

Watershed

Sentinel



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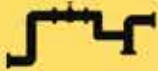


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Support communities opposing Coastal Gaslink:
<https://unistoten.camp/>
<https://www.facebook.com/wetsuwetenstrong/>

COASTAL GASLINK PIPELINE

A project that hasn't had a federal review



Owned by TransCanada

The owner of Keystone XL and many contentious pipeline projects with a reputation of spills and explosions



670 kilometers to expand fracked gas

Stretching from near Dawson Creek to Kitimat, B.C. Coastal GasLink is slated to feed the LNG Canada liquefaction export facility with fracked gas from northeastern British Columbia, Canada



Feeding the largest LNG export facility in Canada

40 billion dollar project, the largest private sector investment in Canadian history. This facility means highly explosive ships moving up and down the west coast for export



Canadians are paying millions for the export facility

LNG Canada is subsidized with 275 million federal dollars, and millions more in tax breaks



Wet'suwet'en community is opposed to the pipeline

The indigenous Wet'suwet'en hereditary chiefs have opposed CGL since it was proposed. They are currently being forcefully removed by militarized police.



Fracking poisons drinking water

Fracking contaminates an average of 260 barrels of water for every million cubic feet of natural gas



Destroys our livable climate

Gas is released into the atmosphere upon extraction and seeps from old poorly managed wells. So-called 'fugitive emissions' are not measured, despite a worse climate impact than CO2.

HEAL THE PEOPLE



HEAL THE LAND

UNIST'OT'EN CAMP

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Features



State of Denial

The roots of today’s mutant climate change denial lie in neoliberal market ideology. The result? Predatory delay.

Natural Carbon Solutions

Soil isn’t as sexy as a Tesla, but restoring the planet’s natural ability to store carbon by letting soil, plants, and trees do their thing is not only cheaper than high-tech solutions, it benefits wild creatures and places at the same time.

Contents

3, 5	Shorts News from Canada and around the world	12	Sponge Cities Can innovations stop surface runoff from killing our waters?	32	Island Recycling Celebrating an outstanding team effort on Cortes Island
4	Letters Our readers on everything from 5G to the Unist’ot’en stand-off	14	TMX Déjà Vu Instant replay? NEB review still lacks scope and ambition	33	Guatemala The criminalization of Indigenous land defense
6	Clean BC BC’s climate plan, magical thinking, and the status quo	28	Land & Justice Dr. Lynn Gehl reviews Art Manuel’s <i>Reconciliation Manifesto</i>	36	Wild Times Joe Foy on forests filled with the phantoms of extinct creatures
11	Wild Salmon Limited official progress on fish farms spurs legal action	30	Deep Earth A subterranean Galapagos expands the tree of life		Cover Credit ©Christi Belcourt www.christibelcourt.com



Publisher Watershed Sentinel Educational Society
 Editor Delores Broten
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 Graphic Design Ester Strijbos
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 Advertising Sally Gellard

Special thanks to Valerie Sherriff, Mike Morrell, Mary Gavan, Kathy Smail, Norberto Rodriguez de la Vega, Jason Motz, Sally Gellard, Kathy Smail, Ray Woollam, the writers, advertisers, distributors, and all who send information.

Deep thanks to our Board of Directors: Anicca de Trey, Alice Grange, Mike Morrell, Norberto Rodriguez de la Vega, Susan Yates, Lannie Keller, Sally Gellard, Rob Powell and Carly Palmer. Published five times per year.

Subscriptions: Canada \$25 one year,
 \$40 two years; US \$35 per year,
 Electronic only \$15 a year

Distribution by subscription, and to Friends of Cortes Island. Free at Vancouver Island and Vancouver area libraries, and by sponsorship in BC colleges, universities, and eco-organizations.

Disclaimer: Opinions published are not necessarily those of the publisher, editor or other staff and volunteers of the magazine.

Member Magazines BC and Magazines Canada
 ISSN 1188-360X
 Publication Mail Canada Post Agreement
 PM 40012720

Return Undeliverable Canadian Addresses to:
 Watershed Sentinel
 Box 1270, Comox, BC, Canada V9M 7Z8
 250-339-6117
 editor@watershedsentinel.ca
 www.watershedsentinel.ca

We acknowledge the financial support of the
 Government of Canada.



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**Next Issue Ad and Copy Deadline:
 February 25, 2019**

Abusive Relationship

Every once in awhile, the state of Canada feels the irrepressible need to beat on Indigenous Peoples. Not just in the hurtful, racist actions of daily life, but a full-scale blow out. Oka, Ipperwash, Gustafsen Lake, Elsipogtog, and now the Wet'suwet'en.

The neighbours look on in horror (the UN has just asked BC to stop construction at Site C until First Nations rights are resolved), but are helpless. As are the abused – Canada, after all, has taken all the relations hostage. It declares all land Crown land, until the courts rule otherwise.

It is mean and it is premeditated. In 2015, a Public Safety Canada Government Operations Centre (GOC) did a risk assessment for an RCMP action on the Unist'ot'en camp. which was set up by a Wet'suwet'en house group to block TransCanada's Coastal GasLink pipeline. The risk assessment said a raid on the Unist'ot'en camp would likely trigger "a broader series of protests or blockades nationwide," but the "risk to the national interest" of these events was medium low, noting that they "are not highly functional due to a lack of the organization's ability to garner the support of large groups." (CBC News, January 12, 2019).

Afterward, as after every abusive outburst, there is reconciliation. Sometimes, if the prime minister of the time is a drama teacher, even tears. And, oh, the promises!

As for the "rule of law," it is always, eventually, proven to uphold the Indigenous right to their own land. This is the sick travesty at the heart of an apparently wonderful, but colonial country on a magnificent part of Earth.

—Delores Broten, Comox, BC, January 2019

For a detailed analysis, see "The Unist'ot'en stand-off: How Canada's "prove-it" mentality undermines reconciliation," West Coast Environmental Law, January 16, 2019. To support the Wet'suwet'en, go to <https://unistoten.camp/supportertoolkit/>

At the 'Shed

A Change of Pace. We are excited to announce that, for non-commercial users, we are transitioning our original content from a copyright licence to a creative commons licence. This change better aligns with our mandate to share environmental information, without barriers.

Thanks to everyone who sent us encouragement and nice comments over the holidays and in response to last year's fundraising drive – it all helps! Thanks to your generous support, we've been able to hire a staff reporter, and increase our social media presence.

Congratulations. *Bypassing Dystopia*, Joyce Nelson's sequel to *Beyond Banksters*, has been nominated for the 2019 George Ryga Award for Social Awareness in Literature.

LNG, Fracking, and the Comox Valley Connection. Hear four exciting speakers at the Florence Filberg Centre, Courtenay, February 27, 7 to 9 pm.

Ozone layer could mend by 2060s

Ozone Healing

The decline in chlorofluorocarbons (CFCs) in our atmosphere due to their ban since the Montreal Protocol of 1987 is allowing the ozone layer to heal, according to a new UN report. Prior to the ban, CFCs were common in refrigerators, aerosol cans, and dry cleaning chemicals. At recovery rates projected by the report, the northern hemisphere should fully heal by the 2030s, followed by the southern hemisphere in the 2050, and polar regions in the 2060s.

—www.cnn.com
November 6, 2018

Pollution compounds with stalling

Mercury Alert

A new MIT study says that waiting to reduce mercury emissions reduces the effectiveness of those same future reductions, due to accumulation in the environment. For every five years of inaction, reduction policies have to be 14% more stringent to reach the same reduction goal. The Minamata Convention, an international treaty signed by 101 parties to reduce mercury emissions, allows for a 10-year delay in addressing the problem.

—news.mit.edu
November 1, 2018

“Crushing blow” to oil giant

Exxon Denied

ExxonMobil, which is facing multiple climate lawsuits around the US, has been dealt what legal experts are calling a “crushing blow” in a climate change

investigation led by Massachusetts’ Attorney General. The Supreme Court’s decision to decline to hear an appeal from Exxon could have implications beyond the state of Massachusetts, as Exxon is now forced to hand over documents detailing what it knew about climate change and when. As in New York, the Massachusetts suit is investigating whether the company lied to the public and its investors about the risks of burning fossil fuels.

—www.thinkprogress.org
January 7, 2019

Ocean warming accelerating

Hot Water

The world’s oceans, which absorb 93% of the extra heat trapped due to climate change, are warming faster than climate reports have suggested, according to a new meta-analysis published in *Science*. 2018 will be the warmest year on record in the oceans, just as 2017 and 2016 were in their respective years. Study authors found “The numbers are coming in 40-50% [warmer] than the last IPCC report.”

—www.washingtonpost.com
January 11, 2019

Fossil auto sales may have peaked

Peak ICE

According to experts interviewed by the *Financial Times*, sales of internal combustion engine (ICE) vehicles may have peaked in 2018, due to a variety of factors, including Brexit, the US-China trade war, and European emissions targets. The peak was previously not predicted to happen until 2022 or later.

—www.futurism.com
December 31, 2018

Shipping giant aims for CO₂ neutral

Maersk

The world’s biggest container shipper, Maersk, has set a zero carbon target for 2050, stating that “The only possible way to achieve the so-much-needed decarbonization in our industry is by fully transforming to new carbon neutral fuels and supply chains.” Given the lifespan of shipping vessels, new ships would have to be developed decades in advance of the 2050 target. The plan is to have carbon neutral ships commercially viable by 2030 by using energy sources such as biofuels.

—www.reuters.com
December 4, 2018

Palau bans sunscreen chemicals

Win for Coral



Starting in 2020, the island Republic of Palau in the Western Pacific Ocean will forbid a range of chemicals found in sunscreen products that are toxic to corals, fish, macro-algae, and even people. High on the list is Oxybenzone, which has been found to make coral more susceptible to bleaching, damage the coral’s DNA, and kill juvenile coral. Also making the list are parabens, triclosan, and phenoxyethanol – antimicrobial preservatives used in sunscreens, shampoos, moisturizers, liquid soaps, and hair conditioners.

—Haereticus Environmental Laboratory
November 1, 2018

Letters

Lasting Impression

Thank you for all your work, and for Rose Thater Braan-Imai's beautiful essay, in the September/October issue. Her description of time and space will stay with me.

—Ann Hiatt,
Cortes Island, BC

Cap Over Tax

The fossil fuel industry has spent \$31 million in Washington State to defeat a carbon tax, as opposed to \$15 million spent in support of the tax to fight climate change. This is not a big deal in itself because even this lowly environmentalist thinks that tax is not effective. But, carbon caps are effective if applied at the point that carbon comes out of the ground. We need to bypass the carbon tax and calculate how much each country needs to cap their extraction of fossil fuels to save the planet and our descendants.

—Sue Hiscocks,
Victoria, BC

5G Important, Unregulated

I'm a new subscriber and appreciated reading the articles on wireless technology in the last two issues. The 5G infrastructure will soon be our new reality. Microwave systems are still unmonitored and unregulated according to preventative health standards, despite physicians and scientists warning about serious health effects for decades. I hope to read more on this hidden but highly important topic in future issues. Thank you for your "scrappy" environmental magazine.

—Agneta Jonsson,
Langley, BC

Algonquin Deserves Better

I just received your latest issue of *Watershed Sentinel*. You are to be commended for covering so many troublesome issues in a concise and objective manner.

I represent Algonquin Eco Watch. The Algonquin Park ecosystem is home to the headwaters of eight major watersheds and contains more than 250 self-sustaining brook trout lakes; one of the highest concentrations in the world. There are a surprising number of issues facing the Algonquin ecosystem – the largest of which appears to be apathy on the part of Canadian citizens.

—Mike Wilton, Spring Bay,
Ontario

Wet'suwet'en

Sending armed police [into Wet'suwet'en territory] to use force is highly transparent and highly unfair. It does not resolve the dispute, it makes it worse. Coastal Gaslink, the Trudeau government and the RCMP may have arranged a narrowly conceived legal permission for their actions but in doing so they showed a profound disrespect for the Wet'suwet'en culture and for the national process of reconciliation.

