
MAWQATMUTI'KW

OUR CONNECTION

"We may get to the point where the only way of saving the world will be for industrial civilizations to collapse."

"We must from here on in, all go down the same path…There may not be another chance."

– Maurice Strong

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" *Explore the unique visual experience of a free dive within the water world of a floating Lillypad's field* "
- Gilbert van Ryckevorsel.

mawqatmuti'kw

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Mawqatmuti'kw is also produced to feature articles and information about MAARS work to promote knowledge about aquatic resources, ocean management, communal commercial fisheries, collaborative partnerships and governance.

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Photo Credit: Alan Syliboy. Humpback With Two Silver Stars (11" x 14" print), original: acrylic on canvas 36" x 48", 2014. Artist Statement: "This piece is from my Whale Series. The Humpback Whale has appeared in many of my pieces and continues to be one of the most popular images".

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NEWS FROM MAARS & MAPC

GUEST WRITER

COMMUNAL LIVING ON PLANET EARTH

by KATHERINE SORBEY

In 1956 my mother Susan Johnson and I were looking out the window at night on Benedych Street in Sydney, Nova Scotia. I had just been released from St. Rita Hospital. I had my appendix rupture and I needed surgery.

I had been very sick and very frightened, but my mother pacified me by telling us to look out through an open window.

It was a perfect night, clear and still. The stars were out in record numbers.

My mother said to me "Daughter do you know that we are not the only people blessed with this beautiful sight", I said how come? Because she says, we are only seeing a drop of the Mestaqamu'k (Universe). There are many, many people on this wsitqamu'k (mother earth). We are called mimajuinu'k (human beings).

I never forgot that story and never forgot mom "kiju". Along my life's journey, I met many mothers who became my Kiju's, all over the Maritimes the land of the Mi'kmaq, for I am a Mi'kmaq woman.

I was born and raised in Mi'kmaki and I've been everywhere, where my people still call this their ancestral homeland for thousands of years.

I prefer to live in Mi'kmaki as a Mi'Kmaq and I mean that literally. I still speak and live my language. I have been taught by my elders to respect, honour and cherish mother earth, for it gives me life each day - one of the most important treasures given to us by the Creator.

I just wish everyone would view mother earth the way I do with peace, joy,

Katherine Sorbey, throughout Mi'kma'ki and beyond, is known as the "Language and Culture Ambassador" of the Mi'kmaq receiving countless testimonies and accolades for her tireless work. She is a founding member of the Boston Indian Council, as well as the Non-Status Indian and Métis Association, established in 1974, today, the Native Council of Nova Scotia. Kathy was received with the official Mi'kmaq delegation of the Mi'kmaq Grand Council Chief and Mi'kmaq Grand Council Keptin by the Commonwealth of Massachusetts at the official ceremonies reaffirming the Watertown Treaty of 1776; the first international Treaty of the United States of America with the Mi'kmaq. Kathy has been an instrumental lead contributor to the Mi'kmaq language program. She was a member of the 1993 production team which produced "Mi'kma'ki The Map". Kathy featured prominently in the visit to the birthplace village in France of Father LaClerq, who in 1610 baptized Chief Henry Membertou. Kathy has attended countless official ceremonies, functions, presentations, workshops, community baptisms, weddings, and funerals. Those who meet Kathy are graced with a unique opportunity to learn the reality of the continuing Mi'kmaq on traditional ancestral homelands. In 2007, Kathy Sorbey was presented with the Congress of Aboriginal Peoples "Aboriginal Order of Canada". Most recently, Kathy contributed to the production of IKANAWTIKET's Kespiatuksitew Wsitqamuey (Species at Risk).

wisdom, understanding and accepting that we humans are just a grain of sand compared to mother earth's usefulness and the bounty it gives and how mighty powerful it is. Somehow we never get over ourselves. We always have to be number one at all times. We forget mother earth, forget the blessed water, the sky, the woods and all other creatures that sustain us. We don't give thanks giving for anything nor for each other or other creatures. The only living creatures that are true to themselves are the creatures we call animals, fish, fowl, serpents, rodents, and many others.

Even these creature we have ruined. We take away their ancestral lands, water, and living space. We have created an evolution of these things and we are going to suffer for that with many diseases on man. We should be grateful for this planet, for it's the only planet that tolerates us humans - so far. I can see that she is getting greatly fed up with the likes of us. She can go on forever, but can we?

The Mestaqamu'k (Universe) is a living source, whose life doesn't depend on us

humans. We live because of its source.

The Aboriginal People on this Planet are seen as different by most non-aboriginal people. It is because those people don't use a conscientious mind to see humanity as a whole, nor do they use their ability to connect with the natural environment of Planet Earth – mother earth.

I'm sorry to say that in my 76 years on this planet, and with the many persons that I have met of all different cultures and different ethnic languages, I firmly believe that their political views and harsh history of where their ancestral lands are, and the leaders which they pick eventually become so engrossed in their leadership, that they actually believe they have the right to run the lives of other people, forgetting that every person is born with the same right to life. Everything human is forgotten as well as to serve others.

In the past, as a native (Mi'kmaq), I have witnessed many, many unkindness's. The only teachings that I remember well, are those shared with me in my native language.

Illustration by Anna Nibby-Woods

The most important one is: "extend a hand in friendship to another person, not an M16 or an AK-47 to make peace or friendship". The fumes from these weapons alone can easily kill you. Peace Keepers beware!

In 1951 my father Noel Johnson took me to the snares he had set. To check out if he would "Oqo'si" (if food would be waiting for us). He showed me how to track the rabbits, how they are only good to eat in the winter months when they were "Wabus" (white rabbit). Never kill a "Apli kmuj" (brown one) because that's when they are breeding.

He stopped and told me to look up at the "Musiki sk" (Sky) "Ju's" (daughter). Take a good look up there. Someday people will be putting things in the sky that don't belong there. It will cause sickness to all humans.

Then in 1978 I was driving my father-in-law Nicholas Sorbey to see my mother-in-law Emily Sorbey in the hospital. As I stopped the car, he got out and said "Tutjij" (little daughter), look up in the "Musik'sk" (sky) see how beautiful it is, its not gonna stay beautiful forever. I asked why? He said because fools are putting stuff up there that don't belong there. I may not live to see it myself, but the sky is gonna turn on us humans. We won't even know where the sickness comes from.

I have travelled to Europe, all over Canada and the United States for the good part of 50 years of my life. I have seen the changes to the sky, the ocean, rivers,

brooks, lakes, streams, rocks, forests, mountains, hills and so many other beautiful features of mother earth. Now, 50 years later, the oceans are full of garbage, the rivers are no longer fishable, the brooks have no brook trout (we can't see them through the silty water), the streams where salmon and bass were a welcome sight are no longer suitable for spawning. Rock mountains are no longer visible, forests are cut down, and the most we have left are landslides, mountains getting smaller and no longer growing the first heavenly flower called the "May flower". Hills where many berries grew like strawberries, raspberries, blackberries, blueberries, mint berries, and many other berries that were used for medicines are destroyed.

Nothing is natural anymore. We all suffer from many new illnesses that we never heard of before. We as humans no longer believe: "what gives us life matters and deserves our respect". So sad that "Mawqatmuti'kw" ("we all live together") no longer matters.

The change to respect life and our natural world – mother earth, I believe lies in us humans. We have evolved drastically to being more centered upon ourselves. We always want more, more, and more. Nothing is ever enough for us. We have to conquer and control everything and everyone around us.

Too bad to be that way, we will never never ever conquer the universe. Without caring for our creators bounty and natural life, or not extending a hand in friendship to another human on mother earth, we are becoming garbage disposal on Planet Earth.

Photo Credit: Wallace Nevin. A view from atop Cape Clear, Cape Breton of the river valley below.

COVID-19 Has Blown Away the Myth About '1st' & '3rd' WORLD COMPETENCE

by **S. FRIEDMAN**

JOHANNESBURG, May 15 2020 (IPS) - One of the planet's – and Africa's – deepest prejudices is being demolished by the way countries handle COVID-19.

For as long as any of us remember, everyone "knew" that "First World" countries – in effect, Western Europe and North America – were much better at providing their citizens with a good life than the poor and incapable states of the "Third World". "First World" has become shorthand for competence, sophistication and the highest political and economic standards.

So deep-rooted is this that even critics of the "First World" usually accept it. They might argue that it became that way by exploiting the rest of the world or that it is not morally or culturally superior. But they never question that it knows how to offer (some) people a better material life. Africans and others in the "Third World" often aspire to become like the "First World" – and to live in it, because that means living better.

For Anglophone Africans, it is doubly interesting that two of the greatest failures in handling COVID-19 are the former coloniser, Britain, and the English-speaking superpower, the United States of America

So we should have expected the state-of-the-art health systems of the "First World", spurred on by their aware and empowered citizens, to handle COVID-19 with relative ease, leaving the rest of the planet to endure the horror of buckling health systems and mass graves.

We have seen precisely the opposite.

PHOTO BY Authors

FATAL ERRORS

"First World" is often code for countries run by Europeans or people of European descent; some of the worst health performers on the globe in recent weeks have been "First World". For Anglophone Africans, it is doubly interesting that two of the greatest failures in handling COVID-19 are the former coloniser, Britain, and the English-speaking superpower, the United States of America.

Both countries' national governments have made just about every possible mistake in tackling COVID-19.

They ignored the threat. When they were forced to act, they sent mixed signals to citizens which encouraged many to act in ways which spread the infection. Neither did anything like the testing needed to control the virus. Both failed to equip their hospitals and health workers with the equipment they needed, triggering many avoidable deaths.

The failure was political. The US is the only rich country with no national health system. An attempt by former president Barack Obama to extend affordable care was watered down by right-wing resistance, then further gutted by the current president and his party. Britain's much-loved National Health Service has been weakened by spending cuts. Both governments failed to fight the virus in time because they had other priorities.

And yet, in Britain, the government's popularity ratings are sky high and it is expected to win the next election comfortably. The US president is behind in the polls but the contest is close enough to make his re-election a real

possibility. Can there be anything more typically "Third World" than citizens supporting a government whose actions cost thousands of lives?

Western European countries such as Spain, Italy and Africa's other wholesale coloniser, France, also battled to contain the virus. Some European countries have coped reasonably well, as have some run by the descendants of Europeans such as New Zealand and Australia. But the star performers are not in the historical "First World".

EFFECTIVE RESPONSES

The most effective response was probably South Korea's, followed by other East Asian states and territories. This is partly because they are used to dealing with coronavirus outbreaks. But it is also because they learned from experience: South Korea's success is due to very effective testing and tracing of infected people. Whatever the reason, it is East Asia, not "the West", which has done what the "First World" is expected to do.

Some would reply that East Asia is now "First World". So, it is still superior; it has simply changed its address. This is debatable. But, even if it is accepted, some places have contained the virus in distinctly "Third World" conditions.

Kerala was the first Indian state to encounter the virus but has kept deaths down to three. It had largely curbed COVID-19 but is now dealing with nearly 200 cases, all people arriving from other parts of India. Judging by its record so far, it will contain this outbreak too.

Kerala, too, has learnt from handling previous epidemics. It also has a strong health system. But one of its key tools is citizen participation: it has worked with neighbourhood watches and citizen volunteers to track the contacts of infected people. Students were recruited to build kiosks at which citizens were tested. Kerala also had the capacity to ensure that all children entitled to school meals received them after schools were closed: non-governmental organisations were mostly responsible, emphasising the partnership between the government and citizens.

Kerala's performance is not a fluke: it has, for years, produced better health outcomes and literacy rates than the rest of India.

Nor has Africa's response to the virus confirmed prejudices. When COVID-19 began spreading, it became almost routine for reports, commentaries – and Melinda Gates, who, with her husband Bill, heads the couple's development foundation – to predict that Africa would be engulfed in death as the virus ripped through its weak health systems. This is, after all, what is meant to happen in the "Third World" and particularly in Africa, which is always considered the least capable continent on the planet.

So far, it has not happened. It still might but, even if it does, some countries are coping better than the dire predictions claimed (and, perhaps, better than the "First World"). One stand-out is Senegal, which has devised a cheap test for the virus and has used 3-D printing to produce ventilators at a fraction of the going price. Africa, too, has experienced recent outbreaks, notably of Ebola, and

seems to have learned valuable lessons from them.

INSPIRING

The “First World” is still far richer than the rest of the planet and may well remain so. So its politicians, academics and journalists will probably still believe they are better than the rest.

But the COVID-19 experience may just trigger new thinking in the “Third World”. The most basic function of a government is to protect the safety of its citizens. Ensuring that people remain healthy is at least as important a guarantee of safety as protecting them from violence.

Reasonable people would surely much rather be living in Kerala or Senegal (or East Asia) right now than in Europe and North America, raising obvious questions about who really does offer a better life.

That should inspire Africans and others in the “Third World” to ask themselves whether it makes sense to want to be in America, Britain or France. COVID-19 has made a strong argument for wanting to be in East Asia – or, given Africa’s circumstances, Kerala.

Steven Friedman, Professor of Political Studies, University of Johannesburg

Story Credit: Steven Friedman, May 2020 - Inter Press Service (IPS), ipsnews.net

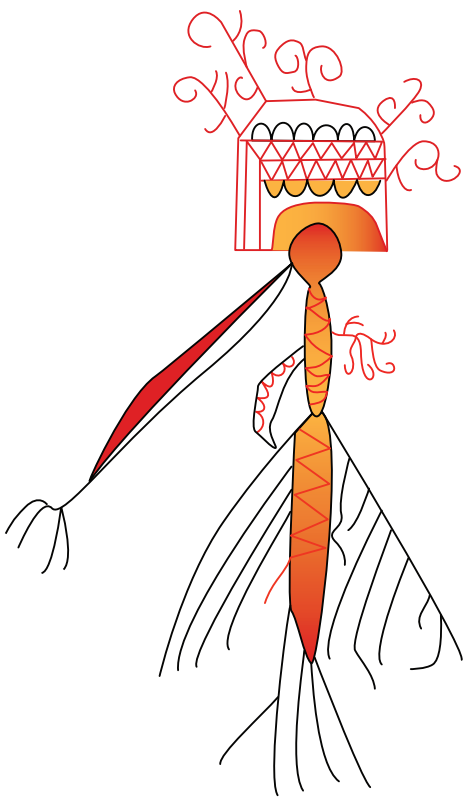

Illustration by Anna Nibby-Woods

NO SUSTAINABLE DEVELOPMENT WITHOUT INDIGENOUS PEOPLES

by J. CAMPBELL

STORY HIGHLIGHTS

Indigenous peoples are of vital importance to the world's land management and keeping the world's food systems diverse and sustainable.

They make up less than 5% of the population but manage more than one-quarter of the world's land surface.

Many of the world's forests remain intact because indigenous peoples have protected and maintained them for centuries.

