More trees please…

The climate benefits from conservation

[From a presentation made by Anne Lambert at ICFC's AGM in June 2019, with subsequent revisions]

Our organization – the International Conservation Fund of Canada (ICFC) conserves nature in the tropics and other priority areas worldwide. We've always known that our conservation efforts have climate benefits, but how important are those?

Turns out they are very large indeed and extremely low-cost compared with other climate mitigation measures.

Here we will focus on forests because of their particular importance in relation to climate and because our projects prevent a lot of deforestation and also entail forest recovery and restoration.

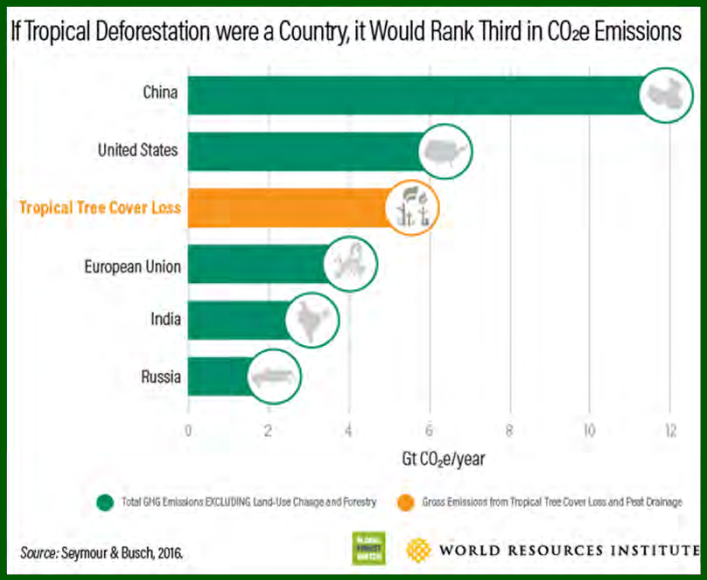
Carbon emissions from tropical deforestation:

How much?

What is the scale of carbon emissions from tropical deforestation?

8%

to 12%



Figures ranging from 8% to 12% are given and this WRI table shows that if tropical deforestation was a country it would rank third in emissions behind China and the US.

Now, you may assume that the potential for forests to mitigate climate change is of the same order.

But… that's *net* emissions!

The climate mitigation potential for forests is actually much greater.

But those figures are for NET emissions.

The gross emissions from deforestation and forest degradation are actually much greater.