Grand Chief Wilton Littlechild, speaking from the UN Permanent Forum on Indigenous Issues in 2018 said, "Indigenous Peoples must be part of decision making when our rights and well-being are at stake. Working with us to determine what that looks like is the smart thing to do. It will lead to fewer acrimonious decisions, fewer court battles, more timely decisions, and better outcomes for us all."

Our immediate focus should not be on allowing Coastal Gaslink access to contested territory but on returning them all to the table with a renewed commitment to transparent, fair and culturally appropriate discussions.

—Robert Hart,
Terrace, BC

Hello? Earth to Earth!

Despite much commerce, extraction of so many resources, production of so many products, generation of so much money, there seems to be a lack of understanding of how to provide the basics of food and shelter for everyone.

NAFTA was supposed to create a trickle-down effect for spreading the wealth. As that failed, governments are now calling for more trade and increased economic development, while forests burn and homes are flooded. Our way of life is unsustainable, yet there is no great cry for much-needed change and redistribution of wealth. How many people really question what humans are doing on this planet, and why we allow the insanity to continue? Hello? Earth to Earth! Is anyone listening?

—Lavonne Garnett,
Nanaimo BC

The Watershed Sentinel welcomes letters

but reserves the right to edit for brevity, clarity, legality, and taste.

Anonymous letters will not be published.

Send your musings and your missives to:

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or online at www.watershedsentinel.ca

Illegal fracking dams in court

Rogue Dams

Ecojustice, on behalf of Sierra Club BC, is challenging the Province's unprecedented decision to retroactively exempt two unauthorized and illegally constructed dams from environmental assessment. The dams were built by Progress Energy Canada Ltd., a subsidiary of Malaysian state-owned petro giant Petronas, a major player in BC's fracking industry. Both dams qualify as major projects under the BC Environmental Assessment Act, at 5 storeys and 7 seven stories high, and are among more than 50 large earthen structures built without permits by energy companies on Crown or public lands in northeast BC (Treaty 8 territory).

—www.ecojustice.ca
November 5, 2018

Birth critical for population

Baby Orca

A new calf, reportedly healthy, has brought the southern resident killer whale population to 75. Between June and September of 2018, the population lost three whales. The last baby to be born lived only an hour. Its mother, Tahlequah, carried the body for 17 days, bringing worldwide attention to the whales' plight.

—www.ecowatch.com
January 14, 2019

UN: respect Indigenous rights

Suspend Site C

In a rare rebuke, a December 14 letter from the UN's Human Rights Office of the High Commissioner instructed Canada to suspend construction of the Site C

dam until "free, prior and informed consent" of Indigenous peoples is obtained. Site C would flood 128 linear kilometres of the Peace system in the heart of Treaty 8 territory. Canada has until April 8 to respond to the request and outline the steps it has taken to suspend the project.

—www.thenarwhal.ca
January 9, 2019

Cost revelation, AER resignation

Giant Liability

The president and CEO of Alberta Energy Regulator is resigning. Jim Ellis will step down effective January 31, after a public apology by the organization for the alarm caused by a \$260-billion internal estimate of oilpatch cleanup liabilities. The estimate, revealed by investigative reporting, applies to cleanup of inactive oil and gas wells, facilities, pipelines, and tailings ponds. AER said the resignation is unrelated to the revealed cleanup cost, and had been "in the planning stages for months."

—www.nationalobserver.com
November 2, 2018

Funding for Indigenous oversight

Guardians

\$5.7 million in federal funding has been announced for 28 Indigenous Guardian pilot programs. Guardians will help oversee tribal parks, monitor for illegal fishing and forestry activities, protect cultural sites, and guide tourism. In the North, guardians will also track climate change impacts and the effects of increased shipping in the Northwest Passage.

—www.thenarwhal.ca
November 13, 2018



©Mike James

Enviros, companies want labelling

GM Salmon

A December letter to the federal Minister of Environment and Climate Change, signed by 21 environmental groups and seven seafood companies, called for precautionary and transparent regulation of GM fish. GM salmon has been on the Canadian market unlabelled since 2017. "Without mandatory labelling of GM salmon, we risk undermining consumer confidence in Canadian seafood," said Franz Perrot, quality control manager at seafood importer Lagoon Seafood.

—www.cban.ca
December 3, 2018

Germans vs. Nova Scotia LNG plant

Global Gas Fight

Anti-fracking activists in Germany have petitioned the German government not to give a financial guarantee to Pieridae, the company behind the proposed \$10-billion LNG Goldboro export plant in Nova Scotia. An open letter signed by a number of NGOs and over 15,000 people urged the German government to deny the guarantee because "new gas infrastructure delays the switch to 100% renewable energies in Germany and abroad. Publicly funded investments in natural gas are at the expense of renewables and block the way to the energy transition."

—www.canadians.org
November 7, 2018

CleanBC

Opinion: magical thinking and the status quo

by Bill Henderson

The NDP/Green government's new CleanBC plan looks to be a winner politically. BC environmental groups have lauded the plan as needed climate leadership, even while pointing out that the emission reduction targets are not nearly enough to stay under 2° Paris Agreement targets, let alone 1.5°.

There are many questions about the government's ability to craft policies to meet these targets, especially while planning to build an LNG export industry, but reaction has been generally positive – because in reality CleanBC is less a climate plan than it is an optimistic vision of a prosperous economy based on the growth of clean energy.

But climate change is getting worse fast, with extreme weather already a potential economic and social threat multiplier. Tipping points toward a “hothouse earth” state, where climate change accelerates, are closer daily.

Fossil fuel production and use, and greenhouse gas emissions, continue to rise, with projections showing little decline until at least 2040. In this context, the CleanBC plan is a plan to fail. To continue attempting to reduce emissions, while at the same time expanding fossil fuel production, is not leadership.

There is a dawning awareness that we are failing to mitigate climate effectively, because decarbonization as presently envisioned – the framework for emis-

sions reduction for Canada and most of the world's countries – is pretend mitigation; it is a market-based slow transition with a minimum of government action, even though climate change is an emergency requiring a wartime mobilization degree of government action.

A much faster transition is needed than is possible with renewables competing against fossil fuels in present markets. Despite the exponential growth of renewable capacity, the market share of oil and gas increased twice as much as renewable electricity between 2011 and 2016. Over the past twenty years fossil fuels have accounted for just over 80% of global energy production, and are projected to still be the source for over 80% of global energy in 2040.

Mitigation is really two linked endeavors: reducing fossil fuel production and use, and increasing renewable production and use. Building renewable capacity alone doesn't necessarily reduce emissions. A regulated, managed decline of fossil fuel production and use is needed. At the very least this means no new fossil fuel infrastructure.

After three wasted decades, the scientific diagnosis requires timely treatment for what could now be a fatal condition. But the patient – and this includes both the BC public and government – stays firmly in denial, because treatment may be too disruptive, and instead continues to shoehorn climate change

into the political and economic status quo. This is all that is allowed by our neoliberal governments and the global economy, and it isn't near good enough.

CleanBC is positive, feelgood messaging that ignores the scale of change effective mitigation now requires. As such, the new CleanBC plan is climate denial, not climate leadership.

Bill Henderson is a long time climate activist (and cancer survivor) who lives in Gibsons, BC.

cleanBC
our nature. our power. our future.

**Clean
BC
Highlights**

1.5 is Alive

Research: global renewable energy shift underway

by Watershed Sentinel staff

A phase out of fossil fuel infrastructure starting now gives good odds to avoid the worst consequences of climate change, according to new research published in *Nature Communications*.

The study found that if carbon-intensive infrastructure is phased out at the end of its natural lifetime, there's a 64% chance of keeping mean temperature rise under the Paris Accord's 1.5°C aspirational target.

Power plants, cars, factories, ships, and planes would need to be replaced with zero carbon alternatives as they wear out.

The model used in the study shows time is precious – delaying a phase out until 2030, even if it were then accelerated,

“considerably reduces the likelihood that 1.5°C would be attainable.”

The results would also rely on fast global weaning off of livestock and dairy consumption.

Fortunately, the shift toward renewable energy is already underway, according to a major report by the International Renewable Energy Agency. Driven by falling costs, new technology, investor action, public opinion, and rising energy efficiency, the transformation now has “irresistible momentum.”

Geopolitical ramifications analyzed by the report are hard to overstate. “The global energy transformation is already becoming a major geopolitical force:

changing the power structures of regions and states, bringing the promise of energy independence to nations and communities, enhancing energy security and democratic empowerment.”

The report found a new global hierarchy of influence will emerge based on nation's exposure to fossil fuel trade flows, and their embrace of renewable energy. Countries dependent on fossil fuel exports will see a decline in global influence unless they can “reinvent their economy for a new energy era.”

Taken together, the reports show an energy transformation is inevitable and underway, but must be accelerated with an aggressive fossil phase out to reach climate safety.

Industry (-8.4 Megatons CO₂)

- Incentivize cleaner operations with fund from industry carbon tax
- Reduce methane emissions from oil and gas operations by 45%
- Regulatory framework for carbon capture and storage and direct air capture of carbon dioxide
- Use electricity produced via hydro to power natural gas production

Transport (-6 Megatons CO₂)

- Phase-out sales of internal combustion engine vehicles by 2040
- Purchase incentives for ZEV's
- Increase low carbon fuel standard to 20% by 2030
- Increase tailpipe emissions standards for vehicles sold after 2025

Buildings (-2 Megatons CO₂)

- More efficient building standards phased in (all buildings “net-zero energy ready” by 2032)
- Incentives for heat pumps and energy efficiency upgrades
- Efficiency upgrades for public housing
- 15% renewable gas mandate on natural gas

Also

- Job training for ZEVs and new building codes
- Reduction of emissions from organic waste

Source: BC government

State of Denial

Market ideology restricts climate action

by Gavin MacRae

Unfazed by the insults, Finbarr Wilson enters the fray. The arena - the comments section of another *National Post* editorial trivializing climate change - is a climate-denier stronghold where Wilson, along with others trying to talk some sense, is outnumbered. The conversation is far from civil: “STFU you erectus IQ knuckle-walker,” or, “you really are as stupid as you look.”

In the minds of the most zealous climate change deniers, David Suzuki and Al Gore head an ominous global conspiracy by climate scientists intent on “trillions in carbon cash.” Covert efforts by “eco-fascists” and governments to “unleash their brand of communism” on the world will culminate in the totalitarian rule of a one world government.

Thankfully, Wilson says, this type of over-the-top denial is rarer now. He’s been “fighting the good fight” against climate denial for over a decade, and has seen some people come around slowly to reality. “What’s being debated now is completely different from what it was five, ten years ago,” says Wilson. “There’s a whole evolution of this debate where the old hard deniers are rare, and frankly they’re not as smart as they used to be.”

But it would be a mistake to conclude that climate change denial is in retreat. It has simply mutated.



Photo © BlueEyes Pete Williamson

By the numbers

Understanding of climate change in Canada cleaves along political lines. A November 2018 Angus Reid poll shows that while 87% of Canadians agree that global temperature is rising, only one-third who voted Conservative in 2015 agree that “climate change is a fact and mostly caused by emissions from vehicles and industrial facilities.” Conversely, over eight-in-ten Liberal and NDP voters agree with the same statement.

A February 2018 poll, by Abacus Data, shows that a majority of Canadians feel we should continue to develop oil and gas resources while transitioning to a low-carbon economy.

Deep roots

Donald Gutstein is a former SFU journalism professor and author of *The Big Stall: How big oil and think tanks are blocking action on climate change in Canada*. In it, he traces a causal chain backward from the climate policy paralysis of today to the birth of neoliberalism in the 1940s.

Neoliberalism is an economic and political ideology that sees individual self-interest acting in free markets as an ideal means of realizing human well being and exercising social control. State regulation is heretical – the role of government in society is to create markets, and then get out of the way.

Shortly after its inception, neoliberals realized that to influence governments they needed to change the values under which government operates, says Gutstein. “To do that they set up think tanks to disseminate these ideas to what [they] called the second hand dealers in ideas – the media.”

“Big Oil and the think tanks are also waging a second, more subtle campaign: to promote ineffective market responses to climate change that they can control.”

