grasslands in Canada. As use of native grasslands advances due to incursions from urban growth, agriculture or industry, they say “more emphasis should be placed on protecting remnant native grassland ecosystem to enhance their productivity, biological biodiversity, drought and disease resistance, and soil carbon sequestration.”²⁷



The Energy Future Forum recommends that the Government of Canada increase its financial commitment to the \$3 billion Natural Climate Solutions Fund announced in 2019 and the \$1.3 billion Canada Nature Fund, which supports protection of Canada’s ecosystems, landscapes and biodiversity, including species at risk. The government has announced its intention to conserve 25 percent of Canada’s land mass and 25 percent of its oceans by 2025. Those are objectives the Energy Future Forum fully supports.

Oceans, coastlines and wetlands management

Canada’s marine coastlines that encompass the Atlantic, Pacific and Arctic oceans are the largest of any nation, totalling 243,000 kilometres. The oceans, coastlines, associated wetlands and peatlands form biodiverse ecosystems and regions that are being negatively impacted by climate change, but also offer an opportunity to mitigate the impact of GHG emissions. In many cases, Indigenous peoples live along the coastlines, which for hundreds of years have been part of their livelihoods, customs and cultures. Canada needs to include comprehensive strategies that use Indigenous knowledge on how to protect and enhance these areas as part of its climate change agenda.

The United Nations Framework Convention on Climate Change identified the risks. “Sea level has risen. The risk of extreme events and their intensity has increased. Arctic sea ice has declined. Ocean acidity has increased. With 93 percent of heat attributed to global warming and 28 percent of anthropogenic CO₂ emissions ending up in the oceans, oceans have acted as the most important mitigation factor of climate change thus far,” the report stated.²⁸

In assessing the policy range when addressing the coastal regions, we begin by recognizing the diversity and tremendous variability within the regions. They range from sparsely populated areas in the north to densely populated areas, such as southwestern British Columbia and Atlantic Canada, which includes cities and smaller communities along the coastline. Each brings unique issues and opportunities. A changing climate is affecting sea levels and coastline ecosystems, and damaging infrastructure. The effects on Canada’s coasts and associated wetlands is detailed in Natural Resources Canada’s *Marine Coasts in a Changing Climate*, an exhaustive 2016 study that explores adaptation measures to address the impact of climate change.

Beyond adaptation, coastal ecosystems such as salt marshes and seagrasses play a crucial role in carbon storage and sequestration, as do inland freshwater wetlands. According to the International Union for Conservation of Nature, on a per unit of area basis, coastline ecosystems sequester carbon faster and far more efficiently than terrestrial forests. Moreover, the loss, degradation or conversion of these ecosystems have harmful GHG effects. The result is that a massive amount of CO₂ – an estimated 0.15 to 1.02 billion tons every year – is released into the atmosphere or ocean. It is an amount that equals up to 19 percent of global carbon emissions from deforestation. But beyond the sequestration loss, the ecosystem benefits, such as the flood and storm protection they provide, are also lost.²⁹

These ocean-related “blue carbon” ecosystems are extremely efficient carbon sinks. The National Oceanic and Atmospheric Administration (NOAA) in the U.S. says these coastal systems are extremely efficient and sequester carbon at a much faster rate than forests, and can continue to do so for millions of years. “Most of the carbon taken up by these ecosystems is stored below ground where we can’t see it, but it is still there. The carbon found in coastal soil is often thousands of years old,” NOAA reports.³⁰

Currently, Parks Canada is studying blue carbon in protected areas as part of developing marine protected areas. For example, off the coast of British Columbia work is ongoing to understand the carbon sink capacities of eelgrass meadows and tidal salt marshes within park reserves. According to Parks Canada, these reserves in shallow water have “an impressive capacity” to absorb CO₂. One estimate is that sea marsh of only one hectare can absorb an equivalent amount of carbon emitted by 488 cars in a year.³¹



The Energy Future Forum recommends expansion of policies to protect and restore both coastal and marine ecosystems. Canada has the world’s largest coastlines, which are an important tool to be used in efforts to

address climate change. The Energy Future Forum fully supports the federal government's efforts to work with provinces, Indigenous peoples and territories along Canada's coastlines to advance policies and initiatives that increase the capacity of nature to be an important ally in addressing climate change.

A market-based approach: Carbon offsets

With a vast array of nature-based tools to tackle climate change and enhance biodiversity, the question is how to quickly mobilize nature-based solutions in the quest for a net-zero future. In other words, what is the best way for the public and private sector to work together to mobilize the largescale investments in nature-based solutions that will help achieve our Paris and net-zero targets in a cost-effective manner?

One opportunity for immediate and largescale impact in deploying nature-based solutions is through a system of GHG emissions offsets or credits. A carbon offset is a credit received for reductions in emissions given to one entity that can be sold to another to compensate for its emissions. Done properly, with transparent and verifiable results, and coupled with aggressive GHG reductions, the use of carbon credits is endorsed by many environmental organizations, including the David Suzuki Foundation, the Pembina Institute and the World Wildlife Fund for Nature.