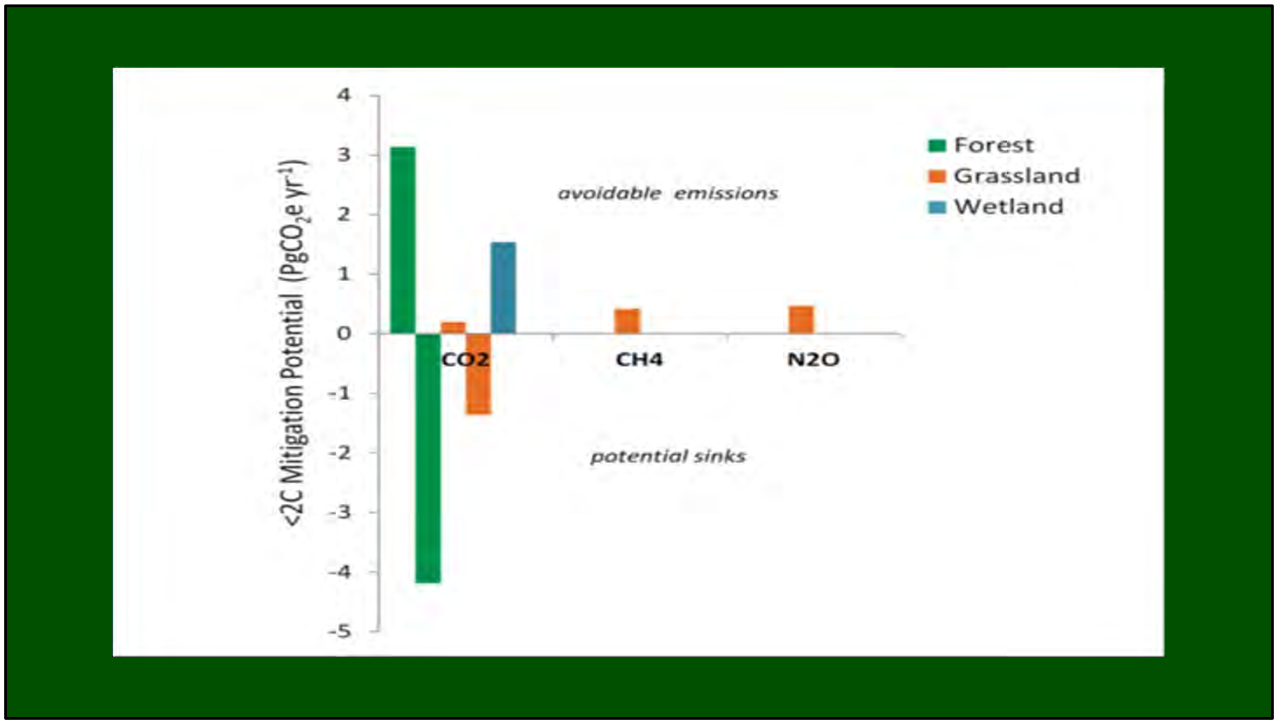
net emissions =

deforestation & forest degradation (carbon emitting)

minus

regeneration & reforestation (carbon sequestering)

This is masked because the “negative emissions” from reforestation and natural regeneration of logged forests are subtracted.

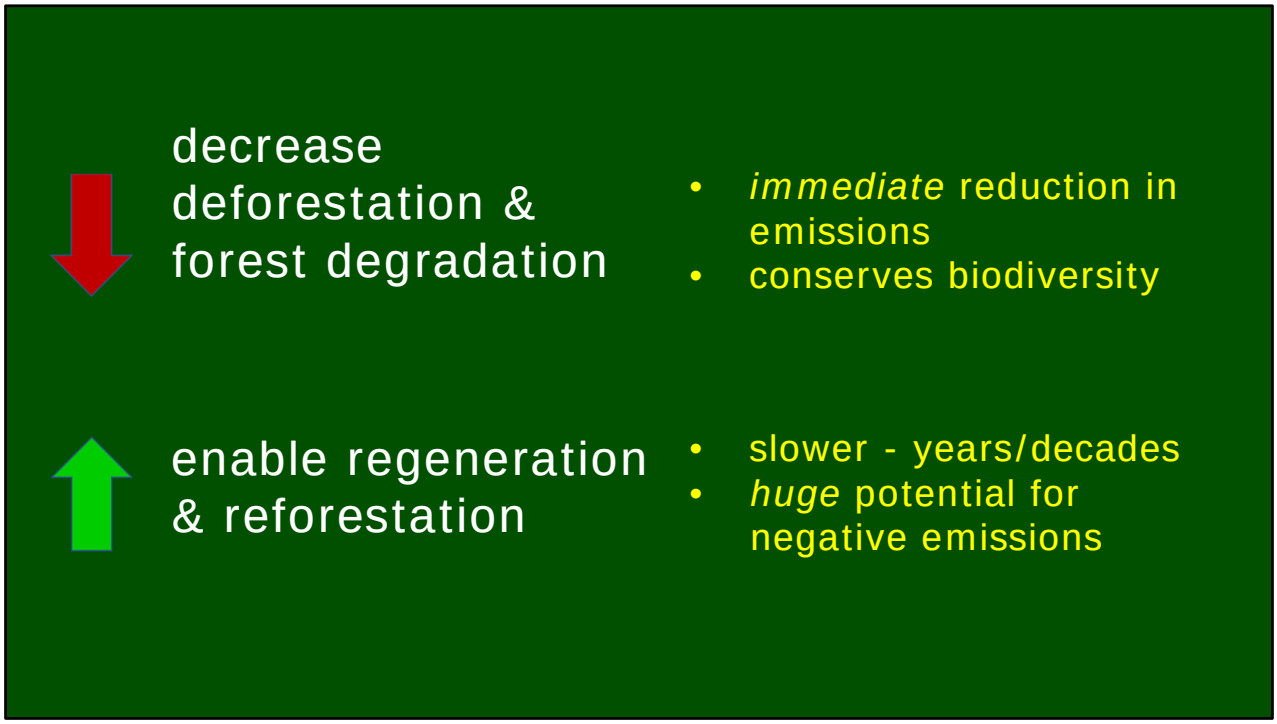


This graph shows the emissions mitigation potential for forests, grasslands and wetlands.