It wasn't until the 1970s that neoliberalism took root, providing a seemingly easy answer to stalled-out economies in America and Europe. Since then it has grown to become a potent force guiding global economic policy.

In the 1990s, fearing the strong state regulation that would be needed to address global warming, Big Oil and neoliberal think tanks joined forces to peddle disinformation on the science of climate change.

Big Oil had a template to follow. “They saw what a good job the think tanks did in denying the link between second hand smoke and lung cancer,” says Gutstein, “which was totally funded by the big tobacco companies ... and they said ‘aha’ we could use this to create denial, doubt, confusion.”

Over time, as people began to see climate change with their own eyes (and scientific consensus built), the think tanks largely backed off trying to convince people that climate change was a hoax. However, they have continued to rally behind falsehoods such as anthropogenic climate change is natural, inconsequential (or beneficial), and too expensive to fix anyway.

Gutstein explains Big Oil and the think tanks are also waging a second, more subtle campaign: to promote ineffective market responses to climate change that they can control.

Predatory delay

These market based “solutions” placate demands on industry to act, but are designed to impose no barriers to fossil fuel extraction. This influence has been called soft denial, but futurist and author Alex Steffen has a more apt term: “predatory delay” – *the deliberate slowing of change to sustain a profitable but unsustainable status quo whose cost will be paid by others*.

The notion that foot-dragging constitutes denial rests on scientific bedrock: The Intergovernmental Panel on Climate Change tells us we have a slim window to rapidly decarbonize across all sectors and avoid the worst impacts of climate change.

Dr. William Carroll is a University of Victoria sociologist who uses social network analysis to study the mechanics of this new climate change denial in Canada. Soft denial recognizes that the climate crisis is manmade, he says, but “basically presents a menu of market-based solutions that are obviously not powerful enough to create the kinds of changes that would get us on a pathway to climate stabilization.”

Carroll's findings demonstrate a sprawling, linked network made up of board members from fossil fuel companies who also hold positions of power in key think tanks, industry associations, business advocacy organizations, universities, and

other civil society organizations. This influence is “in many ways very subtle, because it’s not this full-on Donald Trump style denialism that is so [easy] to discredit,” says Carroll. “But in this case it’s really embedded in many of our institutions.”

Gutstein argues this influence has contorted climate policy efforts to fit market-friendly mandates, leaving Canada hamstrung to rein in emissions. He points to cap and trade schemes, carbon capture and storage, and more efficient extraction technology, as examples of such market-based measures – providing a reassuring climate narrative for Canadians, with little benefit to the climate, and little danger to fossil’s core business model.

He also considers Canada’s carbon tax a strategic concession by the fossil fuel regime, who entered into a “grand bargain” with government to accept a carbon tax, in return for continued extraction and new infrastructure.

Gutstein is not alone in viewing carbon taxes this way. In October, Steffen tweeted: “Slow, low carbon taxes – especially those that limit fossil fuel company liabilities for climate change or gut existing regulations – may look like climate action, but they’re actually predatory delay. They’re oil companies playing for time.”

But jobs!

One way fossil fuel interests influence civil society is through initiatives that advocate a snail’s pace energy transition, disparage renewable energy, or foment an “us against the environmentalists” attitude with energy sector workers. “They are really trying to connect with working class people who are concerned about jobs and whether they’ll be able to pay the mortgage,” says Carroll. Examples

“It’s not this full-on Donald Trump style denialism that is so [easy] to discredit. But it’s really embedded in many of our institutions.”

include Oil Respect, Canada’s Energy Citizens, and Resource Works.

Of course, the energy sector worker facing layoffs is in a real predicament. A predicament that, without alternatives, guarantees a ready pool of outraged citizens to promote continued extraction.

Carroll stresses the need to “seriously grow alternative energy systems that provide good paying, stable jobs based on renewable energy, and put that under community control” rather than replaying the current situation where “people, communities, and workers are so dependent on the private investment community that they don’t feel that they’re able to take a kind of ethically responsible position.”

Glimpses of such a solution can be seen in the fragile but growing Green New Deal in the United States – a proposal that would see the US invest in climate mitigation with wartime urgency. All the boxes are ticked: a just transition for workers, massive investment in renewable energy, and enhanced regulation.

Denying the future

According to Gutstein, the agents of climate denial have a three-fold strategy: denial, ineffective market-based measures, and finally geoengineering. “What’s consistent with all of [these strategies] is there’s no role for government,” he says.

It seems odd that deniers would support geoengineering – a solution to a problem they ostensibly don’t believe exists – but in understanding their denial as a disingenuous con, it makes sense: run out the clock until last-ditch efforts seem reasonable.

Win like Fin

Gutstein believes a paradigm shift will be needed to topple neoliberal influence. “We need to view the economy in an entirely new way,” he says. His book makes clear that direct regulation is detested by the fossil fuel regime above all else, providing a clue for policy alternatives.

In daily life, Finbarr Wilson’s verbal sparring holds a lesson for the more timid: speak up. Research from Yale University shows that in the US, while most people feel climate change is personally important, seven-in-ten say they rarely or never talk about it with family or friends.

Talking about climate change accelerates action. It also fends off despair. According to the 2018 Angus Reid poll, one-in-five Canadians believe there’s nothing humanity can do to reduce global warming. This defeatism is a win for predatory delay.

In the struggle for hearts and minds, “the playing field is not level, let’s face it,” says Carroll. “But none the less, it is possible to win these struggles playing uphill.”

Gavin MacRae is the *Watershed Sentinel’s* staff reporter and editorial assistant. He lives in Comox, BC.

State of the Salmon

Limited official progress spurs legal action for wild salmon

by Claire Gilmore

On January 10, leaders of the Dzawada’enuxw First Nation (DFN) from Kingcome Inlet, BC filed an Aboriginal rights lawsuit against Canada.

“This is an action against Canada to terminate the federal licences which authorize fish farms,” said lawyer Jack Woodward, who represented the Tsilhqot’in in their landmark title and rights case. “The legal ... case is that these federal licences infringe upon my client’s constitutionally-protected Aboriginal Rights.”

The lawsuit argues that the fish farms have exposed wild salmon and eulachon, traditional staples for the First Nation, to higher levels of sea lice and viral diseases – including piscine orthoreovirus (PRV), a disease of farmed Atlantic salmon.

The DFN’s federal rights claim could affect not only the 10 farms within DFN waters, but any on the BC coast which could damage salmon, eulachon, or other fisheries upon which the DFN depend. “This challenge is essential to protect wild salmon, not just for our people, but for all British Columbians,” said Traditional Leader Willie Moon (Okwilagame).

On December 14, 2018, the BC government, aquaculture industry, and the Kwikwasut’inuxw Haxwa’mis, ‘Namgis, and Mamalilikulla First Nations signed an agreement to shut down ten fish farms in the Broughton Archipelago over the next three years. The deal made some progress in protecting wild salmon from fish farms and has been celebrated by some wild salmon advocates – yet critical gaps remain:

- Many farm closures aren’t planned to take effect until June of 2024.
- Most of these closures fall beyond the next provincial election, putting follow-through in doubt.
- Industry is openly saying this won’t affect overall production, as they will simply move farms elsewhere.

BC Premier Horgan maintains “the companies are here to stay,” while the federal government still plans to double aquaculture production in Canada by 2026.

In response, independent marine biologist Alexandra Morton wrote: “I have enormous respect for the First Nations who made this happen by occupying the salmon farms in their territories over 280 days through the storms of winter, and for the First Nation leaders who doggedly hammered out this agreement over the past year.” She continued, however, by announcing she is launching “extinction watch” to ramp up monitoring of wild salmon populations in the Broughton, as “the farms are not leaving all at once, so wild salmon will still suffer exposure to sea lice, industrial viruses, and chemicals coming from the farms.”

As the 2012 Cohen Commission final report pointed out, Fisheries and Oceans Canada (DFO)’s dual responsibility to protect wild fisheries and promote the aquaculture industry is a clear and highly problematic conflict of interest. Which way they ultimately lean was re-emphasized on January 7, when Chief Bob Chamberlin, Owadi, vice-president of the Union of BC Indian Chiefs, told CBC that DFO has denied the First Nations of the Broughton Archipelago access to a DFO lab, after an agreement with the province had given them the authority to test farmed salmon.

At the January 10 press conference announcing DFN’s federal Rights claim, Chief Willie Moon emphasized that the zero tolerance for fish farms in their territories was grounded in direction from the nation’s matriarchs, membership, and community. He said his nation wants all of the fish farms removed from their territories, something that wasn’t expressed in the December agreement.

“We don’t have five years. I’m one of the ones who fish in our rivers. When you’re only getting five or six fish a day, that’s a warning sign for all of us. That’s why we’re moving forward with this case, because it’s not moving fast enough. We have never given industry the go-ahead to have these farms in our territories.”

With files from the Dzawada’enuxw First Nation and Wild Salmon Defence Fund

Sponge Cities

Can innovations stop surface runoff from killing our waters?



Photo © Ester Strijbos

by George Le Masurier

The Department of Fisheries and Oceans slapped a ban on both personal and commercial shellfish harvesting throughout Baynes Sound recently because of heavy rainfall, which came “after a prolonged dry spell,” so would “adversely affect marine water quality.”

It’s a regular notice the DFO issues around most urbanized regions of Vancouver Island in the fall, and it usually lasts for more than a few days.

Why? Because every time it rains after a dry period, it’s as if a giant toilet flush-

es animal feces, fertilizers, pesticides, oils, road salts, heavy metals and other contaminants into municipal stormwater systems, which in turn send torrents of polluted water directly into watersheds, killing fish, eroding property and making waters unsafe for shellfish harvesting.

This is not a new problem. For the past 100 years, urban development has replaced natural vegetated land with impervious surfaces like roads and parking lots. This has diminished the amount of rainwater absorbed into the ground and reduced the dispersal of precipitation back

into the atmosphere from trees (which do the heavy lifting) and other plants, via a process called evapotranspiration.

As a result, surface runoff has become the primary means of rainwater drainage.

To control flooding, Vancouver Island municipalities, like other local governments around the world, invested millions of dollars over time in underground infrastructure to channel rainwater runoff into rivers or streams. This not only polluted these waterways and killed wildlife, but the increased volume and speed of the

moving water caused erosion and other flooding risks by altering the natural hydrologic cycle.

Comox's Golf Creek is a prime example. Eighty-six per cent of the once flourishing natural stream flowing into Comox Harbour has been buried beneath residential streets, a shopping mall, and a retirement housing development. It's polluted after heavy rains and a downstream property owner is currently suing the town over erosion caused by the creek's sudden fast flows and large volumes.

"Humans have an order to their development process: first we log it, then we farm it, then we pave it," says Chris Hilliar, a former Department of Fisheries and Oceans officer in Comox. "Fish can get along with forestry, if it's done right; they can get along with farming, if it's done right; but, concrete and pavement are killers, a death knell to streams and the aquatic life within them."

Stormwater runoff is the main reason why many urban streams are devoid of fish or linger on aquatic life-support, and why these streams can pose a public health risk for children who play in them. Runoff is also the top non-point source of oil from human activity into North America's oceans, according to the National Research Council. And it has been identified as the source of polychlorinated biphenyls (PCBs) that are harming British Columbia's killer whale population, according to another NRC paper.

The situation is reversible

A shift in thinking about traditional methods of handling stormwater began to occur during the 1980s and 1990s, toward constructing wetlands and ponds to detain rainwater long enough for contaminants to settle out and allow some

water to infiltrate back into the ground. This gave hope that there was a means of cleaning our streams and extending the life of municipal infrastructure.

Today, there's been a further shift toward a recognition that nature itself cleans and controls rainwater better than any engineered solution. This new emphasis attempts to imitate nature with pervious surfaces, downspout disconnection, rain gardens, bioswales, green roofs and rainwater harvesting.

The prospects have excited many municipal engineers and environmentalists.

The city of Courtenay has narrowed roadways (reducing impervious surface area) and added rain gardens to capture runoff and encourage infiltration. The city plans to develop its first Integrated Stormwater Management Plan in 2019 that could set a new, greener standard for stormwater management in the municipality.