But it must be understood that credible offsets should not be used by entities to avoid absolute reductions in their GHG emissions. Offsets are part of the climate change suite of solutions, forming a separate and complementary means to generate investments in nature-based solutions.

The effectiveness of tradeable carbon credits is well established. The British Columbia government included credits as part of its 2008 framework for managing GHGs and Alberta has been using tradeable credits since 2007. According to the B.C government, the province's carbon credit portfolio has resulted in a reduction in total emissions of approximately 6.8 million tonnes on CO₂ equivalent between 2010 and 2019.³²

An integrated national carbon credit program would create a financial incentive, particularly for large GHG emitters, to not only reduce their emissions, but also invest in nature-based offsets. In other words, governments should support the expansion and management of carbon sinks, primarily through forestation, afforestation, forests, soil carbon management, peatlands, oceans and coastlines to mitigate GHG emissions. In its Pan-Canadian Framework on Clean Growth and Climate Change, the federal government said it intended to establish an "offset protocol framework and verified carbon credits that can be traded domestically and internationally."

Work by the federal government is ongoing in the development of protocols and regulatory frameworks for an offset credit program. Draft regulations are anticipated this fall, with final regulations in the spring of 2021. With

the clock ticking towards 2030 and the goal of a 30 percent reduction in GHG emissions, time is of the essence. A broadly based national offsets program, where federal and provincial policies are harmonized to allow for a fluid pan-Canadian credit market, is crucial in mobilizing the private sector to capture the benefits of nature-based GHG mitigation and reductions. Such a system would deliver progress on quantifiable emissions reductions by creating financial incentives for the private sector to monetize its GHG emission reduction efforts.

According to an article in the Proceedings of the National Academies of Science, the European Union Emission Trading System reduced cumulative emissions of about 1.2 billion tonnes over the period 2008–2016, or approximately half of what EU governments promised in the Kyoto Protocol.³³ Australia’s emissions trading scheme is recognized to have generated more than \$2.5 billion in emission-reduction actions by private sector companies, including large mining companies that recognized carbon pricing is both a solution and a financial opportunity if the right market environment is created.³⁴

The door to offsets was opened in Article 6 of the Paris Agreement, which promotes holistic, integrated climate solutions, including international emissions trading systems as part of nationally determined contributions to the global GHG reduction targets. There is not yet a multilateral agreement on the specifics of how an international trading system of offsets would work – such as how to verify the legitimacy of credits – but that is not inhibiting the Government of Canada from implementing its proposed domestic GHG offset credit market that it committed to in 2016. The compliance protocols need to be developed in the context of existing provincial programs to ensure alignment of both policy and science standards. So too must they be shaped to be effective in the ongoing development of voluntary markets.

Former Bank of England and Bank of Canada governor Mark Carney says an international carbon offsets market will be “very much a component of the climate solution.” Currently the UN Special Envoy for Climate Action and Finance, Carney admits the market will be complex, but essential to reaching global emissions targets.³⁵

The federal government says a national GHG offset system will “encourage cost-effective domestic GHG emissions reductions.” With carbon pricing and an output-based pricing system (OBPS) for designated large emitters as a cornerstone of the federal government’s Pan-Canadian Framework on Climate Change, the table was set to establish a market for emission offsets. However, given that environmental policy is a shared jurisdiction between Ottawa and the provinces, a federal program needs to be integrated with provincial offset programs to ensure a Canada-wide system that precludes double counting of offsets. Some provinces, specifically B.C., Alberta, Saskatchewan and Quebec have large-emitter output-based performance standards that establish a threshold where emissions are priced. The federal offset program would provide another opportunity for emitters to meet their obligations under the OBPS.

Key will be for the federal GHG credit program to create the conditions for success. Namely, it results in a viable, robust and transparent carbon offset market that has public confidence in the investments that result.



The Energy Future Forum recommends creation of incentives through an integrated and harmonized national regulatory system that delivers certainty and predictability for the market, offering compliance choices for regulated emitters and the voluntary market. It should:

- reduce the cost of natural carbon removal to enable more participants to take climate action;
- support clean growth and stimulate innovation;
- provide clarity on credit verification standards and rules, as well as protocols for project developers to follow credits that are credible and verifiable;
- ensure alignment between jurisdictions; and
- provide the foundation for Canada's engagement in an anticipated international offsets market.

The work of the federal government to develop a national GHG emission offset program remains urgent if Canada is going to meet its 2030 targets and beyond. A well-functioning market that is seamlessly aligned on a federal-provincial basis, and offers opportunities for Indigenous communities, will create the incentives needed for the private sector climate investments into GHG reduction and mitigation initiatives, including nature-based solutions. **The Energy Future Forum fully supports the government's efforts to create the regulatory and design framework as soon as possible for an emissions credit market.**

The bottom line is evident. The necessary conditions for action and success are in place: consensus, commitment and cooperation. The Energy Future Forums adds its voice to those of the World Wildlife Fund, the Task Force for a Resilient Recovery, the Nature-Based Climate Solutions Summit, the Nature Conservancy, the International Institute for Environment and Development and others in support of nature-based solutions. What's required is for governments to create the right policy framework to unleash the potential and power of nature in meeting our dual national objectives of addressing climate change and ensuring a strong and growing economy.

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