You can see that when you sum the amounts above and below the x-axis, there's a large potential from conserving and restoring forests.

Above the x-axis is the potential for avoiding emissions from deforestation and forest degradation.

Below the x-axis is the potential for negative emissions from sequestration. Sequestration is ongoing and substantial and could be higher still.



Both components are important. We view avoided emissions as the priority because its benefits are immediate and it has the largest biodiversity benefits.

But negative emissions WILL be needed and there's a huge potential.

Tropical forests counter global warming in an additional way. Tropical forests transpire massive amounts of water causing evaporative cooling and sunlight-blocking cloud formation. The cooling effect more than offsets the decreased reflection of solar energy (albedo) by trees as compared with bare ground, unlike in higher latitude or higher altitude regions where decreased albedo is more significant.

“nature-based solutions”

(aka natural climate solutions)

What we are talking about here is what are called nature-based solutions or “natural climate solutions” (NCS).

“Natural climate solutions” was the title of a major study published in PNAS in 2017. The study quantified 20 conservation, restoration, and improved land management pathways that increase carbon storage and/or avoid greenhouse gas emissions across global forests, wetlands, grasslands, and agricultural lands. The analysis set the condition of addressing the need for food and fiber security and biodiversity conservation.

CLIMATE

All pathways to meeting our climate targets require:

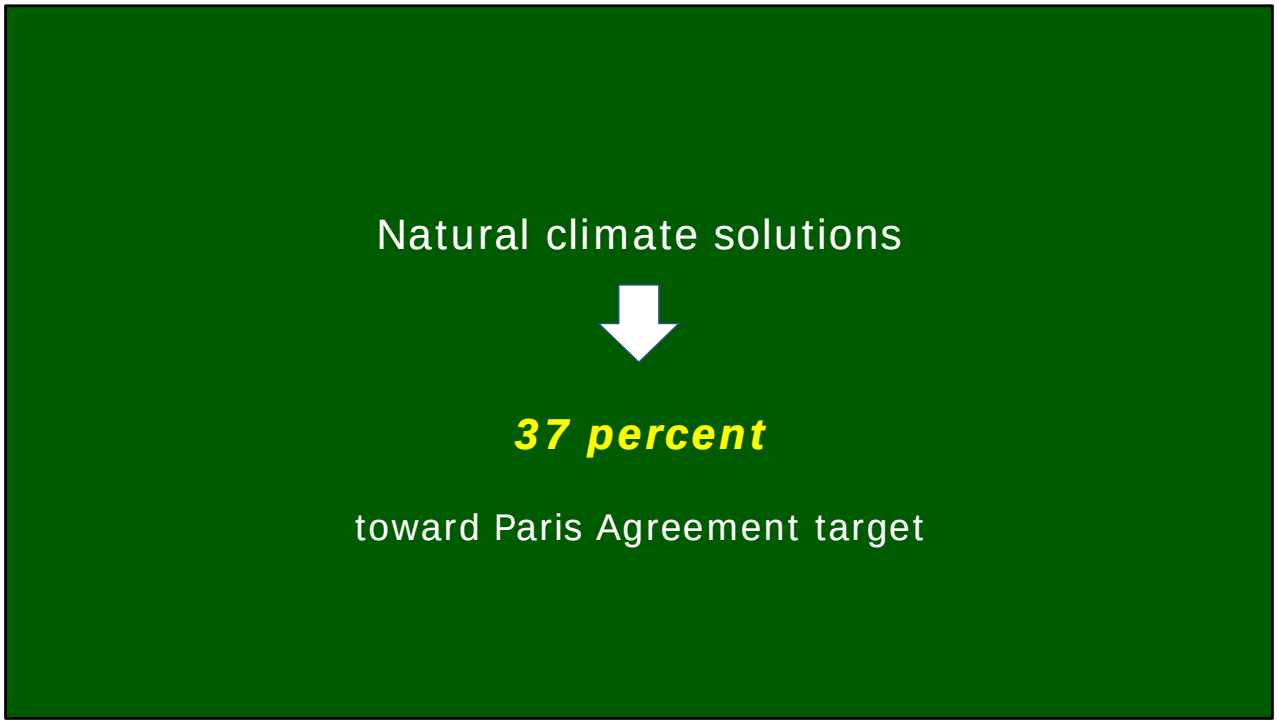
- rapid reduction in fossil fuel emissions
- "negative emissions" (removing CO_2 from the atmosphere)