Victoria has created a new utility tax to fund its future cost of maintaining stormwater infrastructure and to encourage residents and developers to adopt green infrastructure and low-impact development designs. In most communities, stormwater infrastructure costs are paid out of general revenue. Victoria residents are now taxed separately for the stormwater that leaves their property. In other words, the more impervious surfaces and the fewer onsite mitigations you have, such as rain gardens and rock pits, the more you will pay.

It's the theory behind Chinese landscape architect Kongjian

Yu's "sponge cities" concept, a way to describe the capacity of an urban landscape to absorb rainwater naturally. Major world cities have jumped on the idea. Berlin, Germany, adopted a city-wide Sponge City Strategy in 2017.

Since 2009, Toronto, Ontario has required buildings over 2,000 square metres to have green roofs, which use several layers of soil to grow plants that capture and release rainwater, slowing the rush of water through the city's stormwater pipes.

The list and variety of innovations for managing stormwater through green infrastructure is long and growing.

The change may seem to be coming too late for streams that are almost entirely buried and channelized. But challenging initiatives like the 100-year plan to restore Bowker Creek in Victoria and the campaign to save the Morrison Creek headwaters between Courtenay and Cumberland may someday restore fish in our streams and keep our waters open to shellfish harvesting.

George Le Masurier is a retired journalist and newspaper executive. This article is from his website www.decafNation.net and reprinted as part of a collaboration with the *Watershed Sentinel*.



TMX Deja Vu

NEB review re-do still lacks scope and ambition



Photo © Miles Ritter

by Eugene Kung

Tell me if you've heard this one before: the National Energy Board (NEB) is rushing through a pipeline review with a compressed timeline and narrow scope, where it sides with the proponent more often than not (despite tremendous opposition by intervenors), and excludes the public from "public" hearings. Huge volumes of evidence are filed by the proponent in what appears to be an attempt to overwhelm and paralyze participation in the already limited timeline.

For those paying attention to the Trans Mountain saga, it feels like an instant replay of the project's last NEB review, which concluded in 2016. That review and the resulting federal cabinet approval of the pipeline and tanker project resulted in 15 legal challenges that led to a two-week hearing at the Federal Court of Appeal (FCA).

The result? The court quashed the federal approval, based on inadequate consultation with First Nations and the illegal exclusion of marine shipping that rendered the NEB's report invalid.

In response to the FCA decision in *Tsleil-Waututh Nation et al vs. Canada*, the federal cabinet issued a directive to the NEB to redo (or more correctly, to do for the first time) an environmental assessment of marine shipping for the project with a focus on southern resident orcas. The government gave the NEB a 22-week timeline to produce its report.

During the announcement, Natural Resources Minister Amarjeet Sohi also stated, “We truly believe the Trans Mountain pipeline-expansion project is an investment in Canada’s future.... It must move forward in the right way.”

The NEB took this directive and launched its new review on marine shipping by unilaterally announcing its process and giving interested parties a one-week period to apply to participate. It also asked for feedback on the proposed scope of the review on the Friday of the Thanksgiving long weekend, with comments due the following Tuesday.

Despite a very short timeline (over the long weekend), thousands and thousands of letters were faxed to the NEB regarding the limited scope of the review. Side note: Did you know that the NEB will not take letters via email, only fax or in person? Because it’s 2019.

Indeed, over 66,400 letters of comment were faxed to the NEB during the latest comment period that closed on November 20, 2018. This followed more than 11,000 letters of comment on the scope of the review that happened over Thanksgiving, which resulted in the Board’s fax machine “having difficulty keeping up with the volume of use.”

History repeating

Unfortunately, it appears as if the NEB is repeating the exact same errors that landed the government in court last time: rushing through a process with a narrow scope that ignores important topics and shuts out the public.

As we have stated before, the NEB (and Canada’s) approach continues to be informed by a mentality that seeks to do the least amount possible, and which

It appears as if the NEB is repeating the exact same errors that landed the government in court last time: rushing through a process with a narrow scope that ignores important topics and shuts out the public.

reads court cases like the Tsleil-Waututh through a lens that interprets decisions with an eye to the legal minimum.

For example, while the court said that excluding marine shipping was a “fatal error” in the initial Trans Mountain review, it also held that other shortcomings alleged by the litigants (like excluding cross examination or not addressing climate change) were not unreasonable, which is not, as some would like to believe, an endorsement of the NEB’s process.

As a result, the NEB is now only addressing marine shipping in the reconsideration, and continuing to ignore unresolved issues related to climate, economics and salmon, among other things that were ignored in the Crown’s legally inadequate consultation with First Nations. This approach risks leaving Canada with stale evidence for the redo of the Indigenous consultation process, which is still to come.

So, informed by the “bare minimum” approach, the NEB set out on its new marine shipping review. Almost immediately we are seeing the same patterns emerge.

Narrow scope

One example of the NEB opting for a minimal approach is the geographic scope of the marine shipping review. The NEB asked for intervenors to comment

on whether it should consider impacts within the 12 nautical mile (NM) territorial limit, or the 200 NM exclusive economic zone (EEZ) in which only Canada has the ability to regulate.

Only the Government of Canada, Alberta, and Trans Mountain supported the 12 NM limit, while the vast majority of intervenors including First Nations, the State of Washington, community groups, and others supported 200 NM – but the NEB still ruled in favour of limiting its review to 12 NM. This was despite the obvious fact that the project’s 400+ tankers per year will not stop at 12 NM, that an oil spill will not respect this arbitrary line, or that the southern resident killer whale’s critical habitat extends beyond 12 NM.

Economic need based on stale evidence

The NEB also refused calls from intervenors to reexamine the underlying need, or economic case for the pipeline. A lot has changed since the project was first filed by Kinder Morgan back in 2013, when oil was well over \$100 a barrel.

Oil transportation economics have or will soon be disrupted further. Very Large Crude Carriers (VLCCs) in the new Louisiana Offshore Oil Port (LOOP) terminal will magnify the market forces hindering

Continued on Page 16 ⇨

Canadian producers; new fuel standards regulations will reduce the demand (and therefore price) for sulphur-heavy oil-sands products; and climate commitments in Canada and globally will also impact demand.

Finally, Canada's overpayment of at least \$1.2 billion for the pipeline has never received any public scrutiny, and the estimated nine billion (or more) construction cost is only climbing higher, without any public oversight.

Climate excluded again

Climate impacts are also once again being excluded from the NEB review, despite the fact that the agency had decided to review upstream and downstream emissions from the Energy East pipeline before Trans Canada abandoned the project because it was uneconomic. Trans Mountain was uneconomic even without a climate test, but Kinder Morgan was able to pull a fast one on Canada and salvaged its losses by selling the project.

One would hope that the NEB would take the opportunity to correct these other gaps while redoing its review.

Salmon spawning

Another example of the NEB's flawed approach is the exclusion of salmon spawning habitat, particularly given that the review is also supposed to be about the fate of the endangered southern resident killer whales. Scientists agree that one of the main threats to the iconic species is a lack of its primary food – Chinook salmon. The noise from tanker traffic also impedes the whales' ability to hunt these salmon (and a spill would obviously be detrimental), but upstream spawning grounds are inextricably linked to salmon health as well.

Now that the proponent of the pipeline is effectively the federal government, how can that same government objectively review, regulate and enforce laws against a project that it owns, and has already invested so much public money and political capital into?

It was in some of these same spawning grounds that Kinder Morgan was caught illegally installing anti-spawning mats. The interconnected nature of the rivers and streams that flow into the ocean, and the salmon that rely on these networks to reproduce, underscores the folly of segmenting sections of the review as if they were independent. The reality is that what happens in these streams impacts the whales because it impacts the salmon, so any review that does not consider this is not getting a full picture of the impacts on southern residents.

These are just three examples of the issues that arise when you scope the review of a project as narrowly as possible.

Tight timeline

Despite repeated calls for a longer review, the NEB's hearing order set an incredibly tight timeline for its process. This is, in part, because the NEB does not have the same powers to start and stop time as it did in the original review. That means the only party that can extend the process is the federal cabinet.

Many intervenors were dismayed to see that the hearing order gave them only five weeks to file evidence (until November 20). For many, this requires finding and hiring available experts to produce a report and review existing evidence – a nearly impossible task.

After contacting multiple experts who were unable to draft a submission in less than a month, the Wilderness Committee ended up declining \$25,000 in participant funding due to the NEB's unreasonable timelines.

To be fair, the federal government and Trans Mountain were also subject to the NEB's tight timeline, and on October 31 they filed evidence and statements that together totalled 8,033 pages. This puts intervenors and their experts in an even tougher position – experts will now have to review all of this evidence before even starting their own reports.

In addition to the obvious disparity in financial and human resources available to the federal government and Trans Mountain compared to intervenors (including First Nations, community groups and affected individuals), the former also have a distinct further advantage.

Remember, it was cabinet who set the timeline for the review, and cabinet who knew when they were going to make the announcement. Ministers would have known that their 22-week timeline would result in a compressed schedule, so it is possible, and even likely that the work to prepare the evidence was underway well before the NEB issued its hearing order on October 12. Likewise, Trans Mountain Corporation, which is now owned by the federal government, may have known about the timeline and begun work early.

There is nothing illegal about beginning work early, but this example underscores a major complexity in the current review: now that the proponent of the pipeline is effectively the federal government, how can that same government objectively review, regulate and enforce laws against a project that it owns, and has already invested so much public money and political capital into?

With so many possibilities for conflicts of interest, and gaming the system, it will only complicate an already complex decision for cabinet. The federal government will have to navigate the legal requirement to make a fresh decision, while depending on stale evidence and continuing to suggest that the decision is already made.

Squamish Nation's motion to the NEB

On November 5, the Squamish Nation filed a motion with the NEB, asking for an extension of time to file expert evidence. Squamish asked for an extension of 15 days, which, if not granted, would prevent Squamish from participating in the process fully, but maintained their primary complaint that the entire NEB reconsideration process was too short.

On November 13, the NEB decided to grant the extension, and compress the rest of its process. But as we have stated above, it will still be constrained within the timeline set by cabinet. Only cabinet can extend the deadline beyond February 22, 2019.

Tsleil-Waututh Nation's application for review

On November 16, Tsleil-Waututh Nation filed an application for review of the NEB's hearing order. The application challenged the decision to exclude the exclusive economic zone from the marine shipping review, as well as the exclusion of socio-economic effects from the scope of the reconsideration. Tsleil-Waututh also argued that the NEB process violates a fundamental administrative law principle ("they who hear must decide") by adding panel members who had not heard the previous evidence directly, while still having them reconsider and decide on issues raised by that evidence.

Less than a week after Tsleil-Waututh's application, the NEB set a process for comment on the application, with a two-week turnaround for intervenors to provide their input.

Same problems, same result?

So the NEB is off to another rocky start; something we've seen before. With the recent Newfoundland oil spill now deemed impossible to clean up because of weather, it has never been more important to have fulsome processes to evaluate the risks of marine shipping.

We still don't know how the federal government will follow up on this NEB review with further Indigenous consultation before making a fresh decision. But for now the main question is: how much longer before we're back in court?

Eugene Kung is a lawyer with West Coast Environmental Law.

Originally published on the West Coast Environmental Law blog, and in the *National Observer*.



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Nature's



Soil isn't as sexy as a Tesla, and forests aren't cutting edge like a photovoltaic panel. It is easy to forget that the earth's carbon cycle is what's actually doing the decarbonizing.

Deforestation, land use changes, and industrial farming have hobbled the carbon cycle.

Natural carbon solutions are about restoring and enhancing the earth's ability to store carbon – letting soil, plants, and trees do their thing. Without additional carbon from fossil fuels to process, the carbon cycle can begin to rebalance the atmosphere.

We don't need cutting edge technology to do this, we just need to work with what we've got.

Carbon Storage

Wild Carbon

Saving wilderness saves the climate

by Peter McCartney

Wildlife need a place to call home, nourish themselves and raise their young. Wilderness areas are also vital for human spirit and creativity, providing us with places to play, relax and soak in the scenery.

Indigenous communities especially depend on the living world for physical, cultural and spiritual health. A safe climate requires nature – forests, meadows and wetlands – to absorb the carbon pollution we've created. Protecting wilderness is as much a necessity to fight climate change as renewable energy is.