For years, the importance of indigenous peoples in the fight against deforestation, land degradation and climate change was overlooked and even denied, to the detriment of the environment and the food systems on which we all depend. Thanks to the global advocacy of indigenous peoples and their organizations, this tendency is changing – though not fast enough.

Some 370 million people identify themselves as members of indigenous cultures. While indigenous peoples make up less than 5% of the world's total population, they wield enormous influence over the well-being of the natural resources on which we all depend. They manage 28% of the world's land surface and, are the de facto guardians of 80% of global biodiversity – including most of the plant and animal species on Earth.

As family farmers, fishers, pastoralists and forest-dwellers, indigenous peoples apply traditional methods of land management and food production which have evolved over centuries and which have often proven their sustainability and resilience in the face of environmental changes.

Photo courtesy of Jennie Persson

Indigenous knowledge systems and languages contribute directly to biological and cultural diversity, poverty eradication, conflict resolution, food security and ecosystem health, and serve as the foundation of the resilience of indigenous communities to the impact of climate change. Their awareness of traditional food sources and the fundamental connection between food systems and healthy landscapes can help to promote diets that are diverse and sustainable.

The vital role of indigenous peoples was recognized in the 2007 UN Declaration on the Rights of Indigenous Peoples (UNDRIP). And yet, indigenous peoples continue to suffer disproportionately high levels of land insecurity, social dislocation and violence while defending their traditional lands. They also make up 15% of the world's poorest people.

These and other factors, including youth migration, are causing traditional knowledge and indigenous food systems to disappear at an alarming rate. They are also contributing to the rapid loss of indigenous languages. In fact, this year's observance of the International Day of the World's Indigenous Peoples (9 August) focuses attention on the world's 7,000 indigenous languages, in keeping with the year-long observance of the International Year of Indigenous Languages.

When, in 2015, the international community agreed on 17 Sustainable Development Goals (SDGs), a set of targets for improving lives while protecting natural resources by the year 2030, they included specific mention of indigenous peoples, and acknowledged that there can be no truly sustainable development without protecting the traditional knowledge and territories of indigenous peoples.

We can look to the world's forests for an example of why this is so. Forests continue to be critical for the food security, livelihoods, culture and spiritual identity of indigenous peoples. Their resources include nutritious foods and medicines, household materials and the income gained from selling forest products.

Indigenous knowledge can be combined with new information and innovation in agriculture and land management to protect biodiversity and foster integrated sustainable management of diverse food systems and conservation of traditional medicines. But this approach requires urgent, consistent action.

In countries like Indonesia and Peru, governments and organizations of indigenous peoples are working to develop appropriate forestry policies that take into consideration the land, resource rights and views of indigenous peoples, providing communities with land tenure options and offering farmers, fishers and forest-dwellers training in updated techniques to address climate change and forest management.

In Côte d'Ivoire, Panama and elsewhere, new technologies, such as drone-supported mapping of forest cover and territories, are being used to support sustainable land management (SLM) practices and recognition of traditional land ownership rights.

Other initiatives to support indigenous peoples include finding new markets for traditional products, developing forest and land management plans that are climate-resistant, promoting protection of indigenous intellectual property and cultural identities and developing systems for indigenous peoples to negotiate and resolve potential conflicts with the holders of private forest concessions.

In recent months, the Food and Agriculture Organization of the UN (FAO) hosted the first-ever high-level expert meeting on indigenous food systems. In the near future, a forthcoming FAO report based on two years of research is expected to shed further light on the experiences of indigenous peoples, their needs and their potential to help achieve a sustainable, hunger-free world.

While these are encouraging signs of commitment, it will take urgent, broader policy changes and community-based action, particularly around the recognition of land rights, to bring about significant, lasting improvements in the lives of indigenous peoples and the natural resources which are vital to us all.

Fortunately, the next generation of indigenous peoples, the youth, are showing signs of mobilizing to keep up the momentum. It is our collective responsibility to support them and, ultimately, the well-being of our planet.

Story Credit: Jeffrey Campbell (FFF), Aug 2019, International Institute for Sustainable Development (IISD) & Sustainable Development Goals (SDG) - http://sdg.iisd.org/

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COVID-19 & HUMAN HEALTH RISKS LINKED TO WILDLIFE TRADE PRACTICES

by S. BROAD

CAMBRIDGE, UK, May 7 2020 (IPS) - At the time of writing, the COVID-19 pandemic is raging worldwide, causing human mortality and socio-economic disruption on a massive scale and it appears highly likely that profound impacts will continue for many years to come.

Although the precise origins of the disease remain unproven, there are strong indications of a wild animal source and a direct link to wildlife trade in China.

Even if evidence points elsewhere in future, the magnitude of the current outbreak places under an intense spotlight concerns raised by zoonotic disease experts over many decades about human health risks linked to wild animal trade in the increasingly inter-connected global economy.

As calls for new health-focused restrictions on wildlife trade have increased in volume in response to the current pandemic, some countries have taken immediate action. Building on immediate emergency restrictions placed on wildlife markets in January 2020, China is implementing a long-term prohibition on trade and consumption of wild animals for food as a public health protection measure.

Viet Nam is also considering new health-focused market restrictions and Gabon has introduced new species-specific trade restrictions. Looking ahead, there is a critical need to improve understanding of what sort of interventions might make the biggest difference in reducing risks of zoonotic disease emergence.

However, it is also important to work out how such actions might best complement, rather than conflict with, the range of existing conservation-focused wildlife trade regulation and management measures that are already struggling to contain over-exploitation of nature by people.

An animal market in Indonesia. Credit: TRAFFIC

Zoonotic disease risks have not been wholly ignored before now. Many countries have live animal quarantine requirements and other rules governing the cross-border movement of meat, fish and other animal products.

Similarly, production, trade and use of live animals and products are subject to animal and human health regulations within domestic markets of most countries. However, such measures are typically designed primarily to address trade and consumption of domesticated species, the volume and value of which vastly exceed wild animal business.

As a result, the provisions of such regulations are seldom tailored to the specific dynamics and risks of the trade in wild animals.

Design of new interventions should be based on evidence-based assessment of disease-related vulnerabilities in current wild animal trade chains. Based on study of past cases, experts point to heightened risks of zoonotic disease spillover in places where large numbers of stressed live animals of different species (wild or domesticated) and people are in close proximity, such as transport hubs, holding facilities and markets.

However, there remains considerable uncertainty about differentiation of risk levels between different wild animal species (or species groups) and about the likelihood of transmission from different wild animal parts and products.

There is a wide range of options for future

intervention based on assessment of such risks. Prohibitions on trade and consumption of certain species or products could be warranted. This would likely require new or modified national legislation in many countries, as most current restrictions are explicitly justified by conservation threat levels and jurisdiction is often limited to import/export controls only.

Such measures would of course face the same challenges that undermine existing wildlife trade laws: enforcement is inconsistent, often under-resourced, undermined by criminality and corruption, and given insufficient priority by governments. Risky trade may simply continue through illicit markets.

It is possible that the greatest benefit might come from changes in management practices for holding, trade and processing wild animals in trade. These might include regulatory or voluntary private sector measures aimed to improve animal husbandry, increase separation between species in trade, enhance sanitation at holding facilities and improve personal protection for workers.

These measures may again require modification of existing animal and human health legislation, but there is considerable practical experience from the domesticated animal sector that could be applied to this challenge.

Despite the clear imperative for action provided by the tragic impacts of the COVID-19 pandemic, it will be critical to ensure that remedial restrictions on wildlife commerce are tailored to achieve specific risk reduction goals and designed to take into account potential negative impacts on social equity, livelihoods, and indirect conservation impacts.

Such measures also need to be set in the context of other zoonotic disease pathways and risk factors that need careful attention, such as land-use change, domestic livestock management practices and other human/wildlife interactions.

It is also vital that amidst the urgent need to reduce zoonotic disease threats from wildlife trade, the ongoing drive to address over-exploitation threats to wildlife does not lose momentum. It is of course possible that new health-focused restrictions on wild animal trade and increased scrutiny of wildlife commerce more generally owing to its likely connection with the pandemic may reinforce conservation-focused action.

However, trade in what may be identified as higher risk sectors, such as that of live wild mammals and birds, makes up a small proportion of the global wildlife trade. The greatest over-exploitation threats are faced by marine species and the biggest wildlife trade flows are of timber and other wild plant products.

There is additional cause for concern that socio-economic impacts of the COVID-19 pandemic may be driving new trends in wildlife trade patterns that need careful attention. Past disease outbreaks linked to wild meat trade have led to increased demands for marine fish and there is already evidence of greater attention to wild plant-based medicinal treatments and tonics.

Although some illegal wildlife trade flows may now be suppressed by transport interruptions and retail market closures, there is every likelihood that criminal syndicates will move fast to rebuild illicit businesses and exploit diversion of government enforcement resources to other priorities.

A new focus on human health risks linked to wildlife trade practices is certainly warranted as a component of wider thought and action on the relationship between people and nature as the COVID-19 epidemic persists.

The response should be targeted, appropriate to the task and its design grounded in experience gained from past

An animal market in Indonesia. Credit: TRAFFIC

wildlife trade interventions. In the same way that human and environmental health are intimately connected, it is essential that new health-focused wildlife trade interventions are considered in concert with those already focused on conservation gain.

The "super-year for biodiversity" may have been delayed, but the imperative for conservation action remains.

An abridged version of the article appeared in the April issue of the TRAFFIC Bulletin, available for download at: https://www.traffic.org/site/assets/files/12779/bulletin-32_1-final-web.pdf.

Steven Broad is the Executive Director, TRAFFIC, the Wildlife Trade Monitoring Network.

Story Credit: by Steven Broad, May 2020, Inter Press Service News Agency - ipsnews.net

BELIZE PASSES MILESTONE LAW TO SAFEGUARD FISHERIES

by JEWEL FRASER

PORT OF SPAIN, Feb 26 2020 (IPS) - The Environmental Defence Fund and its partners in conservation are this month celebrating a major milestone in Belize's efforts to safeguard its fisheries.

On Feb. 14, the Belizean Parliament passed into law the Fisheries Resources Act that establishes legal safeguards for marine protected areas and that country's managed access programme for fishers. The Central American country of Belize was a pioneer in 2016 in bringing its entire territorial waters under a system of licensed fishing rights that gave fishers designated spots.

Doug Rader, chief ocean scientist at the EDF, tells Voices from the Global South that this new law is a win-win for all, since the marine protected areas and the managed access programme reinforce each other, ensuring the livelihood of Belizean fishers. In this Voices from the Global South Podcast, IPS Caribbean correspondent Jewel Fraser speaks to Rader about the problems the law will solve and the ways Belize and neighbouring countries will benefit.

Story Credit: Jewel Fraser, Feb 2020, Inter Press Service News Agency - ipsnews.net


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TREE PLANTING DRONES FIRING SEED MISSILES

by L. SHVEDSKY

Technology is the single greatest contributor to climate change but it may also soon be used to offset the damage we've done to our planet since the Industrial Age began.

In September 2018, a project in Myanmar used drones to fire “seed missiles" into remote areas of the country where trees were not growing. Less than a year later, thousands of those seed missiles have sprouted into 20-inch mangrove saplings that could literally be a case study in how technology can be used to innovate our way out of the climate change crisis.

“We now have a case confirmed of what species we can plant and in what conditions," Irina Fedorenko, co-founder of Biocarbon Engineering, told Fast Company. “We are now ready to scale up our planting and replicate this success."

According to Fedoranko, just two operators could send out a mini-fleet of seed missile planting drones that could plant 400,000 trees a day -- a number that quite possibly could make massive headway in combating the effects of manmade climate change.

The drones were designed by an ex-NASA engineer. And with a pressing need to reseed an area in Myanmar equal to the size of Rhode Island, the challenge is massive but suddenly within reach. Bremley Lyngdoh, founder and CEO of World Impact, says reseeding that area could theoretically house as many as 1 billion new trees.

“Obviously, planting a billion trees will take a long time without the help of drones," Lyngdoh told Fast Company.

But they've now got a powerful new ally in their corner. For context, it took the Worldview Foundation 7 years to plant 6 million trees in Myanmar. Now, with the help of the drones, they hope to plant another 4 million before the end of 2019.

Photo: courtesy BioCarbon Engineering/WikiCommons

Myanmar is a great case study for the project. In addition to the available land for the drone project, the nation has been particularly hit by the early effects of climate change in recent years. Rising sea levels are having a measurable impact on the population. In addition to their ability to clear CO2 from the atmosphere, healthy trees can also help solidify the soil, which can reduce the kind of soil erosion that has been affecting local populations in Myanmar.

Going forward, technologies like seed-planting drones could help stem the tide of catastrophic climate change while our governments and societies work to change the habits of consumers and corporations that are driving the problem. Our endless hunger for new technology may be the driving force behind climate change and deforestation but it could also end up being the solution to a problem.

Story Credit: Leo Shvedsky, Apr 2019, https://www.good.is/articles/drones-planting-trees

EXTREME WEATHER EVENTS ARE JUST THE TIP OF RAPIDLY MELTING ICEBERGS

by A. GUTERRES

António Guterres, Secretary-General of the United Nations, in an address to the world body began– Both are dangerous and both are avoidable. Let me begin with the climate emergency.

We have always lived through hot summers. But this is not the summer of our youth. This is not your grandfather's summer.

According to the very latest data from the World Meteorological Organization (WMO) and its climate centre– – the month of July at least equaled if not surpassed the hottest month in recorded history.

This follows the hottest June ever. This is even more significant because the previous hottest month, July 2016, occurred during one of the strongest El Niño's ever. That is not the case this year.

All of this means we are on track for the period from 2015 to 2019 to be the five hottest years on record.

This year alone we have seen temperature records shatter from New Delhi to Anchorage – from Paris to Santiago – from Adelaide to the Arctic Circle.

If we do not take action on climate change now, these extreme weather events are just the tip of the iceberg. And that iceberg is also rapidly melting.

Indeed, the heatwave which affected Europe in the last month has now raised temperatures in the Arctic and Greenland by 10-15 degrees Celsius.

This at a time when Arctic Sea ice is already near record low levels.

Preventing irreversible climate disruption is the race of our lives and for our lives. It is a race we can – and must — win.

The urgent need for climate action is precisely why I am convening the Climate Action Summit on September 23rd.

This will be preceded by a Youth Climate

UNITED NATIONS, Aug 2 2019 (IPS) - First August. It is the middle of summer in the northern hemisphere. We are witnessing not only record global warming but global political tensions are also heating up.

Summit on September 21st. I look forward to welcoming young leaders like Greta Thunberg and so many others.

I have told leaders — from governments, businesses and civil society – that the ticket to entry is bold action and much greater ambition.

The world's leading scientists tell us we must limit temperature increases to 1.5C if we are to avoid the worst impacts of climate change.