Some necessary background. We can only meet our climate targets if we have both a rapid reduction in fossil fuel emissions and negative emissions.

Negative emissions technologies hold the potential to capture carbon at large emissions sources. But these technologies are decades from maturity – and this is too long to wait. Natural climate solutions are available now.

Reducing fossil fuel emissions must remain the priority for developed countries (and China).

By contrast, developing countries have low fossil fuel emissions and many offer outstanding opportunities for negative emissions through natural climate solutions.



According to the PNAS study… Natural climate solutions can help the world achieve 37 percent of the Paris Agreement target through 2030.

Rapid reduction in fossil fuel emissions will also be needed.

On cost, NCS compares very well with other emissions abatement measures.

Forest climate mitigation measures offer over two-thirds of the cost-effective NCS needed to hold warming to below 2^{o}C. The potential is with natural forests as well as forests managed for timber harvest.

NCS potential in:

- agriculture & grasslands
- wetlands

The remaining NCS potential is in agriculture and grasslands and wetlands.

Agriculture:

- improved nutrient management
- more trees in croplands
- planting cover crops

With agriculture, the most significant mitigation measures in terms of cost and scale are:

- Avoiding nitrogen oxide emissions through reduced fertilizer use and improved application methods on croplands
- Additional carbon sequestration through integration of trees in croplands at levels that do not reduce crop yields.
- additional soil carbon sequestration by planting cover crops

Agricultural expansion is responsible for much of the ongoing loss of natural ecosystems. But the world contains large amounts of degraded lands and these can be restored for agriculture, avoiding conversion of forests, grasslands and wetlands. Agriculture can also be made much more productive per unit area.

Wetlands

Protection & restoration of:

- coastal ecosystems (mangroves, salt marshes, seagrass beds)
- peatlands

Peatlands, southeast Asia

As to wetlands, coastal wetlands and peatlands are unusually carbon rich.

- **Coastal mangroves** represent 0.6 percent of all the world's tropical forests but their deforestation accounts for as much as 12 percent of greenhouse gas emissions that come from all tropical deforestation. They also provide nurseries for juvenile fish, stabilize and protect shorelines from storm damage, prevent erosion, and filter pollutants.

- **Peatlands** represent large terrestrial carbon banks and they're a top priority.

NCS co-benefits:

- biodiversity conservation
- water filtration
- flood buffering
- soil health
- livelihoods and human welfare

Nature-based climate solutions improve climate resilience and adaptation in these other ways.

Tropical ecosystems are home to more than three-quarters of all species. including 91% of terrestrial birds and 83% of amphibians. And almost all shallow-water corals, which provide fish resources and coastal protection for up to 200 million people.

Local communities and indigenous people are important partners and beneficiaries in conservation. Traditional indigenous territories encompass up to 22 percent of the world's land surface and hold 80 percent of the planet's biodiversity. In the Brazilian Amazon, Indigenous lands were found to be particularly effective at curbing high deforestation pressure, relative to both strictly protected and sustainable use areas.

Tropical forests supply rainfall in some of the world's most important agricultural regions. Some 240 million people live in forested regions, and in developing countries, forest-based activities provide about 30 million jobs in the informal sector. On average, rural communities in and around forests derive more than one-fifth of household income from gathering wild forest products, such as fuelwood, food, and medicinal plants.