As plants grow, the carbon they breathe in becomes their stems, stumps and eventually the soil. When an old growth forest is logged, a meadow ploughed or a swamp paved over, this process stops and even reverses. That's bad news for the climate.

Start with forests like the Walbran Valley on Vancouver Island, BC. It's hard to fathom how much carbon dioxide goes into building a thousand-year-old tree. Research shows older trees absorb more carbon as they add more wood each year. Think of it like painting a telephone pole versus a toothpick. Keeping forests standing – especially old growth – is vital to maintaining their carbon storage.

Grasslands are another landscape best left undisturbed in the fight against climate change. Ecosystems like BC's South Okanagan-Similkameen store more carbon as more species call them home. Be-

cause of their deep root systems, natural meadows add more plant matter than single crop fields where tilling and fertilizers spill carbon into the atmosphere.

Finally, wetlands are the unsung heroes in the fight against climate change. These ecosystems hold 20-30% of the carbon on Earth despite only taking up 5-8% of its land. One of the key reasons is the dead plants that collect underwater and don't fully decompose. Polar bear habitat in the

Hudson Bay lowlands of Manitoba has a wealth of carbon under its surface.

Natural spaces are worth preserving in their own right. But as we look to tackle global warming, one of our solutions must be to leave more wilderness intact.

Peter McCartney is the climate campaigner for the Wilderness Committee



©Charles Anderson

Carbon By Numbers

Humans are **disrupting** a small part of the carbon cycle

by Delores Broten

Carbon is the fourth most abundant element in the universe, after hydrogen, helium, and oxygen. Because of its structure, with easily available bonds, it is an essential building block for natural and for industrial processes, from growing trees to chemical engineering. Eighteen per cent of your body by weight is carbon.

Not surprisingly, this means the amount of carbon in Earth's systems is, well, ginormous. Most of Earth's carbon – about 65,500 billion metric tons – is stored in rocks. The rest is in the ocean, atmosphere, plants, soil, and fossil fuels. It cycles through the earth's atmosphere, oceans, soil, rocks and vegetation in both slow (the weathering of rocks) and fast (vegetation) cycles, some of which are still being deciphered.

The planet's carbon cycle has stayed in a pretty good balance – carbon moving into the earth and out to the atmosphere – for hundreds of thousands of years. That is, until humans started burning fossil fuels much faster than fossil fuels are created (by the decomposition of plants and animals under geologic pressure). Humans also started deforesting, draining bogs, and plowing the deep prairie soils.

About half of the relatively tiny bit of extra carbon we release with these activities is reabsorbed by planetary processes in the forests, plants, and oceans. The world's vegetation, from Amazonian rainforests to Eurasian grasslands, may hold about 450 billion tonnes of carbon today, about as much as 50 years of human emissions. Researchers estimate that

the planet's vegetation could store double that amount, if there was no human disturbance.

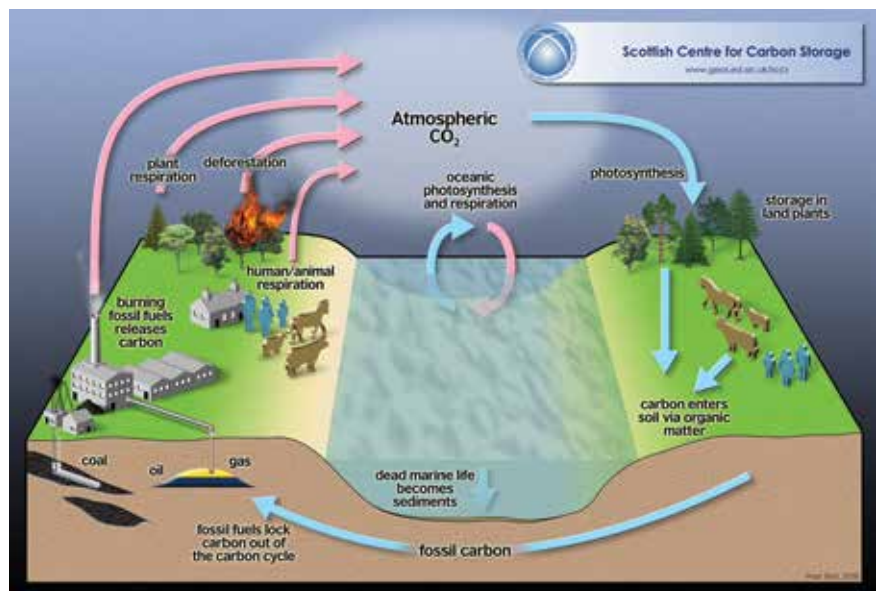
According to almost all of the world's scientists, the problem is in that tiny amount of extra carbon we are emitting to the atmosphere, creating the disturbance we call climate change.

The task now is to stop exceeding the natural cycle, and reabsorb the excesses now circulating in the atmosphere. It is not impossible but will indeed take every tool in nature's toolbox.

See Earth Observatory, www.earthobservatory.nasa.gov/features/CarbonCycle

The World's Carbon Reservoirs	
Reservoir	Size (Gt C)
Atmosphere	750
Forests	610
Soils	1580
Surface ocean	1020
Deep ocean	38,100
Fossil fuels	
Coal	4,000
Oil	500
Natural gas	500
Total fossil fuel	5,000

©James F. Kasling



Dirt Simple

Fixing more carbon in soil: no labcoats required

by Gavin MacRae



Climate change mitigation requires serious innovation. We need a major development in fusion, or a quantum leap in solar cells, or a stunning advance in battery storage, right?

Time to stop and take a look at the ground beneath our feet.

The earth's soils hold two to three times more carbon than the atmosphere. A minuscule increase in the amount of carbon that soil already locks down in the ground would tip the scales back toward climate stabilization.

This is the goal of the "4 Per 1000" initiative. Spearheaded by France in 2015, 4 per 1000 is based around one surprising

(and very encouraging) finding: a 0.4% increase in the rate of carbon storage in the top 30 to 40 centimetres of the world's soil would stop the increase of carbon dioxide in the atmosphere.

The ways to do this are decidedly low tech – no cutting-edge research, no machinery to suck CO₂ from the sky – just basic changes to agriculture, land management, and forestry practices.

Plants remove 30% of the carbon dioxide from the atmosphere. When plant life dies, bacteria, fungi, and invertebrates break down the plant matter. This releases most of the carbon back to the atmosphere to repeat the cycle, but some carbon remains trapped in the soil. Amassing more of this carbon-rich soil sequesters more carbon.

A prerequisite of the 4 per 1000 initiative is halting deforestation. Forests cleared for slash-and-burn agriculture or timber not only lose the carbon stored in vegetation, but lower the carbon holding capacity of the soil. Reforestation and agroforestry (planting trees and shrubs in and around cropland) can build back these wasted soils.

Conservation agriculture and landscape management are central to the initiative. A handful of uncomplicated practices can rebound soil health: avoiding bare soils on croplands, using manure and compost as soil amendments, and allowing water to collect at the base of plants.

The estimated cost of restoring soils on agricultural land runs \$24 per hectare. The effects, if maintained, last two to three decades. With 570 million farms worldwide and three billion people living in rural areas, there is no shortage of manpower.

Of course, with climate change, there is always a catch. Research from 2016 published in *Nature* shows increased temperatures could invigorate soil microbes that would release additional CO₂, potentially equivalent to the emissions of the United States. That in turn will increase temperatures that... you get the idea. This frightening domino effect underscores the need for soil carbon storage to take the limelight in climate mitigation efforts.

Climate aside, with a projected 9.8 billion mouths to feed by 2050, 4 Per 1000 is a good idea. Sufficient organic matter is the main indicator of soil health, and soil degradation threatens over 40% of the earth's land surface. Threats to soil are threats to food security.

4 Per 1000 is open ended: national, regional, and local governments can join. So can farming and forestry organizations, private agricultural and forestry companies, NGOs, and other civil society organizations.

Gavin MacRae is the *Watershed Sentinel's* staff reporter and editorial assistant. He lives in Comox, BC.

The Boreal

A timely opportunity to protect a critical carbon sink

by Rhea Suh

Because our neighboring nations have so much in common culturally, you can sometimes almost forget that you've traveled to another country when visiting Canada from the United States. But after spending much of the last year fighting the efforts of the Trump administration to undermine our environmental safeguards, I find it encouraging to meet with a government willing to consider taking much-needed actions to protect its communities and environmental treasures.

At the beginning of last February, my National Resources Defense Council (NRDC) colleague Anthony Swift and I travelled to Ottawa to meet with indigenous and environmental leaders as well as officials from the government of Prime Minister Justin Trudeau. Our main focus was the boreal forest, one of the largest, most important forest ecosystems in the world. This massive biome, which rings the top of the globe just below the Arctic Circle, provides critical habitat for countless species and is the ancestral home for many hundreds of Indigenous communities. It's also one of our planet's most effective carbon sinks, storing in its trees, plants, and soil as much as 44% of the earth's land-based carbon, according to some experts.

Canada's portion of the boreal forest is believed to store more than 300 billion tons of carbon, which is equivalent to the entire planet's carbon dioxide emissions from 36 years of burning fossil fuels.

That alone makes Canada the custodian of a precious global resource, one that must be tended with the utmost care.

Distressingly, however, industrial logging companies have clearcut more than 25 million acres of Canadian boreal over the past two decades. That activity triggers the release of more than 26 million metric tons of carbon dioxide per year,

Without immediate action, scientists say, thirty per cent of the country's already-diminished boreal caribou population could disappear within the next 15 years.

equal to the emissions from more than five million passenger vehicles. Sustained logging activity has also devastated millions of acres of habitat for the severely threatened boreal woodland caribou and other species and jeopardized the way of life for hundreds of First Nations and Indigenous communities that have lived in the forest for thousands of years.

While the impact of industrial logging in the heart of the boreal has been enabled by a lack of protections, it has also been driven in significant part by US demand for forest products used in the manufac-

ture of our paper, tissue, and lumber. Indeed, eight major buyers of boreal products – companies like Kimberley-Clark, Proctor & Gamble, and Ben & Jerry's – recently called on Canadian federal and provincial governments to take greater action to protect the boreal. Because of its vital importance to Indigenous Peoples and its global importance for our climate and species diversity, we all have a role to play to ensure that one of the world's last great forests is protected.

We went to Ottawa hoping to speak with people who understood and appreciated the need for a healthy, thriving Canadian boreal forest. The Trudeau government has an enormous opportunity to pursue policies that protect the boreal, support a sustainable economy, and foster trust and reconciliation with Indigenous Peoples whose interests have long been ignored or derided by past governments. In striking this new balance, Prime Minister Trudeau must operate within a constitutional framework that gives Canada's provinces primary authority over land use, a factor that inevitably shapes the effort to form a coherent, national boreal forest policy.

But our discussions made it clear that the Canadian boreal is so much more than a problem in need of solving. It also represents a rare opportunity for Canada to strengthen relationships with its Indigenous Peoples, protect and restore its caribou populations, slash its carbon footprint, and reinforce its burgeoning

identity as an international leader on climate change and sustainable development. Immediate action on boreal forest protection could roll all of these urgent environmental and social priorities into a single, integrated solution.

The Trudeau government has taken steps in the right direction. Ottawa has proposed a nationwide action plan to protect boreal woodland caribou habitats. But it needs to move farther and faster.

Between logging industry pushback and provincial politics, deadlines have been missed and concrete action has yet to be taken. Without immediate action, scientists say, thirty per cent of the country's already-diminished boreal caribou population could disappear within the next fifteen years.