We need to cut greenhouse emissions by 45% by 2030. We need carbon neutrality by 2050.

And we need to mainstream climate change risks across all decisions to drive resilient growth, reduce vulnerability and avoid investments that could cause greater damage.

That is why I am telling leaders don't come to the Summit with beautiful speeches.

Come with concrete plans – clear steps to enhance nationally determined contributions by 2020 – and strategies for carbon neutrality by 2050.

There is fortunately some good news. Around the world, governments, businesses and citizens are mobilizing to confront the climate crisis.

Technology is on our side — delivering renewable energy at far lower cost than the fossil-fuel driven economy.

UNITED NATIONS, Aug 2 2019 (IPS)

Solar and onshore wind are now the cheapest sources of new power in virtually all major economies.

Norway's Parliament has voted to divest the world's largest sovereign wealth fund – worth $1 trillion – from fossil fuels.

Many countries — from Chile to Finland, and from the United Kingdom to the Marshall Islands — have concrete and credible plans to achieve carbon neutrality by mid-century.

And many others — from Ethiopia to New Zealand to Fiji to Pakistan — are planting hundreds of millions of trees to reverse deforestation, buttress climate resilience, and remove carbon dioxide from the atmosphere.

Credit ratings agencies are moving to better account for the widespread perils of climate disruption — and more banks and financial institutions are pricing carbon risks into financial decisions.

Asset managers representing nearly half the world's invested capital – some $34 trillion – are demanding urgent climate action, calling on global leaders in a letter recently published and I quote "to phase out fossil fuel subsidies … and thermal coal power worldwide", and "put a meaningful price on carbon".

Leading businesses around the world are also recognizing that moving early from the grey to the green economy will deliver competitive advantages, while delaying will lead to huge losses.

Here at the United Nations, the Global Compact has launched a campaign calling on businesses to join the fight to limit global temperature rise to 1.5C.

Already, businesses with a combined value of more than $1.3 trillion are on board and that number is growing fast.

We need rapid and deep change in how we do business, generate power, build cities

and feed the world.

And – having endured what is possibly the hottest month in recorded history – we need action now. In addition to heat waves, we are also confronting many political hot spots.

Allow me to touch on three.

First, I am worried about rising tensions in the Persian Gulf. A minor miscalculation could lead to a major confrontation.

I stress the need to respect the rights and duties relating to navigation through the Strait of Hormuz and its adjacent waters in accordance with international law.

I have consistently conveyed a clear message to leaders both publicly and privately in numerous meetings and calls. That message can be boiled down to two words: maximum restraint.

I once again urge all parties to refrain from any actions that will escalate tensions further.

The last thing the world needs is a major confrontation in the Gulf that will have devastating implications on global security and the global economy.

Second, I am troubled by growing friction among the two largest global economies. We need to learn the lessons of the Cold War and avoid a new one.

Looking into the not so distant future, I see the possibility of the emergence of two competing blocs — each with their own dominant currency, trade and financial rules, their own internet and artificial intelligence strategy, and their own contradictory geopolitical and military views.

We still have time to avoid this. As I said in my address to the General Assembly last year, with leadership committed to strategic cooperation and to managing competing interests, we can steer the world onto a safer path.

Third, I am concerned about rising tensions between nuclear-armed States.

The Intermediate Nuclear Forces Treaty — the INF — is a landmark agreement that helped stabilize Europe and end the Cold War.

When it expires August 2, the world will lose an invaluable brake on nuclear war. This will likely heighten, not reduce, the threat posed by ballistic missiles.

Regardless of what transpires, the parties should avoid destabilizing developments and urgently seek agreement on a new common path for international arms control.

I strongly encourage the United States and the Russian Federation to extend the so-called 'New Start' agreement to provide stability and the time to negotiate future arms control measures.

I also call on all State Parties to work together at the 2020 Review of the Treaty on the Non-Proliferation of Nuclear Weapons to ensure the NPT remains able to fulfil its fundamental goals – preventing nuclear war and facilitating the elimination of nuclear weapons.

In the context of non-proliferation, I also reiterate that any use of chemical weapons is abhorrent and impunity for their use is inexcusable. It is imperative to identify and hold accountable all those who have used chemical weapons.

The heating of the global political atmosphere complicates all our efforts to resolve troubling situations – from Libya to Syria, from Yemen to Palestine and beyond.

We will do everything to intensify our surge in diplomacy for peace.

We will never give up our efforts to secure peace, reduce human suffering and build a sustainable world for people and planet.

Story Credit: by António Guterres, Aug 2019, Inter Press Service News Agency - ipsnews.net

Haunting Forest Spirits – is Mother Nature STRIKING BACK?

by JAN LUNDIUS

After contagion, the symptoms of the Ebola Virus become evident between two days and three weeks – vomiting, diarrhoea and rash as victims begin to bleed both internally and externally, an average of 50 percent of the afflicted will die. The disease was first identified in 1976. The largest outbreak to date was in West Africa, between December 2013 and January 2016, with 11,323 deaths.[2]

A two year-old-boy, Emile Ouamono, used to play with his friends in a huge hollow tree close to Meliandou, a small village in Guinea. On March 14, 2014, the tree caught fire and "a rain of fruit bats" descended on the village, they had apparently been living in the old tree. Six months later, Emile was dead from Ebola. After investigating bat spilling, collected from the site of the burnt down tree, researchers could establish that they were the original cause of the deadly infection.[3] The bats had originally been living in dense jungle canopies, though when the huge trees had been cut down to make way for oil palms the bats had been forced to move closer to human dwellings.

COVID-19 was apparently also spread by forest-living bats. In this case they had probably infected ant-eating pangolins, which meat was sold at wet markets in Wuhan. Everything indicates that it is humanity's ruthless abuse of earth's forests and their resources, coupled with an ever-progressing globalization, that is the most significant cause of the current proliferation of COVID-19.

Some years ago, I flew across the Congo basin. Looking down at the jungle deep below I could not discern any roads. Occasionally a village could be glimpsed by the brink of one of the many waterways, which meandered through the compact greenery. Kinshasa,

STOCKHOLM / ROME, Apr 20 2020 (IPS) - Epidemic diseases are not random events that afflict societies capriciously and without warning, on the contrary, every society produces its own specific vulnerabilities. To study them is to understand the importance of a society's structure, its standard of living, and its political priorities. […] Epidemics are a mirror, they show who we really are: Our ethics, beliefs, and socio-economic relationships. Frank Snowden [1]

proved to be completely different. With a population of approximately 15 million, growing at a speed with at least one million per year, it had except for some skyscrapers and villas the appearance of being a gargantuan shanty town. Most of the metropolis's exceptionally straight and long streets were lined with makeshift hovels. The contrast between the lack of roads in the jungle and the grid of paths, streets and main roads in Kinshasa, where it lay spread out on the southern banks of the wide, sluggishly moving Congo river, could not be greater. This made me remember the opening lines of Ben Okri's The Famished Road – "In the beginning there was a river. The river became a road and the road branched out to the whole world. And because the road was once a river it was always hungry."[4]

The Famished Road constitutes a bewildering reading experience. A magic mirror which accurately depicts the world we live in, though seen through the eyes and mind of a boy who is far from being a common child. Azaro is a spirit child, an abiku, who divides his existence between a West African shanty town and the Spirit World. Due to the love Azaro has for the family of mortals he has been allotted to stay with for a while, he decides to remain with it, acting as a son to his poor parents. He neither forgets, nor severs his ties with the Spirit World. However, the spirits constantly keep summoning Azaru to return to their realm, though he resists all their attempts to lure him back.

Ben Okri who lives in London, though he spent his childhood and youth in Nigeria, explains that: "We all have an Africa within […] but this Africa has been made sick by the economic, political and ecological troubles of the Africa outside, [severed from] the Africa of myths and legends, storytelling and playfulness; the Africa of paradox, proverbs, and surprise; the Africa of magic, faith, patience and endurance; the Africa of a profound knowledge of nature's ways and the secret cycles of destiny."[5]

In Yoruba mythology, where Okri finds much of his inspiration, the forest is associated with magic and other supernatural manifestations. It is where the spirits dwell. The great Yoruba author Amos Tutuola told in his My Life in

the Bush of Ghosts from 1954 about a small boy lost in the jungle and through his experiences Tutuola explored a world inhabited by spirits, demons and gods. A threshold existence between our concrete, visible communities and The Other World, dwelling place of mysterious and innumerable stories.

The Famished Road takes place in an unnamed African country, where globalization and neocolonial exploitation expose the fragility of our natural environment. Azaro tells his story in a straightforward and deceptively naïve manner. It is a visionary, poetic tale, filled to the brim with verbal pictures of a cruel, beguiling, strangely tender and poor community, harassed by corrupt politicians, thugs, profiteers and parasites. Passions explode in violence, or heart-felt empathy, while everything is engulfed in poverty and a constant struggle for survival.

The Famished Road that apparently describes a West African society by the beginning of the 1960s predicts a future where human agency will destroy nature in an irremediable manner. Azaro's position between a concrete, visible world and a vanishing invisible Spirit World unfolds in a strangely repetitive way. The tale may occasionally appear as a poetic chant that induces its reader in something akin to a meditative state of mind. The cycle of birth, death and rebirth of the abiku Azaru and his continuous threshold existence between childhood and youth, as a celestial being and a suffering human, seems to depict a state of perpetual hardship, a Culture of Poverty marked by endless repetition and arrested development. It appears as if not much is happening in the novel. However, while the reader is gently rocked into the novel's dreamy atmosphere s/he soon discovers that the society Okri describes in reality is undergoing violent transformations – politically, culturally and above all ecologically. Events seem to be circular, though they are actually spiralling towards disaster.

The dirt and violence which characterize life in the ghetto where Azaro spends his perpetual childhood are depicted as a consequence of colonial and neocolonial policies pushing the community towards a chaotic and mindless urbanization. The forest is destroyed and cut down. It will soon cease to be an abode of resistance against alienating commercialism and rectified thinking. It will no longer be a domain of vegetal power and natural energy opposing human greed, violence and inanity. Azaro spends most of his time wandering around in his ghetto, occasionally walking into the nearby forest, or sitting in Madame Koto's bar, while constantly bearing witness to a slowly changing scenery; the rivalry between *The Party of the Poor and The Party of the Rich*, both equally manipulative, and increasingly wealthy people who promote deforestation and a building frenzy accompanied by a constant destruction of nature.

The forest is Azaro´s second home. He calls it "an overcrowded marketplace" and it is swarming with shape shifting animals, monsters and spirits, so numerous that they mutate, continually changing appearance and voices. Insects, lizards, snakes, spirits and birds are moving into the shanty town, some of them are carrying messages to Azaro, others attack him. He is aware that his entire world finds itself in a state of anomaly. Humans´ ruthless onslaught on nature will eventually destroy everything. The fragile balance between humans and nature is already irreversibly upset. The future will bring disease and alienation: "Steadily,

over days and months, the paths had been widening. Bushes were being burnt, tall grasses cleared, tree stumps uprooted. The area was changing […] In the distance I could hear the sounds of dredging, of engines, of road builders, forest clearers, and workmen chanting as they strained their muscles. Each day the area seemed different. […] The world was changing and I went on wandering as if everything would always be the same."[6] Azaro's father tells him:"Sooner than you think there won't be one tree standing. There will be no forest left at all. And there will be wretched houses all over the place. This is where the poor people will live […] This is where you will live."[7]

This is where we all live. Everything is interconnected; the fate of the poor is also the fate of the wealthy. What we are doing to nature is now affecting us all, global warming is one result, epidemics another. The only way to stop this is to act in unison – our future depends on it; especially that of our children and grandchildren, and all generations following them.

The bleak future depicted in The Famished Road is already here. For a long time, we have known that anomalies caused by humans generate natural disasters – inundations, draughts and epidemics, still we remain unprepared to meet the consequences. What happens if COVID-19 hits the poor people living in mega cities in the Southern Hemisphere, cites like Kinshasa, or São Paulo with its 22 million inhabitants, Dhaka (20 million), Mumbai (18 million), Lagos (14 million), Jakarta and Manila with 11 million?

Since Ben Okri wrote his novel, most of Nigeria's forests have disappeared. Last year, the Nigerian Conservation Foundation (NCF) reported that Nigeria has lost 96 percent of its natural forest cover and deforestation rate is at an alarming 11 percent per annum.[8] Thousands of animal species have lost their habitat. This is happening all over the world, for example has Indonesia since 2001 lost 37 percent of its rain forests, while Brazil lost 45 percent.[9] The spread of epidemics may be only one indication of the hardships that might be in store for us all if we continue with our overexploitation of natural resources.

1 Snowden, Frank (2019) Epidemics and Society: From the Black Death to the Present. New Haven CT: Yale University Press.

2 https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease

3 https://www.bbc.com/news/health-30632453

4 Okri, Ben (2016) The Famished Road: 25th Anniversary Edition. London: Vintage, p. 3.

5 Okri, Ben (2011) A Time for New Dreams. London: Rider, pp. 134-135.

6 Okri (2016), p. 122.

7 Ibid, p. 42.

8 https://economicconfidential.com/2019/03/challenge-of-deforestation-nigeria/

9 https://news.mongabay.com/by/ongabay-com/

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Story Credit: by Jan Lundius - Apr 2020, Inter Press Service News Agency - ipsnews.net

UN's Development Goals Threatened by a World Economy FACING RECESSION

by THALIF DEEN

UNITED NATIONS, Apr 23 2020 (IPS) - The UN's 17 Sustainable Development Goals (SDGs), described as an integral part of its highly-ambitious development agenda, may be in deep trouble.

Aimed at addressing some of the global challenges the world faces– including extreme poverty and hunger, inequalities in incomes and gender, climate change and environmental degradation– the SDGs now seem threatened by a world economy facing a brutal recession.

With a 2030 deadline,the SDGs are in near disarray, as the coronavirus pandemic has decimated the economies of both rich and poor countries—even as warning signs reflect a possibly massive rise in poverty and hunger worldwide.

The slump in the global economy has triggered a recession in several donor nations, including Japan, the US, UK, France, Germany and China, among others.

In its most recent report released April 14, the International Monetary Fund (IMF) warned that the world is facing its worst downturn since the Great Depression of the 1930s, and the global economy would contract by 3.0 percent in 2020.

This was a significant reversal from early this year when the IMF predicted the world economy would outpace 2019 and grow by 3.3 percent in 2020.

Ambassador Mona Juul of Norway, President of the UN's Economic and Social Council (ECOSOC), told delegates April 23 that COVID-19 shows "it is more important than ever to focus on the implementation of the SDGs." Therefore, issues such as resource mobilization, illicit finance, debt and women's empowerment must be priorities," she said.

Still, at the United Nations, several lingering questions remain: What are the new obstacles

As famines of "biblical proportions" loom, Security Council urged to "act fast". Credit: United Nations

facing the implementation of SDGs? Will they survive an uncertain future?