Under the Convention on Biological Diversity, Canada committed to assisting developing countries with biodiversity conservation. We also committed to the UN Sustainable Development Goals, which include pledges to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. Nature-based climate solutions represent effective action in fulfilling these commitments.

What are the priorities?

- First, **Tropical forests** exceed temperate and boreal forests in their mitigation potential. Regenerating tropical forests grow year-round and sequester carbon rapidly.
- ***Preventing*** **deforestation and forest degradation** is more cost effective than reforestation and afforestation and yields greater benefits for biodiversity conservation. Protecting **primary forests** is a priority, as they:
    - store 30–70% more carbon than logged and degraded forests
    - have very high biodiversity value
    - are still being lost
- mangroves and peatlands, as mentioned earlier.
- Among restoration measures for degraded ecosystems, **natural regeneration** is the most effective.

Canada and other developed countries committed to assist developing countries with climate mitigation and adaptation.

The agreed assistance was $100 billion (USD) annually by 2020.

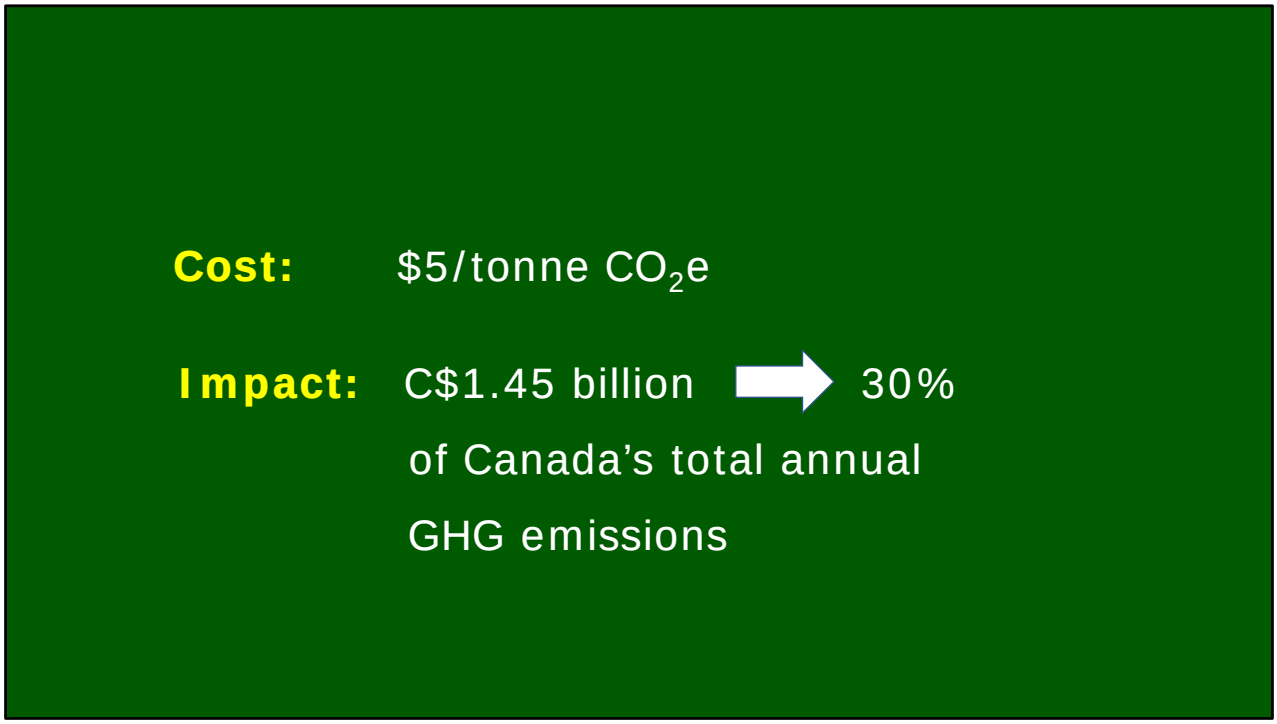
Under the Paris Climate Agreement, developed countries promised US$100 billion annually to assist developing countries with climate mitigation and adaptation.

So what is Canada's share?