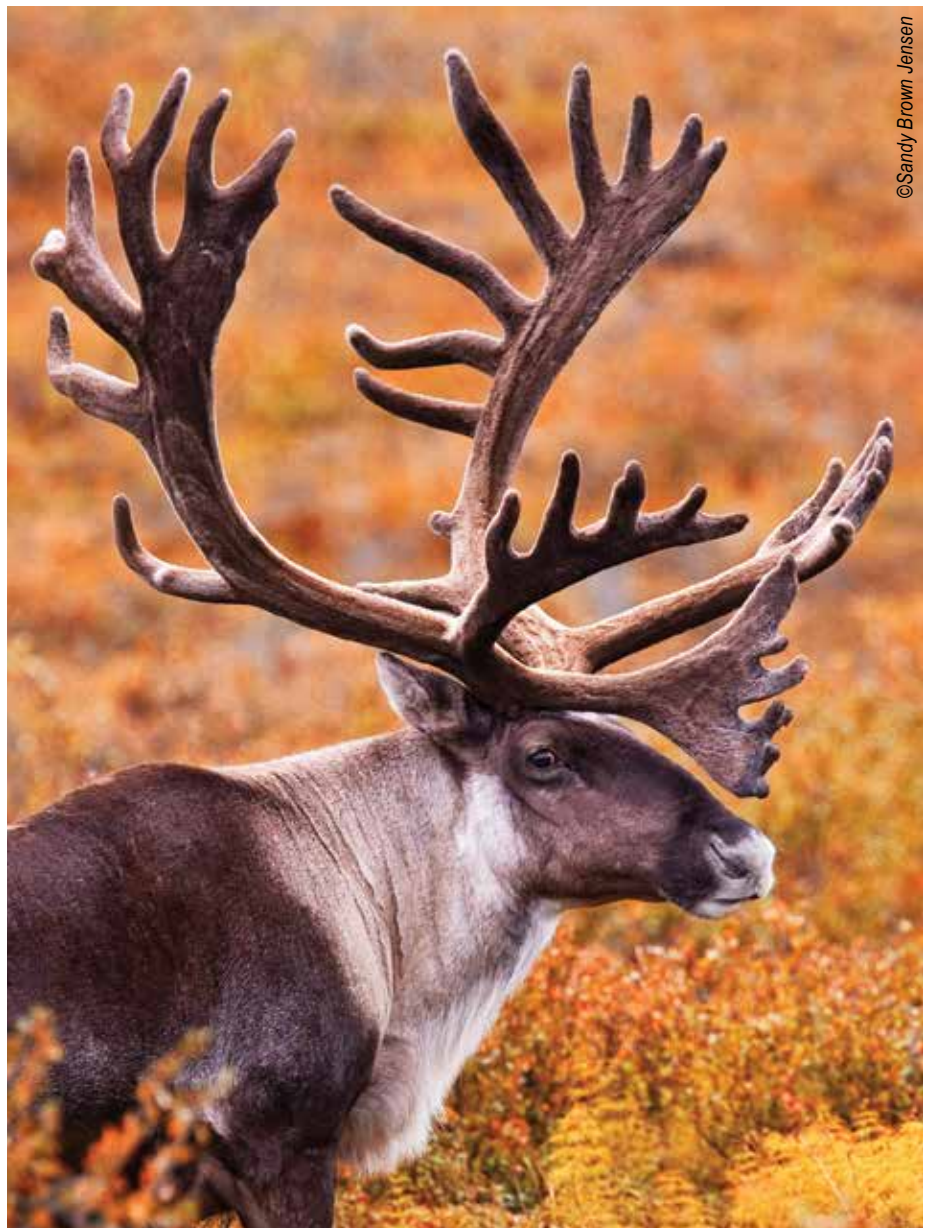
Preserving boreal caribou habitat would bring Canada closer to achieving the national biodiversity goals it set in 2015, including a commitment to conserve at least 17% of its territory as protected areas by 2020. Maintaining the health and efficacy of this gargantuan carbon sink would also be a cornerstone of Canada's effort under the Paris Accord to cut its greenhouse gas emissions by 30% from 2005 levels by 2030.

It's a rare and lucky thing when you look more closely at what you've perceived as a problem and instead see a golden opportunity. That's the real story of Canada's wide, majestic, imperiled boreal forest. When it receives the protection it needs and deserves, the benefits will be returned to Canada a thousand-fold.

Rhea Suh is president of the US-based Natural Resources Defense Council.

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Canada's portion of the boreal forest is believed to store **more than 300 billion tons of carbon**, which is equivalent to the entire planet's carbon dioxide emissions from 36 years of burning fossil fuels.



Be a Soil Farmer

Farm the cattle to farm the plants to farm the soil

By Steve Kenyon

When I first started farming, I bought some cows. I was a cattle farmer. When I determined the cattle were simply a tool to manage the grass, I became a grass farmer. A few years ago I figured out that if I can take care of the soil, and the soil life within it, that would

take care of the grass, which would then take care of the cattle. In other words, plants are simply a tool to manage the soil. So now I am a soil farmer.

Jean Baptista Van Helmont was a scientist in the 1600s who wanted to learn how

plants grew. He was arrested for his science, as it was against modern thinking at the time. His conclusion was that plants grow from water because the weight of the soil at the beginning of the experiment was nearly the same as at the end. His plants grew by adding only water. At



In a healthy ecosystem, plants grow the soil, not the other way around.

the time people thought plants grew from using up the soil. Wait a minute: is that not the same modern thinking that we use today? We add fertilizer to the soil because it gets used up. Think about it. Do you believe plants grow from the soil?

Jean did not know about photosynthesis. Photosynthesis is how plants take carbon dioxide (CO₂) and water (H₂O), and combine them using sunlight energy, to form a simple sugar called glucose (C₆H₁₂O₆). Did you know that a plant can grow without soil? In a crack in a rock on a mountainside, a spruce tree can grow. Where does it get its nutrients? From the air.

Over 95% of the makeup of any plant comes from the air with some assistance from soil organisms. If we look at the typical dry matter composition of a plant, it looks something like this: 45% carbon, 45% oxygen, 6% hydrogen, and 1.5% nitrogen.

Any other element in a plant will make up less than one per cent. Most are measured in parts per million. The rest of the elements we need to grow plants come from somewhere else. This could be from the soil or straight from rock, with the help of our friends, mycorrhizal fungi.

My point is that the plants do not need soil to grow. However, the soil does need the plants. Photosynthesis by the plants produces sugars, which are the foundation to life. Plants push sugar out of the root tips as they grow, “gluing” the soil particles together and causing good aggregation. The plants build the soil by taking hydrogen, oxygen, carbon, and nitrogen from the air and adding them to the soil. We also have to give credit to the soil microbes. In symbiotic relationships with the plants, many of our microbiotic employees also help to build the soil. For example, mycorrhizal fungi produce

glomalin, which is a glycoprotein. Most tests greatly underestimate the amount of glomalin in our soils, which can account for up to one-third of the organic carbon stored in agricultural land. However, we need healthy soils with good organic life to do so.

I have often heard the recommendation that producers need to cultivate their pastures every eight to 10 years in order to release “bound up” nutrients. I totally disagree with this practice. I am trying to build up my soil by making nutrients become “bound up” in it.

When you break up that pasture, nutrients are released. This allows you to mine the land and deplete it faster. The problem is that it works, as producers get a really good crop for a few years by mining the nutrients. But this is a short-term gain that comes at the cost of depleting the soil. Building soil also increases the water-holding capacity by putting more carbon back into the soil. Humus can hold up to nine times its weight in water.

The best way to put organic carbon back into the soil is through exudation from the actively growing roots of the Poaceae family of plants. This includes pasture grasses and cereals. Exudation is when the root tips are pushing out sugars as they grow, which glues the soil together.

The breakdown of plant material and their fibrous roots is also an important source of carbon in soils. The more active the plant roots are, the more carbon is added. Also, the more diverse the plants,

the better for soil life. We need to stay away from monocultures. Polycultures create healthy ecosystems.

I am experimenting with growing perennial pasture grasses and cereals together. The ongoing carbon inputs from the perennial grasses create highly stable forms of soil carbon, while the short-term, high-sugar forms of carbon exuded by the roots of the cereal crop stimulate microbial activity. This is a good combination for building soil. I also want to have some legumes to fix nitrogen as well as some plants that open up the soil like tillage radish and sweet clover. These are not meant to be a forage, but more of a soil amendment. These big roots can dig down and open up the soil allowing water and air infiltration.

In a healthy ecosystem, plants grow the soil, not the other way around. Of course, this relies on the recycling of nutrients provided to us by livestock, which recycle 80% of what they consume. I am sure glad that they are so inefficient; it is almost like they were meant to be that way. My lesson learned: Use plants to build soils and use livestock to manage the plants. It’s been working for centuries without us.

Originally published in *Canadian Cattleman*, July 2016



Peatland Carbon Sinks

Canada's boreal forest is rich in peatlands

Discussion about climate change often centres on carbon dioxide being released into the atmosphere. We hear less about carbon sinks - things that store more carbon than they release.

The Amazon rainforest and ocean plankton are important carbon sinks. But there is a lesser-known, and increasingly important sink that is capturing the attention of scientists: the wetlands of Canada's boreal forest.

The majority of boreal forest wetlands are made up of bogs and fens, also referred to as peatlands, that, according to the Geological Survey of Canada, store almost 60% of all carbon stored in soils across the country.

"With peatlands, we can be talking about several millennia of accumulated organic material that maintains a very slow rate of decomposition," says Alain Richard, head of Boreal Conservation Partnerships and Services for Ducks Unlimited Canada. "Because of that, it is accumulating more carbon than decomposing, resulting in these wetland types functioning as a net carbon sink."

Peatlands can be 40 centimetres to several metres deep. They are in a variety of places, including areas with permafrost which remain frozen all year.

"When peatland systems remain wet, cool or frozen, it really reduces the rate of organic decomposition, resulting in a net annual accumulation of carbon being stored and thereby functioning as carbon

sinks," says Richard. "But if peatlands start to dry up or permafrost starts to melt, these systems are vulnerable to becoming a source of carbon where these and other greenhouse gases are emitted to the atmosphere."

Forest managers taking holistic approach

It's crucial that land managers understand how much carbon is stored both in trees

These wetlands are made up of bogs and fens that, according to the Geological Survey of Canada, store almost 60% of all carbon stored in soils across the country.

and soil. "Today, methods and tools for carbon measurement are well established for upland forests. These types of dry forests have been studied for decades," says Mark Johnston, a senior research scientist at the Saskatchewan Research Council. "By comparison, we know much less about carbon measurement in wetlands, where trees are smaller and areas are water saturated and difficult to operate in."

Developing practical methods for quantifying carbon storage in upland bore-

al forests and wetlands is the goal of a three-year initiative led by the Saskatchewan Research Council in collaboration with Ducks Unlimited's Boreal Program, the Sustainable Forestry Initiative, Louisiana-Pacific Canada Ltd. and Spruce Products Ltd.

The goal of the project is to develop a rapid protocol that forestry professionals can use to get credible estimates of carbon storage in wetlands. Included in the work are field tests with Louisiana-Pacific Canada Ltd. and Spruce Products Ltd. near Swan River, Manitoba. Field work began last summer.

The Sustainable Forestry Initiative is supporting the project through its Conservation Grants Program. Louisiana-Pacific and Spruce Products have provided access and resources on the forest areas they manage. Ducks Unlimited Canada has mapped the wetlands in the area under study. This wetland mapping captures the type and density of vegetation, and identifies different types of wetlands, including those with deep peat deposits. This will allow for more accurate estimation and mapping of boreal wetland carbon stores.

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Land and Justice

Art Manuel's *Reconciliation Manifesto*

Review by Lynn Gehl

The Reconciliation Manifesto: Recovering the Land, Rebuilding the Economy is a crucial read for all people interested in decolonization and in ending colonial genocide in Canada. Arthur Manuel relies on family history, experiential knowledge, legal training, and his love for his family and the land to share with the public insights he gained as a son, father, grandfather, First Nation Chief, and as an international advocate. His *Manifesto* is 312 pages. Grand Chief Ronald Derrickson wrote the introduction and afterword; Naomi Klein wrote the preface. Through the storytelling approach, chapters are short and void of the technicalities of references. In this review I share four crucial lessons to reflect on.

Colonial foundations

First, Manuel ensures readers understand Canada's constitutional history, explaining the *British North American Act* was invented in 1867 by the British Parliament. Under section 91, subsection 24, the federal government gained complete power over, and the responsibilities over Indians and the land reserved for Indians. Through section 92, provincial authorities seized control of land resources, gaining the right to grant it to settlers, harvest trees, and exploit it through mining. Manuel is clear: the wealth of Canada is based on the dispossession, dependency, and oppression of Indigenous people.