Will donor nations help rescue the development agenda? Andwill the General Assembly be forced to push back the 2030 deadline?

Tariq Ahmad, Oxfam America's Senior Policy & Research Advisor told IPS: "We are seeing COVID-19 wreak havoc on the global economy, which is felt acutely in the homes and communities of the most vulnerable among us".

The economy downturn, he said, paints a dismal picture of what resources will be available to finance the SDGs. This crisis could push half a billion more people into poverty unless urgent and drastic action is taken.

A recent Oxfam brief has called for an Economic Rescue Plan For All, suggesting how the world could help finance UN's estimated needs while the UN Conference on Trade and Development (UNCTAD) has called on governments to mobilize at least $2.5 trillion dollars to support developing economics in order to tackle the pandemic and prevent a global economic collapse.

And a new study by the UN University's World Institute for Development Economics Research (UNU-WIDER) predicts that the COVID-19 pandemic could increase global poverty by as much as half a billion people, or 8% of the total human population. This would be the first time that poverty has increased globally in thirty years, since 1990.

In its annual Global Report on Food Crises, an international alliance of UN, governmental and non-governmental agencies, said, at the end of 2019, 135 million people across 55 countries and territories experienced acute food insecurity.

But the coronavirus pandemic is expected to make the situation worse and negatively impact on hunger and food insecurity, specifically in the developing world.

Jens Martens, executive director of Global Policy Forum, (a civil society think tank based in New York and Bonn), told IPS the COVID-19 pandemic not only has serious consequences for the health situation in many countries of the world but it will also have a massive impact on the implementation of almost all SDGs.

"The looming global recession will dramatically increase unemployment, poverty and hunger worldwide," he said.

The situation, he pointed out, is even more serious because the macroeconomic situation in many countries of the global South had already deteriorated before the outbreak of the virus.

A vicious circle of debt and austerity policies have threatened socio-economic development from Argentina to Lebanon, he warned.

"The food situation had also deteriorated in many countries, even before COVID-19, for example, due to the locust plague in East Africa".

Without effective multilateral counter-measures, Martens argued, inequality between rich and poor countries will increase considerably.

"COVID-19 is thus also a global wake-up call for international cooperation and solidarity", he declared.

In a report released April 20, the World Food Programme (WFP) said the COVID-19 pandemic could almost double the number of people suffering acute hunger, pushing it to more than a quarter of a billion by the end of 2020.

The number of people facing acute food insecurity stands to rise to 265 million in 2020, up by 130 million from the 135 million in 2019, as a result of the economic impact of COVID-19, according to a WFP projection.

Ahmad said one of the ways to free up vital resources to tackle the issues of hunger and poverty would be to cancel the debt of developing nations.

For example, Oxfam also jointly warned of the risk in West Africa, of 50 million people threatened by hunger and malnutrition in the coming months.

Meanwhile, Ghana is spending 11 times more on servicing its debts than it is on health. The costs of the debt burden are paid by the poorest people, in cuts to government services, while women are the hardest hit.

Aid is a critical ingredient to help finance the response. Of the estimated 2.5 trillion USD need, the UN estimates a need of 500 billion in new official development assistance (ODA).

In a soon to be released report, Oxfam estimated almost 300 billion of this should be provided by traditional northern donors. And there are still some fundamental flaws in the current system that prevent aid from supporting local responders on the front line of care.

"This crisis is the time for bold and visionary choices for our collective future. It's time for donors to profoundly transform their aid to build a world that is free from poverty, that is more equal, feminist and sustainable. COVID-19 could set back the fight against poverty by decades – we must now act and build a better future," he declared.

Asked if the 193-member UN General Assembly should postpone the 2030 deadline to achieved SDG targets, Martens said postponing the deadline for achieving the SDGs because of COVID-19 would send out completely the wrong signal.

On the contrary, he said, the coronavirus crisis shows how important these multilateral goals are, and how fatal it was that governments have not taken their implementation seriously enough since 2015.

Keep critical food supply chains operating to save lives during COVID-19, urges a new UN-backed report. Credit: United Nations

Key SDG targets like the development of social protection systems, universal health care and a functioning public infrastructure must be given top priority. Only in this way can the current crisis be overcome and future crises prevented. This also requires effective policies of global solidarity, said Martens.

"What we need now is a Solidarity Summit under the auspices of the United Nations to deal with the social and economic consequences of the COVID-19 pandemic in an integrated manner", he declared.

Asked about the postponement, Ahmad said "pushing back the SDG deadline won't help pull anyone who is facing poverty or hunger – instead we need to see sweeping action across the globe to help offset some of this crisis' worst impacts on the world's most vulnerable".

The challenge here is not time, it's political will, he noted.

"This is an unprecedented daunting global challenge, but we must meet it both with urgent action that saves lives now and interventions that create a more fair system going forward, like the cancellation of debt for developing nations, and other support to help families stay healthy and safe until they are able to earn a living again."

Even before COVID-19, he said, "we were dangerously behind on meeting many of the SDGs, but if this moment has taught us anything, it's that we are able to make massive shifts in how we all live and cooperate to tackle a joint challenge – we must see the same approach taken to meet the Sustainable Development Goals."

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Story Credit: by Thalif Deen - Paramaribo, Apr 2020, Inter Press Service News Agency - ipsnews.net

COVID-19 AND HOPE FOR COMPASSIONATE FUTURE

by J. LUNDIUS

STOCKHOLM / ROME, Apr 9 2020 (IPS) - The Coronavirus, COVID-19, makes its deadly round across the world. People fall sick and die, communities and entire nations end up in its deadly grip and try to cope with it. Everything is changing, and changing fast and we all have to deal with it together, even if many of us are being physically apart. Humans are social beings. Our mental and physical capacities are created around that fact and crave for support and compassion.

Some of us benefit from social security, relative wealth, access to health care and a home of our own, others lack all of this. COVID-19 brings already existing social ills and inequalities to the surface. The general and the personal are getting mixed up. A collective state of mind becomes part of our intimate sphere of existence. While an imposed quarantine isolates us from others, we become subjects to conflicting information, wild rumours, and apocalyptic prophesies, combined with an awareness of the injustice of unequal suffering and worries about what the future might hold in store. What happens to our bodies affect our minds, and vice versa. We might feel as we are awake within a nightmare, a state of mind that has been described by several imaginative authors.

In Gabriel García Márquez's One Hundred Year of Solitude the plague

"THE WORLD IS UNDER COVID19 ATTACK" Black Ink Sketch by Wissam Shekhani

sources: Wikimedia public commons

comes to the small town of Maconde, which in Márquez's novel serves as an archetype for countless other Latin American rural towns. However, this plague is not a plague of the body, but of the mind. It makes it impossible for people to sleep and accordingly it also makes them unable to dream. As the plague extends and ultimately affects everyone in Maconde, people do not starve because they can work day and night. They do not suffer since they cannot dream and have thus lost their ability to imagine another existence. To save other communities from the "illness of insomnia", the town's most influential leader, José Arcadio Buendía, decides that it has to be restricted "to the perimeter of the town. So effective was the quarantine that the day came when the emergency situation was accepted as a natural thing and life was organized in such a way that work picked up its rhythm again."1 However, at its final stage the plague proves to be deadly. The victims soon lose their memory, their sense of reality and worst of all – their compassion.

One of the lessons learned from this fable might be that we humans cannot subsist without our dreams, hopes and imagination. Furthermore, we all depend on one another. The weak on the strong, the old on the young, and the entire humanity depends on a natural environment we have abused in a horrifying manner.

The imposed quarantine many of us are subject to might hopefully remind us about differences between the rich and the poor – that wealth and class are always an issue and might determine our ability to cope with the pandemic. A Brazilian story may illustrate this fact:

The first death from COVID-19 in Rio de Janeiro was a domestic worker who tried to get treatment for her breathing problems. However, she was sent back home unattended. When her health deteriorated further and she on the 16th of March returned for treatment, she told the hospital staff that her employer had become ill after returning from Italy. It was found that he had been suspected of being infected by the Coronavirus, something he had not told his employee. He had early on been hospitalized and tested positive. His 63-year-old employee died the day after she was admitted to a hospital.2

Similar cases have occurred in other areas of Latin America and the Caribbean, where maids, gardeners, drivers, nurses, hotel staff and other people in the service sector have by employers and clients been infected with COVID-19. This have made several Latin Americans inclined to label COVID-19 as a "rich man's disease". Many of the original COVID-19 cases have been people returning from visits to Spain, or Italy, as well as tourists coming from

these countries, or businessmen returning from trips to other European countries, or China. Such patients have generally received excellent and expensive care, while poorer victims of COVID-19 who caught their infection from them have often been left unattended and furthermore forced to suffer the disease under conditions of poor housing, insecure income and deficient, or non-existent health care. Similar stories are told from other parts of the world, where we also witness how migrant workers are desperately trying to return to their homes to avoid becoming locked-in within huge cities, far away from their loved ones. How citizens in war-torn areas of Libya, Yemen, Afghanistan and Syria now are further threatened by the pandemic, as well as the homeless refugees amassed and stuck in camps in border areas of Turkey and Bangladesh. Medical doctors are warning that once the pandemic is spreading from wealthy regions and privileged social classes into poorer strata of society, issues of quarantine, loss of income and inadequate healthcare are going to be paramount and insurmountable for poor nations.

Like the people trapped in Maconde many of those quarantined within affluent societies may be affected by a loss of their sense of reality, while becoming numbed by figures and statistics. Living in wealthy nations and/or secluded within upscale neighbourhoods may make them forget the plight of the less fortunate.

Let us hope that this pandemic will serve as a reminder that we all share this earth and it is our common interest to take care of it together. That many of us might come out of our quarantine with an improved, more compassionate view of the world and our fellow human beings. That this global affliction makes us realize that the best way to mitigate future disasters is to preserve our natural resources in a sustainable manner and guarantee equal education and healthcare for all. This can be done and for our own survival we have to achieve it.

1. García Márquez, Gabriel (1978) One Hundred Years of Solitude. London: Picador, p. 45.
2. https://apublica.org/2020/03/primeira-morte-do-rio-por-coronavirus-domestica-nao-foi-informada-de-risco-de-contagio-pela-patroa/

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Story Credit: by Jan Lundius, Apr 2020, Inter Press Service News Agency. ipsnews.net

Boardwalk For Birds: Protecting Lake Victoria's Dunga BEACH WETLANDS

by ISAIAH ESIPISU

At around 11am on a Saturday, Luke Okomo arrives at Dunga Beach, on the outskirts of Kenya's Kisumu City, and heads straight to what is known as the 'Dunga Papyrus Boardwalk'.

He pays Sh200 ($2), the daily fee for local tourists and students, and then joins a group of five visitors already taking a tour of the boardwalk, which is elevated above a wetland swamp and surrounded by papyrus reeds. He then takes a seat in an open café and orders a drink as he enjoys the view of Africa's biggest fresh water body.

It's a good spot for some bird watching.

It's hard to imagine that just a few years ago, Dunga Beach, which is one of the most popular fish landing sites in Kisumu, used to be filthy and a source of pollution that spilled into Lake Victoria.

But two years ago the Dunga Eco Tourism and Environmental Youth Group, with financial support from the French Embassy in Kenya, came up with the idea to turn the marshland here, which extends into the Winam Gulf of Lake Victoria, into a tourist site.

"Our main aim was to generate extra income for the youth, apart from what we get from the fishing business, while at the same time conserving the aquatic environment," Samuel Owino, the coordinator of the Dunga Eco Tourism and Environmental Youth Group, tells IPS.

Edgar Ochieng, a 28-year-old boardwalk tour guide, tells IPS that along the small museum onsite, the boardwalk has become a perfect tourism site for local and foreign visitors.

"Local visitors, most of them students from different parts of the country, come over the weekends during the day to learn from our small museum, which displays the traditional wares and crafts such as musical instruments, various

Dunga Papyrus Boardwalk tour guide Edgar Ochieng shows a handbook documenting birds found at Dunga Beach. Credit: Isaiah Esipisu/IPS

functional artefacts, ornaments, costumes, all made by the local residents, most of them women groups," Ochieng says.

The Dunga Beach Museum, which displays the traditional wares and crafts such as musical instruments, various functional artefacts, ornaments, costumes, all made by the local residents, is located on top of the boardwalk. Credit: Isaiah Esipisu/IPS

Owino points out though that many foreign visitors prefer visiting very early in the morning in the hope of catching site of the rare and threatened bird species that make their home here.

According to Birdlife International, the Winam Gulf is one of the most reliable sites in Kenya for viewing the scarce and threatened bird species — the Papyrus yellow warbler (Chloropeta gracilirostris) — which is often seen along the lakeward side of the swamp.

One can also see the white-winged swamp warbler (Bradypterus carpalis) and papyrus canary (Serinus koliensis) — all papyrus endemics.

Ochieng notes that the Dunga Eco Tourism and Environmental Youth Group has have identified 46 different bird species, which they have documented in a handbook called 'Dunga Wetland Birds'.

The boardwalk extends 50 metres into the Winam Gulf of Lake Victoria. Credit: Isaiah Esipisu/IPS

There are also many snakes here too.

"During the early hours, there is an opportunity to see different types of snakes, but most importantly, many visitors are interested in seeing a huge python that lives in this swamp and the sitatunga antelopes," says Owino.

Though the guides are quick to point out that the boardwalk, which extends about 50 metres, has been coated with waterproof material that also prevents reptiles from climbing it.

"This kind of innovation is a good thing for the lake ecosystem," says Ken Jumba, a county environment officer at the National Environment Management Authority (NEMA) in Kisumu.

"We encourage entrepreneurs from all other communities around the entire lake to learn from what is happening here in Dunga,"Jumba tells IPS.

The construction of the boardwalk in 2016 also resulted in establishing a protected area around the wetland.

"When our proposal was approved for funding, we involved the county government who helped relocating the traders from the wetland, some of whom had erected pit latrines above the water so that the sludge drops directly in the lake," recalls Owino.

Now small businesses, including food places run by local entrepreneurs, have moved away to the upper side of the beach, which has led to improvement of the lake's biodiversity.

About 100 metres away, there is a huge biogas plant that has been welcomed. The plant, which produces some 50,000 litres of ethanol gas daily, makes use of the invasive water hyacinth that grows wildly on the lake as a key ingredient.

The boardwalk extends 50 metres into the Winam Gulf of Lake Victoria. Credit: Isaiah Esipisu/IPS

- Agricultural activities in the lake basin has meant that fertiliser and agricultural chemicals have found their way into Lake Victoria through the rivers that feed it. This has resulted in the flourishing of the water hyacinth and algae, both of which put the aquatic ecosystem around the lake at risk.
- Water hyacinth or Eichhornia crassipes has been responsible for decreasing numbers of fish species found on Lake Victoria. It grows so rapidly that in some areas the water beneath cannot even be seen and boats are unable to pass through it.