- Canada's share of cumulative (1751-2016) global CO_2 emissions is 2 percent, however, our "fair share" responsibility is estimated at 3-4%.
- Canada committed C$2.65 billion for the period 2015-2020 and has indicated that its contribution will scale up to C$800 million per year by 2020, a number substantially below our fair share.

With the international climate finance Canada has already provided, NONE OF IT has gone for nature-based solutions. Through the Green Budget Coalition, ICFC is recommending that the federal government increase its financial commitment and apply at least half to nature-based solutions.

Norway, Germany, and the U.K. have pledged billions in bilateral aid to combat tropical deforestation. We argue that Canada can similarly distinguish itself.



There is no shortage of very low cost NCS – less than $10/tonne all the way down to less than a dollar a tonne.

If Canada applied $1.45 billion to our recommended natural climate solutions at a cost of US$5/t CO_2, the emissions reduction would be 217 Mt -- the equivalent of 30% of Canada's total annual greenhouse gas emissions

For comparison, Alberta committed $1.24 billion "through 2025" to two commercial-scale carbon capture and storage projects that will reduce the CO_2 emissions from the oil sands and fertilizer sectors. The resulting emissions reduction was given as 2.76 Mt annually or 0.4% of Canada's emissions.

In the Brazilian Amazon, ICFC partners with the Kayapo Indigenous People to protect their territories, which span 10 million hectares.

Without this conservation alliance, there would be rapid deforestation.

What are the climate benefits of this project?

Kayapo lands

- 10 million hectares

Let's assume:

- 3% loss per year in absence of Kayapo Project

Let's assume:
Forest loss per year in the absence of the Kayapo Project: 3% (300,000 hectares) of original area of 10,000,000 ha. In 33 years, the forest would be gone. This figure is not based on actual data and is very conservative.

Kayapo Program Director Barb Zimmerman says it would be more like *ten years* in which Kayapo lands would be deforested, based on rates in the surrounding region.

While Barb's figure is more reliable, let's use the conservative figure for this back-of-the envelope analysis.

Kayapo lands

- 10 million hectares

Let's assume:

- 3% loss per year in absence of Kayapo Project
- stored carbon = 100 tonnes/hectare

Next, we'll apply a figure of 100 tonnes of stored carbon per hectare. This is above-ground and below-ground carbon. This is smaller than a figure of 186 T C/ha for the Brazilian Amazon that was given in a review of tropical forest carbon stocks,. We assume that less than 100% of carbon will be released with deforestation and the southeastern Amazon does not have the highest carbon storage levels in the Amazon.

This is *carbon* and carbon emissions are usually expressed in terms of carbon dioxide or carbon dioxide equivalent (CO_2e).

Kayapo lands

- 10 million hectares

Let's assume:

- 3% loss per year in absence of Kayapo Project
- stored carbon expressed as CO_2= 367 tonne/hectare

so that equals 367 tonnes per hectare

(WRI uses 340 tonne/ha)

Kayapo lands

- 10 million hectares

Let's assume:

- 3% loss per year in absence of Kayapo Project
- stored carbon expressed as CO_2= 367 tonne/hectare
- $5 million annual cost for Kayapo conservation efforts

And let's use a comfortable figure of US$5 million for the Kayapo Project or at least the conservation related aspects of it. This is more than is being spent now.

We can now calculate the cost-benefit.

3% LOSS PER YEAR = 300,000 hectares with 30 Megatonnes of carbon or 110 Mt CO_2e

$0.045

(~ five cents)

per tonne

of CO_2e

At a total annual cost of $5 million, this works out to less than 5 cents a tonne!

Phenomenal value.

Many carbon/GHG abatement measures cost tens of dollars or even hundreds of dollars per tonne of CO_2e.

And that is on top of the value from conserving biodiversity and other ecosystem services …..

and the value in conserving the traditional way of life of the Kayapo people.

ICFC Project Locations

For ICFC's other projects, the figures for carbon benefits in relation to cost would also be very favourable.

climate

nature

people

In conclusion, ICFC's programs aimed primarily at conserving natural ecosystems and biodiversity are providing very large climate benefits at an extremely low cost.

The power of nature-based solutions is being increasingly recognized and we are working to draw attention to it and trying to bring significant finance to it.