In the 1980s Prime Minister Pierre Trudeau acted to patriate the *BNA Act*. At the time Manuel's father George Manuel launched a massive lobbying effort to ensure Indigenous rights were protected as a third order of government. George organized the Constitutional Express, a train from Vancouver to Ottawa. Largely due to his effort, section 35, which recognizes and affirms Aboriginal and Treaty Rights inclusive of the right to self-government, became a part of Canada's 1982 Constitution, where section 37 codified the process Canada and Indigenous Peoples would take to define Aboriginal rights. Unfortunately, four subsequent conferences failed to produce an understanding beyond municipal-style government powers which was rejected by Indigenous leaders. In the end settler politicians left it up to their courts to settle.

Canada ignores its own courts

Second, Manuel addresses Canada's refusal to implement Aboriginal rights that the Supreme Court of Canada (SCC) has affirmed. In case after case the SCC has decided in favour of Indigenous rights, beginning with the 1973 Calder decision where judges were split on Aboriginal rights, a clear indication that they existed. The 1997 Delgamuukw decision recognized Aboriginal title as a right to land itself and a form of ownership inclusive of economic rights. The 2004 Haida decision established the crown's duty to consult and accommodate Aboriginal rights and title. Manuel also explains the 2014 Tsilhqot'in decision established Aboriginal title on the ground, inclusive of proprietary interests. Collectively these decisions mean Canada's approach to "modern treaty making," to extinguish Indigenous claims to their land and resources, better known as the comprehensive land claim process (CLCP), must be pushed aside.

Regardless, Manuel continues, SCC judges, who make up the judiciary branch of Canada's parliament, continue to hold racist understandings that assume Indigenous rights are merely a burden on the Crown that needs to be resolved. He adds while Indigenous people have fought hard for court victories, Canada's executive and legislative branches remain in denial and the CLCP continues to impose extinguishment. Manuel argues that while Canada is able to accept the SCC decisions on matters such as same-sex marriage and the need for safe injection sites, it holds firmly to its colonial principles regarding Indigenous rights. His point is clear – decolonizing Canada is beyond the domestic capacity of Canada because Canada will not listen to its own courts.

The view from outside

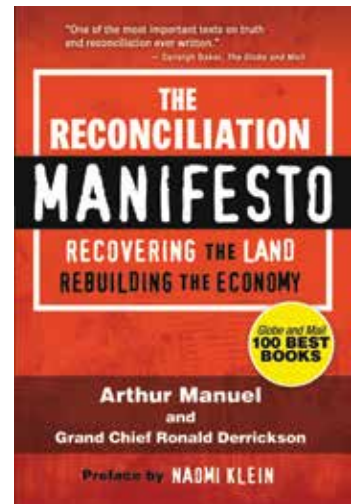
After the second world war, the United Nations proclaimed the Universal Declaration of Human Rights, a cornerstone of international law in which nine basic human rights treaties were agreed upon to protect the rights of people of all nations. Article 1 of the International Covenant on Civil and Political Rights

The Reconciliation Manifesto: Recovering the Land, Rebuilding the Economy

Arthur Manuel

James Lorimer & Company Ltd, 2017

ISBN: 9781459409613



states all people have a right to self-determination; this interacts with Article 3 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which states Indigenous people have the right to self-determination, free from settler interference. Manuel discusses UNDRIP further, reminding us that Canada was one of the countries that voted against it at the 2007 UN General Assembly. He explains he was indeed suspicious when Justin Trudeau campaigned on the promise to adopt it if elected as Prime Minister. In October 2015 he was elected, and in May 2016 Indigenous and Northern Affairs Minister Carolyn Bennett pledged to fully implement UNDRIP. Regardless, in July 2016 Justice Minister Jody Wilson-Raybould, an Indigenous woman, announced it was impossible for Canada to adopt it into Canadian law because it was “unworkable.”

Manuel further explains Canada downplays the importance of international processes for domestic audiences, yet in the international arena a different picture emerges – one where Canada works hard to hide what is going on. Manuel urges Indigenous people to testify at UN meetings because the UN listens. He further explains there are additional international bodies where Indigenous people can take their concerns. When he took his concerns regarding the potential surrender of Secwepemc land through the CLCP to the Committee for the Elimination of Racial Discrimination, the committee concluded the process does not meet the standard of fairness, and also stated that the practice whereby Indigenous nations are expected to borrow funds to ultimately extinguish their own rights was unacceptable.

The struggle for economic justice

Fourth, Manuel offers economic insights. He begins with arguing the poverty of Indigenous people is the result of settler people living on our land enjoying almost 100% of our natural wealth and resources.

Manuel is also clear that the funding sources Indigenous leaders rely on place limits on what a person can say and do, offering he was unemployed since 1988 and while poor he was free to say what he needed to say. He argues there is the need to value leaders who are operating outside of government funding, since changes will only come from outside the system – and Canada

will only pay people who are willing to extinguish Indigenous rights. Unfortunately the Assembly of First Nation (AFN) leaders, he explains, are sell-outs because First Nation Chiefs know when leaders with decolonized mindsets are elected, government funding quickly evaporates.

Manuel argues Indigenous people are in a struggle for economic justice. Canada’s practice of refusing to recognize Indigenous proprietary interests results in international trade subsidies because they are not included in costs. In 2017, British Columbia’s forest industry exported \$2.5 billion of softwood lumber to the United States. He suggests Indigenous people launch a boycott of Canadian forest products and, for example, meet with Home Depot executives and ask them to stop purchasing BC lumber. He further suggests taking the matter up with the World Trade Organization, letting them know that Canada is plundering Indigenous lands without Indigenous people receiving a share.

Within this discussion Manuel explains the economic implications of the Crown’s uncertainty over Indigenous lands, meaning the loss Canada endures because potential investors walk away from the situation. He explains there is a \$600 billion loss and he urges Indigenous people to leverage this in their effort. It is also important to understand provinces are bound to international accounting practices, and it is within these balance sheets where Canada’s liability to Indigenous nations is recorded. This liability is the result of Canada not addressing Indigenous proprietary interests. He reminds us that at the international level, auditors examine Canada’s balance sheets – scrutinizing them for the lies they contain. He laments we must not let Canada resolve its legal uncertainty through extinguishing our rights.

Finally, it is Arthur Manuel’s contention that Prime Minister Trudeau committed the greatest betrayal in all of Canada’s history when he promised he would implement UNDRIP. He lied.

Lynn Gehl, PhD, is an Algonquin Anishinaabe-kwe, an advocate, artist, outspoken critic of colonial law and policies, and author of *Claiming Anishinaabe: Decolonizing the Human Spirit*.

Deep Earth

A subterranean Galapagos expands the tree of life

excerpted by Claire Gilmore

Barely living “zombie” bacteria and other forms of life constitute an immense amount of carbon deep within Earth’s subsurface, according to scientists nearing the end of a 10-year international collaboration to reveal Earth’s innermost secrets.

Scientists with the Deep Carbon Observatory (DCO) say the discovery of this so-called microbial “dark matter” dramatically expands our perspective on the tree of life, and improves our understanding of the impact on life in subsurface locations manipulated by humans (e.g., fracked shales, carbon capture and storage).

Some highlights of the many key discoveries and insights:

- The deep biosphere constitutes a world that can be viewed as a sort of “subterranean Galapagos” and includes members of all three domains of life: bacteria and archaea (microbes with no membrane-bound nucleus), and eukarya (microbes or multicellular organisms with cells that contain a nucleus as well as membrane-bound organelles). Among them are millions of distinct types, most yet to be discovered or characterized.
- Deep microbes are often very different from their surface cousins, with life cycles on near-geologic timescales, dining in some cases on nothing more than energy from rocks.

- The genetic diversity of life below the surface is comparable to or exceeds that above the surface.
- Combined with estimates of subsurface life under the oceans, total global Deep Earth biomass is approximately 15-23 billion tonnes of carbon – 245-385 times greater than the carbon mass of all humans on the surface.

Rick Colwell of Oregon State University comments, “We can only marvel at the nature of the metabolisms that allow life to survive under the extremely impoverished and forbidding conditions for life in deep Earth.”

No limits yet to conditions for life

Indeed, these new discoveries underline the fact that the absolute limits of life on Earth in terms of temperature, pressure, and energy availability have yet to be found – the records continually get broken. For example, a frontrunner for Earth’s hottest organism in the natural world is *Geogemma barossii*, a single-celled organism thriving in hydrothermal vents on the seafloor. Its cells, tiny microscopic spheres, grow and replicate at 121°C (21 degrees hotter than the boiling point of water).

The record depth at which life has been found in the continental subsurface is approximately 5 km; the record in marine waters is 10.5 km from the ocean surface, a depth of extreme pressure; at 4000 metres depth, for example, the pressure is approximately 400 times greater than at sea level.

How these deep microbial life forms get the energy to live and reproduce is still an enigma. DCO scientists have yet to understand whether methane, hydrogen, or natural radiation (from uranium and other elements) is the most important energy source for deep life, and which sources of deep energy are most important in different settings. Karen Lloyd, of the University of Tennessee at Knoxville, says “Today, we know that, in many places, they invest most of their energy to simply maintaining their existence and little into growth, which is a fascinating way to live.”





IODP Expedition 357 to the Atlantis Massif pioneered the use of seabed rockdrills equipped with sensors capable of monitoring in-situ fluid conditions during drilling, and with the potential to “plug” a borehole. Such technology is enhancing scientists’ ability to understand conditions of the deep subsurface encountered by microbial life.

Benedicte Menez of the Institut de Physique du Globe in Paris, France, believes deep life has an important impact on global biogeochemical cycles and chemical equilibria in habitable rocks. According to him, “Deep Life plays a role in aquifer quality, for example, or carbon capture and storage (CCS). Unfortunately, the deep biosphere is very poorly considered in engineering operations carried out in the subsurface. We recently demonstrated the high reactivity of deep biota to CO₂ injections (CCS), which ultimately led to the bioclogging of the injection well, and surrounding reservoir.”

Many other mysteries remain to be investigated, including questions around the origins of deep life, and how microbial populations move from place to place. Scientists are still wondering whether life started deep in Earth (either within the crust, near hydrothermal vents, or in subduction zones) and then migrated upwards toward the sun, or started in a warm little surface pond and migrated down.

Questions and mysteries

Other questions include, how do subsurface microbial zombies reproduce, or live without dividing for millions to tens of millions of years? How does deep life spread – laterally through cracks in rocks? Up, down? How can deep life be so similar in South Africa and Seattle, Washington? Did they have similar origins and were separated by plate tectonics, for example? Or do the communities themselves move? What roles do big geological events (i.e. plate tectonics, earthquakes, creation of large igneous provinces, meteoritic bombardments) play in deep life movements?

“Our studies of deep biosphere microbes have produced much new knowledge, but also a realization and far greater appreciation of how much we have yet to learn about subsurface life,” says Rick Colwell of Oregon State University. “For example, scientists do not yet know all the ways in which deep subsurface life affects surface life and vice versa.”

These discoveries have inspired a sense of wonder, with many scientists comparing deep life to lush, beautifully evolved terrestrial ecosystems such as the Amazon rainforest and the Galapagos Islands. Says Fumio Inagaki of the Japan Agency for Marine-Earth Science and Technology, “Expanding our knowledge of deep life will inspire new insights into planetary habitability, leading us to understand why life emerged on our planet and whether life persists in the Martian subsurface and other celestial bodies.”

—with files from the Deep Carbon Observatory

Island Recycling

A team effort requires a community too

by Isabel Steigemann

Cortes Island's Jo Ann Green Award recognizes contributions to the community's environmental well-being. This year's award was given to Brian Pfeifle who runs the Cortes Island Recycling Centre with his team, Wendy Moore and Donna Naven.

Brian is quick to point out that it's a team award – otherwise he would have been reluctant to accept it.

The Recycling Centre on Cortes is known for its organization, exceptional cleanliness, useful signage, helpful staff and the volunteer-run free store and adjacent "barn" that gives islanders the opportunity to up-cycle.