"We usually shred the water hyacinth, which is considered to be pollution on the lake, and then mix it with all the inedible waste material from the fish to generate the gas," Daniel Owino, the technical operator of the biogas plant, tells IPS.

Meanwhile, industrial activities around Kisumu and other towns in neighbouring Uganda and Tanzania–Lake Victoria also extends to these countries–have turned the lake into a health hazard.

It will take much more commitment and cooperation to ensure that the lake is saved. Though the creation of the Dunga Papyrus Boardwalk and the cleaning up of Dunga Beach can be considered a good start.

Story Credit: by Isaiah Esipisu, Apr 2020, Inter Press Service News Agency - ipsnews.net

U.N. Releases Report on Socio-economic Effects Of CORONAVIRUS

by S. SADEQUE

UNITED NATIONS, Oct 17 2019 (IPS) - When the six much-ballyhooed high-level UN meetings concluded late September, there were mixed feelings about the final outcomes.

UNITED NATIONS, Apr 3 2020 (IPS) - As the number of coronavirus cases continues to grow, concerns are simultaneously growing about the current and long-term effects this will have on certain demographics — specifically, women, the youth, migrant workers, and many employees around the world.

This week, the United Nations launched a report "Shared Responsibility, Global Solidarity: Responding to the socio-economic impacts of COVID-19" that detailed how these communities are affected disproportionately by the current pandemic and quarantine.

A BURDEN ON WOMEN

At the centre of it remains one demographic that likely bear the strongest brunt of it: women.

"The fact that women make up 70 percent of the global health workforce puts them at greater risk of infection," read part of the report. "The current crisis threatens to push back the limited gains made on gender equality and exacerbate the feminisation of poverty, vulnerability to violence, and women's equal participation in the labour force."

But just because women make up almost three-quarters of global healthcare professionals, does not mean they're given the proper respect. According to a March 2019 report by the World Health Organisation, despite having such a crucial

A United Nations report states that the fact that women make up 70 percent of the global health workforce puts them at greater risk of infection. This is a dated photo of Catherine a nurse at Jinja referral hospital,in Uganda. Credit: Lyndal Rowlands/IPS.

role in the public health industry, women continue to face various kinds of abuse or negligence in society, including but not limited to being attributed to a "lower status" or engaging in paid and often, unpaid roles, and being subject to gender bias and harassment.

Meanwhile, given such a large percentage of the workers are women, the requirement of child-care can hinder a woman's ability to work during the pandemic. According to the Centre for American Progress, currently millions of healthcare workers have a child under the age of 14, who might be struggling to manage between going to work and taking care of their children.

"Because mothers' employment is especially likely to suffer when they cannot find reliable child care, this finding suggests that millions of vital health workers currently could be struggling to secure child care, endangering their ability to work at a moment when the U.S. health care infrastructure is already spread too thin," the report reads.

At the launch of the report, U.N. secretary

general António Guterres called for policies to not only address the pandemic and contain its spread, but also that would adopt measures to address the long-lasting impact of the crisis. He called for "designing fiscal and monetary policies able to support the direct provision of resources to support workers and households, the provision of health and unemployment insurance, scaled up social protection, and support to businesses to prevent bankruptcies and massive job losses."

PLIGHT OF MIGRANT WORKERS, LACK OF CONNECTIVITY FURTHER PROBLEMS

Another demographic that is deeply affected as a result of the pandemic are migrant workers, according to the report.

"Migrants account for almost 30 percent of workers in some of the most affected sectors in OECD countries," read the report. "Massive job losses among migrant workers will have knock on effects on economies heavily dependent on remittances, such as El Salvador, Haiti, Honduras, Nepal, Tonga, Tajikistan and Kyrgyzstan."

The International Organisation for Migration (IOM) in Nepal cites the government's figure that estimates between 700 000 to 800 000 Nepali migrants workers in India.

"With the outbreak of COVID-19 and measures by the GOV to mitigate the risks, country is in a national lock – down. Economic production has stopped and many seasonal Nepali migrant workers had to stop working," Lorena Lando, Chief of Mission at IOM Nepal, told IPS.

"Thousands returned back to Nepal before the lock down, others are still in India but unable to work. Many of the migrant workers are daily wages earners, and now they no longer have an income to support their families. Even for those that return back home, job opportunities will be scarce, keeping in mind that was the first reason why they travelled abroad for work."

"The economic impact of COVID-19 in countries such as Nepal will be much bigger than other countries, and while some actions to take are good for the short term, other will need be a socio economic recovery response in longer vision," she added.

Beyond migrant workers, International Labour Organisation (ILO) estimates that the current crisis in the labor market could see between five and 25 million job losses.

"The current crisis exacerbates the feminisation of poverty, vulnerability to violence, and women's equal participation in the labour force," the report noted, highlighting that even amid joblessness, women will be affected disproportionately.

Furthermore, connectivity to the internet, especially at a time when all work and courses are moving online, is also of priority. The report states that currently an estimated 3.6 billion of the world's population remain without connectivity, which means they may not have access to education, health information and telemedicine.

As advocates had told IPS last week, digital access and internet connectivity is key at this time in order to ensure communication among communities.

Story Credit: by Samira Sadeque, UNITED NATIONS, Oct 2019, Inter Press Service News Agency - ipsnews.net

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MOST SUSTAINABLE COOPERATIVES IN THE WORLD

How Encroachments, Willows and Silt Ate up Half of Kashmir's Own Sea

by ATHAR PARVAIZ

BANDIPORA, India, Feb 10 2020 (IPS) - Warming himself with a kangri (a firepot) kept under his pheran (a long winter cloak worn by Kashmiris), 66-year-old Mohammad Subhan Dar sat chatting with a bunch of his fellow villagers on a January afternoon on the edge of the road overlooking Wular Lake in Saderkote-Bandipora, northern India.

"When I was a teenager, this lake looked like a sea," Dar told IPS when asked about his old memories of the lake.

Overlooked by magnificent mountains, Wular Lake is one of the largest freshwater lakes in Asia and the largest flood basin of Kashmir in Bandipora district, some 34 km north of Srinagar, the summer capital of Indian Administered Kashmir.

"But, today, as you can observe, many of its areas have become playing-fields for children and grazing grounds for cattle," he said while referring to the heavy siltation of the lake, which has created vast land masses inside the lake.

Wular, which was declared an international Ramsar site under Ramsar convention in 1990, is not only a beautiful wetland, but has served the people of Kashmir for centuries earning praises from all, including its poets.

"How long will they remain hidden from the world … the unique gems that Wular Lake holds in its depth," 20th century Urdu poet, Sir Muhammed Iqbal, once wrote about Wular Lake's depth and water expanse.

Almost a century after Iqbal's inquisitiveness, the depths of Wular have become heavily silted, its size reduced and its pristine waters suffering from heavy pollution.

In a detailed study of the lake, Wetlands International, a Netherlands-based not-for-profit that works to sustain and restore wetlands globally, says that the original area of Wular Lake was

A fisherman at the eastern shore of Wular Lake. Credit: Athar Parvaiz/IPS

217.8 square kilometres (sq. km), which included 58 sq. km of associated marshes. The area, the study says, was reduced from 157.74 sq. km to 86.71sq. km over a period of time from 1911 to 2007. Overall, there was a 45 percent reduction in the lake area mainly because parts of the lake were converted for agriculture and willow tree plantations, the study says.

As per the estimates of Wular Conservation and Management Authority (WUCMA), about one fifth of the water-holding capacity of Wular Lake has been lost over the last three decades. This, WUCMA observes in a detailed report, is equivalent to an annual lake sedimentation rate of 2,470 acre feet.

"Catchments of Wular Lake are highly degraded. Against more than 50 percent of very dense forests in the 1950s, presently only 30 percent remain under dense forest cover," the report says, adding that around 30 percent of the catchment area of the lake is bare and denuded.

Referring to the deteriorating quality of water of the lake, the report says that the water quality of Wular has deteriorated drastically due to discharge of high levels of untreated sewage into the wetland.

"Wular Lake, due to its geomorphological setting becomes a recipient of entire wastewater of the basin. Despite a rapid increase in human population, there has been no [updgrade] of the civic infrastructure leading to an increasingly higher proportion of wastes being dumped into the water-bodies."

A boy watches his swans swim onto the lake. The north-western area of the Wular Lake retains water throughout the year. Credit: Athar Parvaiz/IPS

WORRIED RESIDENTS AROUND WULAR

Dar told IPS that thousands of people living in dozens of villages around Wular Lake derive their livelihoods from fishing, and water chestnut and fodder collection from the lake. His estimates are corroborated by a study from Wetland International, which has pegged the number of families dependent on the lake's resources at 32,000, including 2,300 fisher households.

"Livelihoods of all these people are at stake if the deterioration of Wular is not checked," Dar told IPS. According to Dar, Wular looks like a lake only in spring when rain water and snow-melt inundates it. "For the rest of the year, most of its areas stay dry. We literally have to haul our boats out because of the lack of water," he said.

Abdul Razzaq, another fisherman, said that he previously used to only earn a living from fishing. But not anymore. Now he is forced to sells various items from a kiosk to supplement his income. "How can the fish population increase in the lake when it is so polluted and its area has got reduced to almost to its half as compared to its size in the past?" Razzaq asked IPS.

However, the youth living in the villages around Wular Lake are interested in the survival of the lake more for tourism reasons. "If the Wular Lake survives and stays in good condition that would mean an assured livelihood for educated people like me who are not interested in fishing," Riyaz Ahmad, who recently graduated from university, told IPS.

WILLOWS, THE CULPRITS

The planting and growth of willow trees on and around Wular Lake, the WUCMA report says, has severely altered the hydrological processes of the wetland. "These plantations act as barriers to silt laden waters of the river Jhelum forcing it

to discharge the sediment load into the lake and thereby inducing loss of water holding capacity."

A spatial analysis of the sedimentation pattern within the wetland, the report says, clearly indicates rapid siltation along the fringes of the plantation areas.

Based on an average plantation density of 1000 trees per ha, Wetlands International in its report titled Comprehensive management Action Plan (CMAP) for Wular Lake, has estimated that 2.1 million willow trees need to be uprooted using manual and mechanical means.

- Willow plantations around Wular Lake first took root in 1924, and was eventually brought under the management of Kashmir's forest department.
- In the 1980s and 1990s, massive woodlands of willow were planted in the area by the region's agriculture department to meet the demand for firewood and the various timber requirements by industry.
- In recent years, as the siltation issues of Wular Lake received growing attention,experts have traced the cause of heavy siltation in the lake to huge presence of of these willow trees in the lake.

"These plantations act as a barrier to silt-laden waters of the River Jhelum forcing it to discharge the sediment load into the lake thereby reducing its water-holding capacity," said Samiullah Bhat of Kashmir University's Environmental Department. Bhat was part of the team which prepared the Environmental Impact Assessment for the removal of willow trees at Wular Lake.

Irfan Rasool Wani, a forest conservator and coordinator at WUCMA, told IPS that willow plantations in the lake extend to an area of 27.30 sq km.

Felling the willows will secure Wular.

The Jammu & Kashmir government has devised a plan for felling over 2.1 million willow trees in Wular Lake in the next few years. It also plans to remove encroachments, reduce pollution and carrying out de-siltation and other treatment measures in and around the lake.

Except "some short term losses," experts have found no faults with these conservation measures, but have recommended proper scientific methods for the removal process.

"The overall implication would be positive as there would be recovery of wetland resources, such as fish and aquatic vegetation in the medium to long term and generation of labour (for removal of willows) in the shorter run," Shakil Romshoo, who heads Kashmir University's Department of Earth Sciences, told IPS.

According to Bhat, the benefits of removing the willow trees from Wular "generally outweigh" the negative impacts of their removal. A report prepared by Bhat and other experts, however, recommends that the process of removal should be undertaken in a phased manner, and based on prescribed scientific principles.

Talking about the negative impacts, Bhat said that the decrease in shady area following the removal of the willow trees can lead to increased summer water temperatures and also have the ability to affect disease resistance in adult fish.

Wani, the WUCMA coordinator, agreed that the majority of over 2.1 million willow trees need to be removed in the coming years.

Mudasir Mehmood, another top official at WUCMA, said that 58,000 willow trees have already been extracted so far and WUCMA plans to remove a further 133,000 willow trees by the end of 2021.

"We are removing the trees selectively. This will help in avoiding abrupt environmental costs and market crash," Mehmood said.

Story Credit: by Athar Parvaiz, Feb 2020, Inter Press Service News Agency - ipsnews.net

BEYOND THE HEADLINES: THE DEVELOPMENT STORY BEHIND IRREGULAR MIGRATION

by M. Jena

World Wetlands Day is on Sunday, Feb. 2. IPS senior correspondent Manipadma Jena marks the day by visiting the East Kolkata Wetlands (EKW), a unique wetland that operates as a natural water purification ecosystem.

KOLKATA, India, Jan 31 2020 (IPS) - Ramkumar Mondal's farm is awash in a brilliant yellow mustard bloom. A flock of grey cranes peck for food amidst the shallow watergrass. But Mondal's fishpond digs in there like a do-or-die last sentinel as nearby high-rise buildings, a symbol of development and encroachment, menacingly tower over the fishpond, permanently blocking the eastern sun so essential for the pondwater to convert sewage into fish-feed.

Mondal's fishpond is part of the East Kolkata Wetlands (EKW), spread over 12,500 hectares in coastal West Bengal's Kolkata city in eastern India that "promotes the world's largest wastewater-fed aqua culture system," Shalini Dhyani, a senior scientist at India's Council of Scientific & Industrial Research (CSIR)-National Environmental Engineering Research Institute (NEERI), told IPS.

EKW was designated a Ramsar site in 2002 under the convention and identified as a perfect example of the "wise use" of a wetland ecosystem.

Currently, everyday some one billion litres of wastewater, an estimated 30 to 50 percent of the sewage from central Kolkata, is drained into, treated and reused by the fishponds and again drained out to rice and vegetable farms from where, in about 30 days, the water drains into the sea.

"Where wastewater might deteriorate the entire wetland water quality, Kolkata's wetland cleans its wastewater in just 20 days," said Dhyani, who is also the South Asia chair Commission on Ecosystem Management (CEM) of the International Union for Conservation of Nature (IUCN).

Where rich biodiversity meets traditional knowledge

A government baseline report prepared on the EKW prior to its designation as a Ramsar site in 2002 mentions 40 fresh-water and brackish water fish species were common, 11 of which were cultivated. Plant species found were 104.

This complex play of diverse organisms from the

A flock of grey cranes peck for food amidst the shallow watergrass. Credit: Manipadma Jena/IPS

humble microbes, wetland plants to more valued fish, aided by sunlight, suitable temperature, dissolved oxygen in the water – all free of cost – cleans Kolkata wastewater of 80 percent organic pollution and 99.9 percent coliform bacteria "much better than sewage treatment plants," biologists said.

A key insight into how the system works also lies on the reliance of the fisherfolk feeding the human-waste-turned-to-algae to their fish.

"In a conventional waste water treatment, booming algae might be an issue while, in EKW the phytoplankton and algae growth, which is nothing but optimised human waste, is regularly netted by fishermen and fed to the fish. Every hectare gets 20 to 60 kilograms of (nature's free) feed a day," Dhyani said.

There are also unique bacteria in the wetlands that serve as "bio-filters".

"There are 40 species of algae, 2 species of fern, 7 species of monocot and 21 species of dicots plants plays an important role in cleaning the sewage water by reducing the eutrophication, preventing oxygen depletion and ensuring that the fish survive. Around a dozen aquatic vascular hydrophytes in the region serve as bio-filters," said Bonani Kakkar a leading Kolkata-based environmental activist heading non-profit People United for Better Living in Calcutta (PUBLIC).

There is no indication of how long the wetlands has been functioning as a natural waste treatment plant. But it could be well over a century. The East Kolkata Wetlands Management Authority's (EKWMA) historical timeline shows that in 1884 underground sewers to the city were laid, and by this time the waterbodies that now comprises EKW had already a number of established fish farms.

A conventional Sewage Treatment Plant (STP) would have cost Kolkata $125 million back in 2010. But thanks to this complex system in the wetlands, the city has its own free sewage treatment, according to a University of Essex study.

Aggressive urban encroachment threatens wetland biodiversity, ecosystem services

One would assume this unique and free natural sewage system would be highly preserved.

But Kakkar is concerned. It was Kakkar's non-profit PUBLIC that in 1991 filed the first-ever lawsuit against land-use change and encroachment in the EKW that resulted in a major court ruling the following year.

"The 1991 public-interest lawsuit by PUBLIC was triggered by a veiled land-grab for setting up a World

In an area already marked out for 'development' Ramkumar Mondal's domestic sewage-fed fishpond makes the most of what little time is left. Harvested rice gives place to a mustard crop while a pumpkin vine perches over the water. Credit: Manipadma Jena/IPS

Trade Centre on 227 acres (90 hectares) of wetland proposed by a private company, and it was supported by the West Bengal government," she told IPS.

Calcutta High Court's ruled in 1992 and directed the state government to ensure no change in the wetlands' land use.

"The EKW are yet to be demarcated (on the ground, though an official map exists) 28 years after the court order. A proper management plan is yet to be formulated," Kakkar said.

Because of this lack of management plan and clear demarcation, there is a frenzy of building activity around the wetlands on land that was previously designated as "wetlands" but is no longer legally so and has since been taken over for development.

"From 1992 onward, PUBLIC has had to file over a dozen complaints in court against violations of the order, including two in India's highest court against projects that received funding commitment from the state government's industrial development wing," Kakkar said adding, "all of these have posed serious threats to the biodiversity, flood mitigation and other benefits offered by the Kolkata wetland."

High-rise buildings glare down at one small remaining patch of the East Kolkata Wetlands (EKW) fishponds. Credit: Manipadma Jena/IPS

PROTECTION, NOT DEVELOPMENT, OF THE WETLANDS IS NEEDED

"Ironically, some of the biggest threats have been due to the state government – large construction proposals for a flyover bridge and another to access the wetlands, for instance," Kakkar explained.

Studies and anecdotal evidence tell of surreptitious land-use change where fish ponds are being converted to rice farms aimed eventually for small industrial or residential utilisation.

EKWMA, the government custodian, shows on its official website that 391 cases for violations it has registered with local police from 2007 till 2014. More recent updates are unavailable. Calls made by IPS to EKWMA for their response went unanswered.

RICH RETURNS FROM A PERFECT NATURE-BASED SOLUTION

But one thing is clear, between 1980 to 2000 around 2,200 hectares fishponds had been converted to rice paddies.

The remaining 254 individual sewage-fed fish ponds, some single holdings sprawling over 144

High-rise buildings glare down at one small remaining patch of the East Kolkata Wetlands (EKW) fishponds. Credit: Manipadma Jena/IPS

hectares with the smallest being a third of a hectare, are spread over 3,900 hectares on the eastern fringes of the city, crisscrossed with canals and creeks, a dead intertidal river, Bidyadhari, and another named Kulti that carries the city's wastewater to the Bay of Bengal.

Together they send 10,000 tonnes of fish to Kolkata's markets yearly, fulfilling one-third of the demand in a city of over five million people.

Not having to buy commercial fish feed saves the farmers money.

And this "nutrient subsidy" fish growers get from the wetland and their low transportation cost to their market is passed on the Kolkata city folks who get fish and vegetable not only farm fresh but reportedly up to 30 percent cheaper than India's other metropolitan cities. For the city's poor, the wetland fish remains one of the few affordable protein sources.

Fishing and the vegetable farms in this biodiverse wetland provides livelihoods, albeit many of these are subsistence-based, to around 100,000 people including large numbers of women and children. Maintaining fishponds, catching fish and carrying them to markets, sowing, weeding and harvesting vegetables and rice are among several employments, some of which get paid in kind.

"Kolkata's wetlands ecosystem is an excellent example of a nature-based solution," Dhyani told IPS.

GENERATIONS OF KNOWLEDGE AND PRACTICES COULD BE LAID TO WASTE BY DEVELOPMENT

Dhyani said three generations of EKW fishers' traditional knowledge is kept alive from father to sons. Pondwater is cleaned using kerosene, lime and oil cakes; digging the ponds to the accurate depth of three to five feet to allow sunlight to the bottom, mixing the right amount of sewage, maintaining the required time for conversion of wastewater into fish feed, when to add spawns and how to protect the embankments from emerging threats of water hyacinths are knowledge gleaned from long years of experience.

But it is slowly disappearing. Like the wetlands around Mondal's fishpond, which has long been converted for development, though a few straggler ponds remain.

Some of the younger generation have turned away from traditional wastewater fisheries owing to several factors including an uncertain future in the face of aggressive urban encroachment and demand for land for city expansion.

"My son has completed a diploma in plumbing and left last year to work in Pune [a city near Mumbai – India's commercial hub],

"He dreams of going to Saudi Arab, says there is money there," he told IPS, with an inaudible catch in his voice.

Story Credit: by Manipadma Jena, Jan 28 2020, Inter Press Service News Agency - ipsnews.net

THREATENED

WORLD'S CRISIS-STRICKEN OCEANS DOOMED TO DESTRUCTION WITHOUT A GLOBAL TREATY

by Thalif Deen

UNITED NATIONS, Dec 3 2019 (IPS) - The greatest single climate-induced threat facing the world's 44 small island developing states (SIDS) is rising sea waters which could obliterate some of the low-lying states, including Maldives, Marshall Islands, Kiribati, Nauru, Solomon Islands, Tuvalu, Palau and Micronesia.

The Marshall Islands alone, says the UN, has seen more than a third of its population move abroad in the last 15-20 years. Many have moved for work, healthcare and education – but climate change is now threatening those who have chosen to stay.

At the Conference of Parties (COP25) on climate change in Madrid December 2, UN Secretary-General Antonio Guterres pointedly warned that rising sea levels were twice as deadly today as it was many moons ago: while oceans are rising, he said, they are also being poisoned.

"Oceans absorb more than a quarter of all CO2 in the atmosphere and generate more than half our oxygen. Absorbing more and more carbon dioxide acidifies the oceans and threatens all life within them", he added.

But bigger cities have not been spared either.

In an article titled "Warming Ocean Waters Have Fish on the Move", The New York Times reported December 2 that Iceland, whose economy has depended largely on commercial fishing, has discovered that warming waters associated with climate change are causing some fish to seek cooler waters elsewhere beyond the reach of Icelandic fishermen.

Pointing out the hazards of climate change, Guterres says ice caps are melting. And in Greenland alone, 179 billion tonnes of ice melted in July. Permafrost in the Arctic is thawing 70 years ahead of projections. And Antarctica is

Credit: UNICEF

melting three times as fast as a decade ago, he told delegates at COP25 which is scheduled to conclude December 13.

But there are two proposals before the UN, both aimed primarily at safeguarding the high seas: a Global Network of Ocean Sanctuaries and a Global Ocean Treaty.

Scientific expeditions in recent years have revealed that the high seas, 200 nautical miles from coastal shores, harbor an incredible array of species that provide essential services for life on Earth. Credit: The Pew Charitable Trusts

Louisa Casson, an Oceans Campaigner at Greenpeace UK, told IPS that scientists and governments have coalesced around the concept of a global network of fully protected ocean sanctuaries, covering at least 30% of the world's ocean.

The creation of this network is not just realistic, but of fundamental importance to the health of our planet, she said.

A new report, "Greenpeace's 30×30: A Blueprint for Ocean Protection" authored in collaboration with the Universities of York and Oxford, sets out a scientifically robust and clear vision for a global network of ocean sanctuaries, totally off limits to human exploitation, which would give oceans and the wildlife that calls it home the space needed to recover and thrive.

To deliver this network, she said, governments at the United Nations must agree on a strong new Global Ocean Treaty in 2020.

"This treaty would help fix the currently broken system of ocean governance, which has allowed our ocean to be exploited to the brink of collapse."

Such a treaty, she said, would provide a clear legal duty and process for nations to protect and restore ocean

health through a network of sanctuaries, and set out a robust institutional framework for creating and effectively managing the network through a Conference of the Parties.

A new treaty should also provide clear enforcement obligations for all governments, and monitoring and review mechanisms to ensure the treaty is being properly implemented by all, said Casson.

The world's high seas, which extend beyond 200 nautical miles, are deemed "international waters" to be shared globally– but they remain largely ungoverned justifying the need for a new treaty.

The world's oceans have steadily undergone environmental destruction, including illegal fishing and overfishing, plastics pollutions, indiscriminate sea bed mining and degradation of marine eco systems.

Dr Palitha Kohona, a former co-chair of the 'U.N. Working Group on the Conservation and Sustainable Use of Marine Biological Diversity Beyond Areas of National Jurisdiction', told IPS the concept of ocean sanctuaries and protected areas has been on the table for some time.

He said it is high on the agenda of Western NGOs and many European countries.

And there is a historic compromise in place between the Group of 77 developing countries (G77) and the European Union (EU) on the outlines of this concept and benefit sharing, he noted.

"Properly identified and policed, ocean sanctuaries and marine protected areas (MPAs) will help to protect the habitat of identified species and the breeding grounds of diverse marine life forms which took millions of years to evolve," he said.

It is hoped that agreement on these will at least help to arrest the decline in the number of marine species, said Dr Kohona a former Permanent Representative of Sri Lanka to the United Nations.

However, a longstanding demand for benefit sharing by developing countries also needs accommodation. A compromise can be achieved. There are precedents which can be adapted, he said.

Biological diversity in the oceans could very well provide the impetus for the next wave of innovations in the pharmaceutical industry and the developing world is acutely conscious of being excluded from it benefits.

"We know that species extinction is occurring at an unprecedented pace, including in the seas and oceans. Global warming is contributing substantially to this phenomenon".

At the same time, species adaptation to changing weather and climate factors is threatening the livelihood of millions who depend on the oceans and seas for their living.

He said fish swim away from familiar habitats to areas where the temperature is more conducive to their existence.

Attempts to arrest global warming have received storms of verbal support but not much by way of practical action. Some in positions of power have even challenged the overwhelming scientific view in order to cultivate uninformed electoral support, he noted.

"At COP 25 in Madrid, we need to encourage thinking that would balance economic consolidation and advancement and the conservation of the environment for our children. Our future must not be left to whims of those who thrive in ignorance," he declared.

Casson pointed out there is wide agreement on the need for a new Global Ocean Treaty.

However, governments have been negotiating on a new treaty for years now, and as industrial vested interests step up their lobbying there is a serious risk of the treaty failing

Scientific expeditions in recent years have revealed that the high seas, 200 nautical miles from coastal shores, harbor an incredible array of species that provide essential services for life on Earth. Credit: The Pew Charitable Trusts

to change the status quo, leaving governments unable to deliver effective ocean protection.

She said governments that are truly supportive of proper marine protection must step up when the United Nations meets next year, and fight for the strongest Global Ocean Treaty possible.

"Without a robust new treaty, the ocean crisis will only worsen, which will have wide implications for our planet's health and for all of humanity," she warned.

Meanwhile, the United Nations has proclaimed a Decade of Ocean Science for Sustainable Development (2021-2030) to support efforts to reverse the cycle of decline in ocean health.

The marine realm, says the UN, is the largest component of the Earth's system that stabilizes climate and support life on Earth and human well-being.

The impact of multiple stressors on the ocean is projected to increase as the human population grows towards the expected 9 billion by 2050.

The writer can be contacted at thalifdeen@ips.org

Story Credit: by Thalif Deen, Dec 2019, Inter Press Service News Agency - ipsnews.net

NOT ALL TRADE IS GOOD – THE CASE OF PLASTIC PLANET

by A. KRAVCHENKO

Alexey Kravchenko is Associate Economic Affairs Officer, Trade, Investment and Innovation Division at the Economic and Social Commission for Asia and the Pacific (ESCAP)

BANGKOK, Thailand, Jan 6 2020 (IPS) - Currently, approximately 300 million tons of oil-based plastic waste are produced every year. A significant amount of plastic waste ends up in the oceans, having a detrimental effect on marine ecosystems and coastal communities. Most of this waste originates from the Asia-Pacific region.

If unaddressed, by 2050 there could be more plastic than fish in the oceans.

Recognizing the problem, the 2030 Agenda for Sustainable Development addresses plastic pollution in the ocean. It is widely acknowledged that regulating single-use plastics and microplastics is a major component in achieving this target.

An increasing number of countries in the Asia-Pacific region and across the world are now introducing regulations addressing consumption, production and trade in single-use plastics and plastic waste.

Perhaps the most stringent recent example of addressing single-use

Credit: United Nations

plastics is in Kenya, where, since August 2017, producing, selling or even using plastic bags can result in four years in prison or a fine of up to $40,000.

Prior to the ban, plastics were ubiquitous on the streets, and 3 out of 10 animals in abattoirs were found to have plastics in their stomachs.

Eight months after, the number has gone down to 1 in 10, and the streets are much cleaner. This, however, came at a significant cost – it was estimated that up to 60,000 jobs were lost as a result – Kenya was a major plastic producer and exporter.

Highlighting the need for regional cooperation, illegal imports from neighbouring countries began to emerge, and the Government of Kenya is urging its neighbours to institute similar bans.