Brian's favourite aspect of his work is seeing islanders' reactions to their tax dollars being used so well. The team honours their grateful responses.

They send plastic recycling to Merlin New Westminster where it's turned into pellets. Tin is sent to Ontario and the US for washing machines and stoves. Glass goes to Stone Pacific on Vancouver Island and is used for aggregate sandblasting. Styrofoam is dispatched to Vancouver and is used for picture framing and moulds. Paper and cardboard are sent to Asia to be recycled.

Brian is enthusiastically participating in a current provincial pilot program dealing with "Other Flexible Plastic Packaging." Exceptions are white construction

strapping, straws, squishy foam, and squeeze tubes such as toothpaste containers.

Sadly, recycling still eludes many. According to Brian, a professional audit – confirmed by personal observations – showed that only 30% of the contents in the 40-cubic-yard landfill bins belongs there. The rest is recyclable or compostable.

"When I took over in 2013, we were going through 107 bins a year," Brian said. "As of last year, we're up to 132. During the summer months, I can go through two recycling containers in two weeks. In the winter, it takes 3 months."

Looking into a landfill container together, Brian and I see paper, cans, food waste, lots of plastic – such as containers and wrapping, and a flat screen TV. Once, Brian took the 1,600 TVs collected since 2010 to Campbell River on his day off. With approximately 400 driveways on Cortes, that is 4 TVs per household! Brian now asks that people take their old TVs to Campbell River themselves.

"We've got to stop using so much plastic. We have to change. We just have to. I'm kind of a vehicle to get in people's faces about it," he said. "But I've watched how



this award has changed people's view of me. Maybe now they think 'He's not just sitting there being grumpy. He's trying to accomplish something for humanity.'"

Brian lives in a fifth wheel trailer with a small wood stove, battery powered LED lighting, and a small TV. "It's like living in a boat; if you don't need it, it ain't in there. My life's so simple." Smiling he advised, "Buy your house, tune it up and go play in your garden."

"I feel obligated to do my part," Brian told me. "I believe we all should. You've got to lead by example."

Isabel Steigemann was born and raised on Cortes Island. She actively participates in her community hoping to bring positive changes.

Sponsored by Friends of Cortes Island



Carbonless Cargo

A wooden schooner, the sun and the wind

by Gavin MacRae

On a lush patch of cleared jungle outside the slow-paced Pacific coastal town of Punta Morales, Costa Rica, a score of people labour to change the future of the shipping industry.

A workday starts with an early communal breakfast. Then the sawmill and chain-saws start up, and shipbuilding continues until late afternoon. They've nearly laid the keel of their wooden schooner, *Ceiba*.

Designed to haul bulk cargo using only wind and sun as power, the ship will be three-masted and have an electric motor that can be charged from solar panels or the wind.

The company is Sailcargo, and their mission is to “inspire change in the shipping and transportation industry,” says co-founder Danielle Doggett. “We hope to do that by offering a financially successful, financially viable, emissions-free cargo ship.”

With a capacity equivalent to 10 standard shipping containers, *Ceiba* will be tiny relative to modern cargo vessels hauling 18,000 containers or more. Despite this, wooden ships hauling freight under sail are a budding trend, and *Ceiba* will join the ranks of similar operations on other oceans, already transporting boutique cargoes such as rum, wine, cacao, and coffee.

The intention with Sailcargo is not to compete with conventional cargo ships,



but to promote an alternate concept of ocean shipping – and to demonstrate that carbon-neutral shipping is possible, and profitable. “You don’t go to your farmer’s market ... and ask ‘how can you compete with Walmart?’” says Doggett. “It’s emissions-free cargo, we’re not trying to compete, we’re offering a different service.”

Like the ships, the carbon footprint of the modern shipping industry is super-sized. The International Maritime Organization, the UN body that regulates the industry, has struggled to rein in emissions and to free itself from the corporate influence of status quo industry voices. Without bold action, shipping emissions are set to balloon in coming decades, driven largely by increased global trade.

Doggett has worked aboard other sail cargo vessels and acted as an advisor to other sail cargo operations. “The main thing we tried to do with this company is take the lessons we’ve learned from those pioneering companies and make it more eco-

nomically viable,” she says. “If it doesn’t make money, [investors] aren’t interested. So we said okay, let’s start with that and from there we can build a beautiful ship and have a value added service.”

Ceiba will begin her maiden voyage up the Pacific coast of the Americas in roughly three-and-a-half years. They already have cargoes booked – a twice-yearly load of coffee destined for BC, with a return voyage hauling barley back to Costa Rica. Although not a passenger or training vessel, some of *Ceiba*’s berths will be set aside for shareholders looking for a working vacation, or environmental scientists conducting research.

Businesses looking to haul freight on the Pacific coast sans carbon can contact Sailcargo. Investors can also purchase stocks. www.sailcargo.org

Gavin MacRae is the *Watershed Sentinel*’s staff reporter and editorial assistant. He lives in Comox, BC.

Guatemala

The criminalization of Indigenous land defense

by Dawn Paley



Birds trill from above through the heat and humidity, oblivious to the nearly 5,000 incarcerated men below. After a long wait to get approval to enter the largest men's prison in Guatemala, I walk down the steps into the main area of jail. The mood inside is rowdy. A handful of new prisoners, still in the

hold, call out to me in English. The smell of burned hair moves through the filthy corridor.

Eventually, we're allowed to see Abelino Chub Caal, a schoolteacher who spent 10 years accompanying Maya Q'eqchi' communities in their land struggles before he was arrested in February of 2017. Two investment corporations pressed charges, accusing him of disturbing the peace, illicit association (under anti-narcotics legislation), and arson, allegedly for burning a field of African oil palm in the eastern province of Izabal.

We greet each other through a thick acrylic pane with a dozen pea-sized holes at mouth level. "If the crime for which I have been detained has been representing communities, then it's evident that state authorities and the companies don't want me supporting the communities," says Chub Caal, straining to be heard against the din. "What these communities did was re-occupy the lands that they were pushed off during the [civil] war."

Chub Caal paints a bleak picture of dozens of Indigenous families with little access to lands for farming, some of whom are near starving. Since he's been in prison, he says, officials from the two investment corporations have visited and told him that if he stops his work with the communities, he'll walk.

The power of large landowners and the military means hundreds of thousands

of Guatemalans, like those supported by Chub Caal, remain displaced from their lands 21 years after the Peace Accords. Wealthy elites have a stranglehold on the national economy: 0.0001% represent more than half of the wealth in the country. Communal structures and traditional knowledge, especially that held by women, remain vibrant, but are under attack by armed groups and state institutions.

Migration, disaster, and insecurity

In June, US Vice President Mike Pence traveled to Guatemala, where he met with Guatemalan President Jimmy Morales and the presidents of Honduras and



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El Salvador. The three agreed to ramp up anti-drug action. None of the men mentioned the Alliance for Prosperity, a plan to transform energy and logistics infrastructure in Central America while militarizing the region on the pretext of fighting the war on drugs.

In his remarks in Guatemala City, Pence stated “While many claim asylum, few are fleeing persecution.” The situation on the ground, however, looks very different. According to the World Bank, at the end of 2017 there were 242,000 people internally displaced by conflict and violence in Guatemala, and another 40,000 displaced by natural disasters. Guatemala’s homicide rate remains high, and Indigenous and campesino communities continue to be evicted from their lands in order to open the door to new energy and agribusiness interests.

Though many Guatemalans have chosen to attempt a dangerous journey to the United States, others remain and continue to work to protect their lands and lifestyles from the threats posed by extractive industries, large landowners, and energy projects. In the first six months of 2018, at least twelve land defenders were killed in Guatemala, most of them Indigenous.

One of the most emblematic struggles in the country is that of the Xinca people, who number over a half-million and are one of two non-Mayan Indigenous groups officially recognized in Guatemala.

The Xinca struggle for recognition

Xinca identity, long denied, is undergoing a period of revival. A tall poster in the entryway of the Parliament reads “Xinca, a matter of the heart,” encouraging locals to reconnect to their Indigenous roots. There’s a familiar series of threats to Xinca lands: industrial farming of African

palm oil, sugar cane, and eucalyptus, as well as a proposed superhighway connecting the Atlantic to the Pacific. “What we’re most concerned about are the threats from the extractive industries,” says Aleisar Arana, President of the Xinca Parliament.

The Xinca are on the national stage after winning a June 2017 injunction following a court challenge against a gold-lead-zinc mine owned by US-Canadian Tahoe Resources.


Locals have set up resistance camps to ensure the court injunction is respected. As in the case of Chub Caal, people participating in the resistance to the mine have been criminalized and threatened by state forces and mine security.

The court case on keeping the mine shut was before the Constitutional Court for months. “Either we’re going to continue with this system where large corporations can do whatever they want, or we’re going to set a precedent that the law means something, and it should be respected, even if that means ‘damaging’ the interests of a large corporation,” said Magalí Rey Rosa, an ecologist who has been active in conservation struggles for decades.

In early September, the Constitutional Court upheld the suspension of the mine and ruled that the Xinca people must be consulted before any mining activity takes place. In response, the Xinca Parliament stated they had hoped for a definitive suspension of the project, but saw it as an important precedent towards the legal recognition of Indigenous Peoples, and as a chance to permanently stop the mine.

In the capital and in the territories, extreme inequality reigns in Guatemala, and militarization is increasingly the norm. “The current conditions of inequality and land expropriation appear just as they did in the 1970s,” said Dr. Gladys Tzul Tzul, a Maya K’iche’ sociologist. “Those are the very conditions that led to the internal conflict and to genocide.”

Dawn Paley is the Mexico-based author of *Drug War Capitalism* (AK Press, 2014).




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Wild Times

Phantom Forests

by Joe Foy

Forests are relaxing. How fine it is to hear a cool mountain breeze whispering through the treetops or a stream bubbling around mossy boulders in the deep woods. Waking up to the melody of early morning bird song is calming and beautiful.

But increasingly BC's forests are becoming a source of high anxiety. Though our political leaders often say the forests are well looked after, declining wildlife populations tell a different story.

Take the spotted owl. In 1986, BC's declining spotted owl population was designated as endangered in Canada. Before heavy logging began, spotted owls numbered around 500 pairs in the southwest mainland.

In 1993, provincial biologists found only 61 adult spotted owls at 39 active sites. The team found just 22 pairs – a far cry from the 500 pairs that once lived there.

But BC's logging of old growth spotted owl habitat continued.

In 2004, BC government biologists could find only 25 spotted owls, consisting of 8 pairs and 9 singles.

In 2017, they could only find 12 spotted owls, consisting of 2 pairs and 8 singles.

BC Timber Sales (BCTS), a provincial government agency, has for some years planned and overseen more logging of spotted owl habitat than any other logging operation. BCTS logging plans for the Chilliwack forests for 2019 and beyond shows that they have planned twice as many clearcuts in old growth forests as in second growth forests – which of course is yet another nail in the coffin for the spotted owl who rely on old growth forests for survival.

It matters because the disaster that has befallen the spotted owl is not the end – it's just the beginning.

The old growth logging that has been allowed to carry on decade after decade in BC is now causing a cascade of wildlife disappearances. Mountain caribou populations are collapsing because of old growth logging, with some herds in the Selkirk Mountains disappearing altogether this past year.

And in the forest habitat of the herds adjacent to Wells Gray Provincial Park, 589 clearcuts are to be logged, a whopping

9,402 hectares of old growth forests. This is an extinction plan – there's no other way to put it.

The growing roll call of disappearing old growth dependent species is just too painfully long to list here, from the marbled murrelet to the Vancouver Island marmot. BC must stop logging our few remaining old growth forests. And speed up the process of working with First Nations to get special wild places designated as protected areas.

There is hope, even for the spotted owl, if enough old growth forest can be protected and younger forests allowed to live long enough to become old-growth once again. But time is clearly running out.

To continue logging old growth is to condemn future generations to a legacy of phantom forests, haunted by the spirits of wildlife that once lived there.

Joe Foy is the co-executive director for the Wilderness Committee, Canada's largest membership-based wilderness preservation organization.



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