While many developed countries remain better at ensuring that plastics and other waste do not end up in waterways through adequate refuse collection mechanisms and littering fines, recycling remains an

issue. This was seemingly addressed through exporting waste plastic for recycling to other countries, most significantly to China.

Since 1992, China imported almost half of the world's plastic waste for recycling.

However, recognizing the negative effect these imports were having on its environment and air quality, in 2018, the Government of China banned the importation of plastic waste.

Over the coming decades, as much as 111 million tons of plastic will have to find a new place to be processed or otherwise disposed of as a result of China's ban.

The ban led exporters to seek other markets, and exports of plastic waste to other countries in the region, such as India, Indonesia, Malaysia and Thailand have skyrocketed.

Expectedly, this resulted in deteriorating environmental situations in the recipient countries and generated backlash: following China's example, both Malaysia and Thailand have since banned the import of plastic waste.

Recognizing the damaging effect of trade in plastic waste, on 11 May 2019, a total of 180 Governments adopted an amendment to the Basel Convention to include plastic waste in a legally-binding framework that will make global trade in plastic waste more transparent and better regulated, while also ensuring that its management is safer for human health and the environment.

According to this Agreement, exporting countries will now have to obtain consent from countries receiving contaminated, mixed or unrecyclable plastic waste.

Such trade regulations are commonly referred to as non-tariff measures (NTMs) – policy measures other than tariffs that can potentially have an economic effect on international trade in goods.

During the past two decades, while applied tariffs in the Asia-Pacific region have been halved, the number of NTMs has risen significantly. NTMs often serve legitimate and important public policy objectives, but their trade costs are estimated to be more than double that of ordinary customs tariffs.

As such, they have become a key concern for traders as well as for trade policymakers aiming to ensure that trade can continue to support sustainable development.

This year's Asia-Pacific Trade and Investment Report by ESCAP and UNCTAD provides an overview of NTM trends and developments in Asia and the Pacific. It explores how NTMs relate to the Sustainable Development Goals and points to the importance of aligning NTMs with international standards as one way to bring down trade costs of NTMs, as well as of strengthening regional cooperation and streamlining and digitalizing compliance procedures.

Story Credit: by Alexey Kravchenko, Jan 2020, Inter Press Service News Agency - ipsnews.net


YOU SEE THE DIFFERENCE
A TURTLE DOES NOT

GENUINE REFORM CULTURE LACKING IN ZIMBABWE

by BUSANI BAFANA

BULAWAYO, Jan 16 2020 (IPS) - Zimbabwe needs urgent economic and political reforms to transform its economy amidst a growing national crisis, researchers say in a new study that urges swift policy changes and a sound financial framework to attract investment.

The country has been reeling from one of the worst droughts in decades, with the United Nation's World Food Programme (WFP) identifying Zimbabwe as one of the 15 critical emergencies around the world at risk of crisis without rapid intervention.

- More than 7 million Zimbabwean are food insecure owing to a projected 50 percent fall in the 2019 cereal harvest. This month the WFP is doubling its assistance to reach 4.1 million people who are hardest hit in rural areas.
- But the study, G20 Compact with Africa: No Reformers, No Compact- The Zimbabwean Case Study, states that the G20 Compact with Africa (CwA) investment framework, initiated by the G20 countries in 2017, could support Zimbabwe's economic transformation only if Zimbabwe was committed to undertaking reforms.
- The voluntary compact has been signed by 12 African countries to date, including Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Rwanda, Senegal, Togo and Tunisia. Zimbabwe is not a signatory.
- The compact seeks to stimulate economic growth, create employment and nurture investment. Through this partnership, African governments are responsible for spearheading reforms

Zimbabwe needs urgent economic and political reforms to transform its economy amidst a growing national crisis, researchers say as more than 7 million Zimbabwean are food insecure owing to a projected 50 percent fall in the 2019 cereal harvest. Credit: Jeffrey Moyo/IPS

that will make their countries attractive to international investors.

- The focus of the CwA is to promote a sustainable development framework in those African countries that accepted the invitation to be part of the initiative, in an attempt to attract private investors. The framework is a three-tiered approach to reforming three economic fundamentals – macroeconomics, business and finance.

"As a reform strategy, the CwA framework has the potential to support Zimbabwe's economic transformation agenda," the study published last week by the South African Institute of International Affairs (SAIIA), an independent public policy think tank, stated. It further noted that the compact was relevant to Zimbabwe's re-engagement agenda and the Transitional Stabilisation Programme (TSP), which was introduced in 2018 as a blue print to turn around the economy.

But a crisis of governance and financial stewardship has long been stalking Zimbabwe, a Southern African nation that was once a model of economic success and democracy in Africa. Life has become difficult for its citizens who have to battle with a high cost of living and many things are in short supply from water to electricity to monetary currency, jobs, food and even political freedoms.

The report pointed out that Zimbabwe's economic woes are multi-faceted — a result of a combination of factors, including economic mismanagement, chaotic land reform, indigenisation policies, political instability and fiscal mismanagement driven by corruption.

COLD RECEPTION FOR COMPACT

Yet despite its relevance, the compact has failed to raise enthusiasm among Zimbabwean policymakers, and few economic stakeholders are aware of it, the study found, pointing out that the Zimbabwe government is desperate and preoccupied with finding a quick solution to the economic crisis.

The study also made a note that there is no reform culture among the custodians of reforms in Zimbabwe.

Besides, the country's multilateral debt, estimated at over $8,2 billion, has prevented any potential inroads with the international organisations involved with the compact.

"Clearance of multilateral debt arrears: the sanctions rhetoric seems to have taken the centrestage ahead of reform implementation," noted the study, adding that, "This behaviour has promoted corruption and stands in the way of reforms; hence there is no CwA for Zimbabwe."

Economic analyst, John Robertson, said nobody agrees with the government on the point of economic sanctions imposed by the Western countries on individuals accused of human rights abuses in Zimbabwe.

"The sanctions are not applied to the country; the sanctions did not cause the country's failure. The failure is caused by our decision to close down our biggest industries," Robertson told IPS, referring to the destruction of the agriculture sector and the collapse of the manufacturing sector.

POOR POLICY CHOICES

"The policy choices that we made have caused so much damage to our productive sectors starting with agriculture," said Robertson, adding, "We imposed upon ourselves a serious handicap when we said the land in the country no longer has market value land so [people with] land can no longer borrow against ownership rights to that land because the land is now the property of the state."

David Moore, researcher and political economist at the University of Johannesburg, told IPS that if the ruling Zimbabwe African National Union – Patriotic Front (ZANU PF) party had maintained its neo-liberal and white-farmer-friendly economic promises it might have kept the "west" on its side.

But cabals and corruption cannot be dismantled – they are the pillars of the party, he said. And so the military-party complex so tight that it cannot be untied: they are integral parts of the country's political economy.

Academic and social commentator, Rudo Gaidzanwa, concurred saying it will take pushing to get ZANU (PF) ruling party and its military allies to undertake political and social reforms.

"The types of political and economic reforms that the civilians want will undermine the interests of the militarist elements in the state and the security sector," Gaidzanwa, a Sociology Professor at the University of Zimbabwe, told IPS.

"ZANU won't stand for anything that undermines their hold over the state and the society. It is not likely that any meaningful reform will occur unless dramatic social and political changes occur in Zimbabwe," she said, adding that the ZANU PF led-

government and elites have used economic sanctions as a convenient excuse to evade responsibility for economic and social crises.

Sanctions have not prevented the president and his cohorts from pillaging mineral resources. The current chaos was ideal for pillaging resources and undermining the rule of law and democracy, she said.

- Zimbabwe's late president Robert Mugabe, who was ousted from power in November 2017, is believed to have looted hundreds of millions of dollars, though no exact figure has been given.
- Tendai Biti, Zimbabwe's finance minister between 2009-2013, told Deutsche Welle that Mugabe and his family where not the only ones responsible for looting the state and that during his term of office some $15 billion had "disappeared through other channels".
- Last July the country's auditor general released a report that since Mugabe's ouster, executives at state-owned enterprises had mismanaged millions of dollars, spending the money to their personal benefit.
- "Rigged elections are an issue because they prevent the will of the people from prevailing," Gaidzanwa told IPS. "The present situation over contested presidential elections between (Nelson) Chamisa and (Emerson) Mnangagwa is symptomatic of that struggle…These issues have dogged our elections for decades and remain unresolved hence our dire economic and political situation."
- After Mugabe was ousted from power Zimbabweans went to the polls in July 2018 to elect a new leader, with Mnangagwa winning 50.8 percent of the voted compared to Chamisa's 44.3 percent.
- The results were disputed.

Economist and former parliamentarian, Eddie Cross sees the situation differently, saying Zimbabwe, despite its current challenges, has a good start to turn around its economic fortunes.

"We have a fiscal surplus, government salaries are down to a third of the budget from over 95 percent, we have a balance of payments surplus and nearly $1 billion in bank accounts," Cross said, adding that Zimbabwe's domestic debt has been devalued and exports are highly profitable.

"[Political] Stability is no longer an issue – it's a done deal, what is a problem is financing and this is going to be a challenge because we really have to look after ourselves," Cross, a member of the Reserve Bank of Zimbabwe's Monetary Committee, told IPS in an interview. "A couple of billion dollars would be useful. Perhaps we can persuade Mrs. [Grace] Mugabe to bring some money back from abroad."

Cross believes Zimbabwe can benefit from the G20 CwA even though the country is a pariah state.

"I think Brexit is important and also the IMF and if we play our cards right and get on with reforms I see no reason why we cannot be in a very different place in 2021."

Story Credit: by Busani Bafana, Jan 2020, Inter Press Service News Agency - ipsnews.net

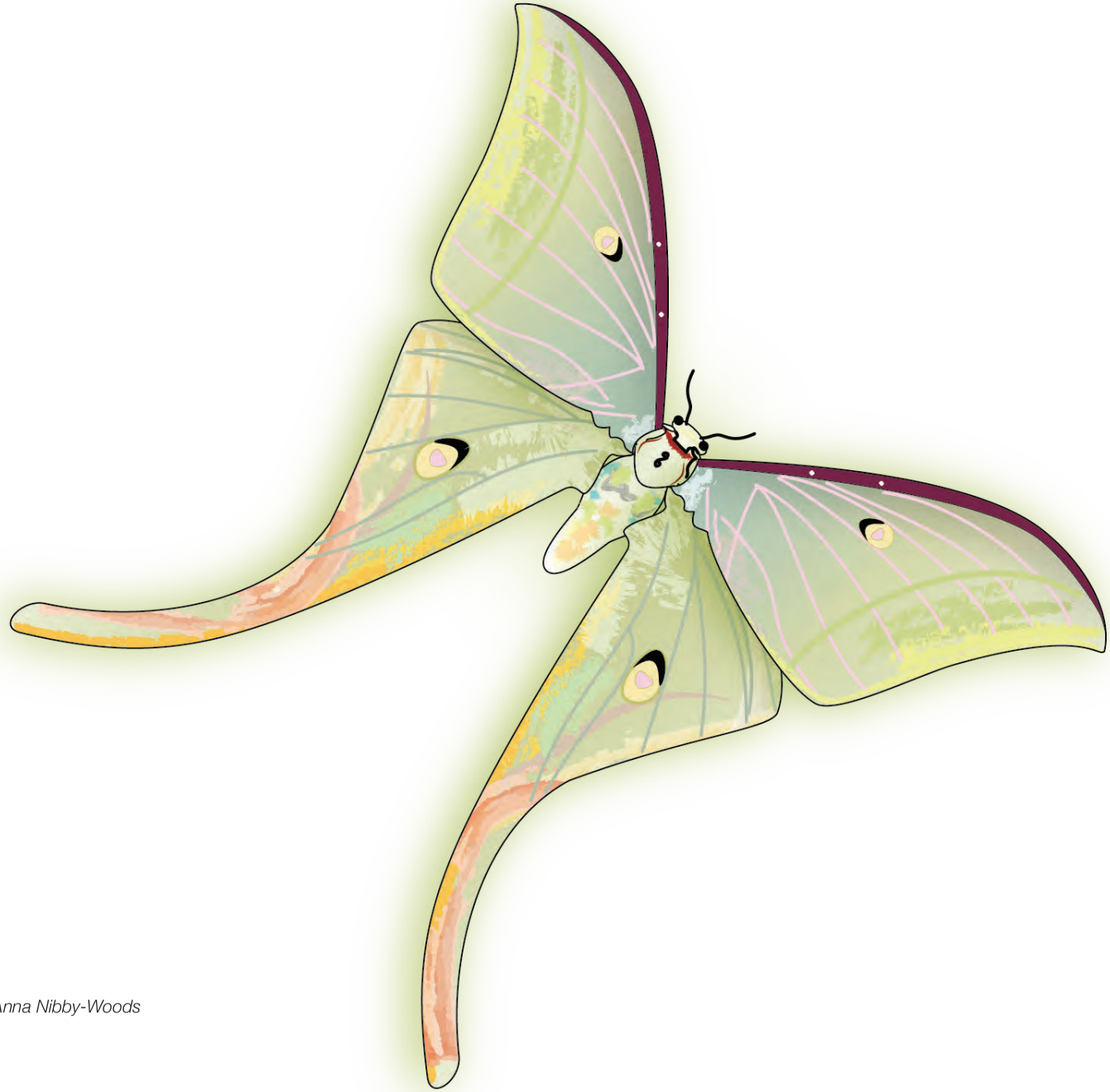

Illustration by Anna Nibby-Woods

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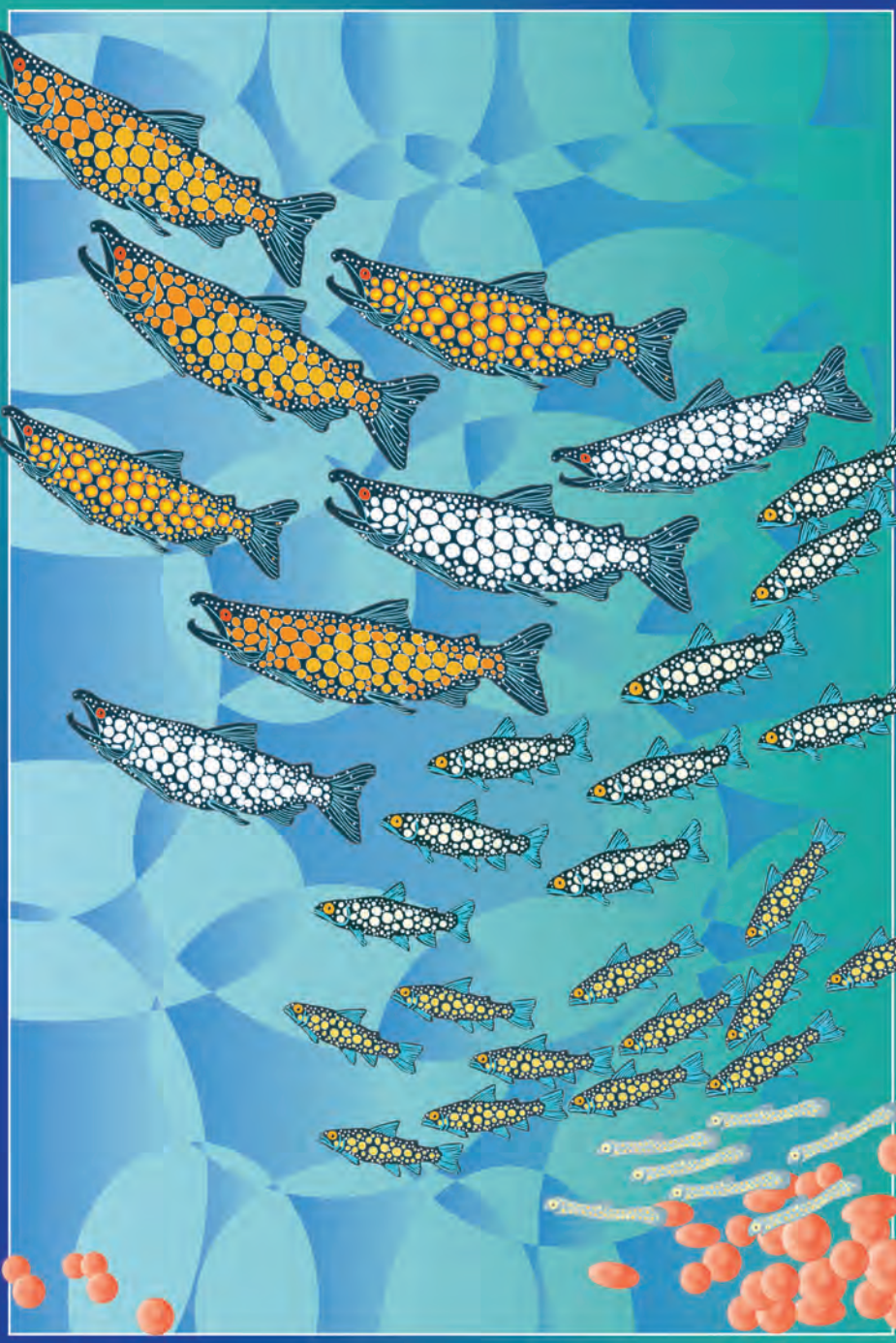


MAARS & MAPC

MARITIME ABORIGINAL AQUATIC RESOURCES SECRETARIATE

Illustration by Anna Nibby-Woods

The ABS Path Towards Justice & RECONCILIATION

by J. McNEELY

We, the people of South Africa, Recognise the injustices of our past; Honour those who suffered for justice and freedom in our land; Respect those who have worked to build and develop our country; and Believe that South Africa belongs to all who live in it, united in our diversity. We therefore, through our freely elected representatives, adopt this Constitution as the supreme law of the Republic so as to Heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights; Lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law; Improve the quality of life of all citizens and free the potential of each person; and Build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.

May God protect our people.

Nkosi Sikelel' iAfrika. Morena boloka setjhaba sa heso.

God seën Suid-Afrika. God bless South Africa.

Mudzimu fhatutshedza Afurika. Hosi katekisa Afrika.

December 16, 1996 marked a new hope, not only for the Peoples of South Africa, but also for Peoples around the world still yearning to be free of their colonial history. After almost 50 years, the South African government's colonial policy of institutionalized racism towards the black and Indigenous Peoples of South Africa, known throughout the world as Apartheid, came to an end. The way was filled with violence, vitriol, racism, and fear, but eventually the majority black and Indigenous Peoples secured their power and their rights to enjoy the full economic, social, and political life that South Africa has to offer – to "free the potential of each person".

There is a lesson to be learned by the Indigenous Peoples still nested within the Federation of Canada. We have not yet in this country, I believe, so decidedly discarded colonialism, which still bonds the mind and spirit of Canadians. Our own constitution, the most recent articulation in 1982, was adopted only a few years prior to South Africa's constitution, and is by comparison a patchwork, with threads not yet fully tested as to our resolve. While great strides were made to modernize the Canadian Constitution to resolve conflict among provincial powers and the federal government, and almost miraculously including an entire Part II for the "Rights of Aboriginal Peoples", the promises of 1982, and later the Charlottetown Accord, towards the Aboriginal Peoples still nested within (but not yet wholly a part of) Canada remains broken. It is clear for the many nations of Aboriginal Peoples that substantive change gathered into the hand so often melts away like silt in a fast river, where we have so little power to compel it to our will. Who among the Canadians comprehends the place of Aboriginal Peoples in this confederation. Almost 40 years later, Part II remains without form or content, save for the decisions that Aboriginal Peoples have fought for and won in courtrooms – supreme advice for the prudent governance of this federation, but still short of compelling confederation with Aboriginal Peoples.

Upon invitation from a small group attempting to raise one root solution, known as ABS Canada, I travelled to South Africa* to learn about their system and lessons for fostering a new age of nationhood centered around community economic, social, and political development, and which takes a holistic approach towards locally directed sustainable development and conservation, underpinned by the necessity for equitably sharing in their benefits (i.e., "Access & Benefit Sharing" or ABS).

Without delving into the history of apartheid, as a simple internet search will surely open many eyes to the subversive hideousness of a "modern day colonial system" from 1948 to the early 1990s; how South Africa has pulled itself out of apartheid to "take its rightful place as a sovereign state in the family of nations" is, I believe, of vital importance for every Canadian to ponder as we too aspire to some New Canada built on trust, opportunity, and reconciliation.

I think the hero of the revolution and first president of the new Republic, Nelson Mandela, being a well-educated person and having experienced first-hand the many faces of violence between whites and non-whites, and even among the non-white communities themselves, knew the precarious position South Africa was facing in the early 1990s. The revolution may have been a means, but as the contemporary revolutions in other

(from the Wikipedia entry for Apartheid)

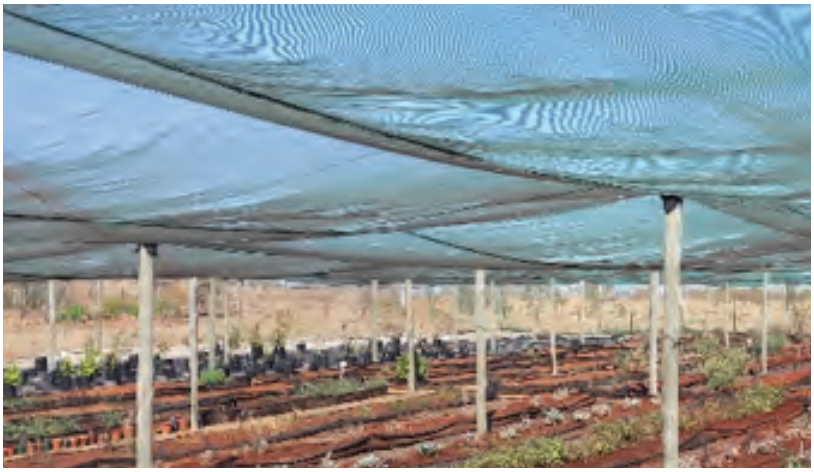
fledging African states was showning, without diligent follow through with reconciliation and nation building at all levels of society, all levels of governance, and all levels of the economy, violence only begets violence.

How this transition from generations of colonial institutionalized racism, to revolution which killed 8,500, to the establishment in 1994 of the Government of National Unity is worthy reading for every Canadian. The history is important, not just because of Canada's outward international stance against apartheid, including political pressures against South Africa, resulting in its ouster from the Commonwealth in 1961 or our supporting of economic sanctions in 1986-1993 (try to find a bottle of South African brandy today).

To the contrary, we should learn this history, because of Canada's deep economic interests to support apartheid in South Africa which provided cheap resources and cheap labour for exploitation. Apartheid was not just a system to segregate the ruling white class from non-whites, it was a means to control and exploit land and resources. Furthermore, I don't think it was coincidence that there are so many parallels between the South African colonial apartheid system and the Canadian colonial Indian Policy system, and there are instances of South African officials travelling to Canada to learn about Indian Reserves and Residential Schools.

So effective it was at centralizing economic and political power that even after more than a quarter of a century since apartheid, the capital area of Gauteng Province (~1.5% of South Africa's land area) accounts for about one half of all the wealth in South Africa. In the black communities surrounding the administrative capital of Pretoria and the political capital of Johannesburg, the remnants of walls and guard towers remain which once imprisoned (segregated) whole communities. Instead, as I travel through the still predominantly white Pretoria, to me it seemed a prison in reverse, where each home was its own self-imposed cell of concrete walls, razor wire, CCTV, and guards.

As a Canadian, it is a shock to witness the visceral reminders in South Africa that colonialism is not yet dead. As I stare out my window at mile upon mile of barbed wire,



I wonder what is the effect on people's minds, on their relationships, on their outlook of the world? Yet, in the midst of all this, there is hope everywhere, from the daily discussions in local newspapers about legal cases attempting to restore lands, automobile advertisements which very overtly push a new image of a welcoming society which values all persons, the resurrection of the N|uu language by the San People of the Kalahari, and the pride of a community which, through cleaning trash off a mountain, has vanquished the demons of apartheid nested there and reclaimed it for their spiritual and physical healing.

Pondering these thoughts, as I pass one gated community after another, I begin to think about Canada's identity(ies).

Living under a dominant white social, political, and economic order, it is understandable that the majority may feel that they understand all of Canada, for in the end are we not all Canadians, eh? However, we are not as unified as we

Medicinal herbal farm of Mothong African Heritage Trust overlooking Mamelodi, with the home, practice, office, and medical school of local healer Ntate Ephraim Mabena. Mr. Mabena has been on a near twenty year spiritual journey to clear the literal mountain of trash, including guard posts, dead bodies, and drugs, and return this place to a place of learning and healing. He envisions the farm with a processing plant and other facilities necessary to bring his medicines and teachings to other communities in need. (J. McNeely)

like to think, COVID-19 notwithstanding, and I am certain each of us has at times expressed shock and confusion when the various parts of our federation threaten revolt or wish to resign. For the Indigenous Peoples still nested within the Federation of Canada, the walls surrounding our communities were not so overt as concrete and wire, though we do remember the forced centralization, the residential schools, the ticket necessary to leave the reserve. More covert was (and still is) the building of unseen walls erected of policies and laws designed to segregate Aboriginal Peoples from their lands and resources and the sundering of families, communities, and nations which reverberates throughout our history with a maladious tune and which is still being plucked out by a master in search of some elusive harmony, but the instrument is not of such a design. For the purpose of economic, political, and social advantage of one class over another, and now rationalized as the common good, we allow the theft of Canada to stand and be entrenched through a compromise of reconciliation, the degree and meaning of which still has not yet broached the Canadian conscious.

Though in both cases, we have been able to tear down the most recognizable walls around our communities which have kept us in, we are now faced with a multitude of walls designed to keep us out. Sure there are a few success stories in Canada, such as in the realm of fisheries where the Minister has chosen to accommodate Aboriginal Peoples treaty right to fish for economic purposes by issuing Aboriginal Communal Fishing Licenses under the *Fisheries Act*. Still at government control, but which at least brings in some money and the prospect of a few jobs for some Aboriginal persons. But we are a very long way off in Canada from beginning to advance the objectives of the *UN Declaration on the Rights of Indigenous Peoples*, which foremost recognizes that the inherent rights of Indigenous Peoples are derived from their economic, political, and social structures and that Indigenous Peoples must have control over development in order to maintain and strengthen their institutions, cultures, and traditions. In other words, those who have a say in development directs the implementation and protection of rights.

For Indigenous Peoples around the world, the right to benefit equitably from resources development (ABS) is fundamental and the priority concern for the implementation of the *Convention on Biological Diversity*, and thus the Convention is at the crossroads of many issues, including conservation, sustainable development, the rights of Indigenous Peoples, the burden of responsibility for the "Anthropocene mass extinction", the push and pull of international politics among States, and ultimately, no less than the future of humankind on Mother Earth.

Recognizing ABS to be a means to a new path, not only for the security of South Africa, but also its responsibility towards implementation of the *Convention on Biological Diversity*, South Africa has embarked upon an ambitious effort to implement all aspects, and more, of the *Nagoya Protocol on Access & Benefit Sharing and the Bonn Guidelines on Access & Benefit Sharing*. Things couldn't be more different in Canada, where Environment and Climate Change Canada struggles with where to begin or how Canada could even adopt such instruments, because the provinces and federal government themselves fight over resources and resource dollars, and have not made the time to include Aboriginal Peoples in the debate. We are

so concerned in Canada over oil, water, trees, minerals, and fish that I fear we are missing the new poli-socio-economic future promised with the development of genetic resources. In fact, to date Canada does not even have a national policy on ABS, let alone any sort of coherent law about who owns genetic resources in Canada, how they should be developed, and who should receive the benefits from their development.

During my week in South Africa, I spent many hours talking with community members, Elders, traditional knowledge holders, healers, scientists, government representatives, and business people. We talking about buchu, aloe, wormwood, roobois, and many other traditional plants. We investigated real science being conducted on these plants for healing kidney and urinary track infections, high blood pressure, irritable bowel syndrome, gonnorhea, allergies, malaria, diabetes, fevers, colic, whooping cough, sexually transmitted diseases, and much more. We learned about the new promising uses of these and other plants for food flavourings, fragrances, bug repellent, and insecticides. We visited one such institution of learning, one of the campuses of the Council for Scientific and Industrial Research (of which there are several spread across the country). We witnessed how community members were involved in all stages from community engagement, to discovery of genetic resources and traditional knowledge, to R&D, to business development, to market research, to getting the product to the shelf, and how the benefits flowed back to the communities. We talked about the nuts and bolts of deals with large western corporations including intellectual property rights and benefits arrangements. And most importantly, I saw the impact of locally directed development for the benefit of the community, the boon to the local economy, the pride and optimism

Selection of products derived from the genetic resources of one South African plant developed at the Council for Scientific and Industrial Research (J. McNeely)

for a better future, and the rekindling of traditional knowledge, Indigenous language, and cultural practices, for now people had the instrument and the means to achieve their right to development and self-determination.

In South Africa adoption of such instruments as the Nagoya Protocol or Bonn Guidelines is a natural progression of environmental and human rights law since 1996, in some aspects an additional tool for South Africa to employ to reach its national objectives of peace, unification, and reconciliation. Most importantly, such work has brought to the public's attention that indigenous biodiversity is worth billions of dollars annually to South Africa. The region-wide effort to "valorize" genetic resources in southern African countries (of which South Africa is the development lead) could be worth upwards of $2 trillion dollars in pharmaceuticals, biotech, cosmetics, and functional foods alone. Likely in Canada there is at least as much untapped store of natural wealth, but we do not know what or where it is located, other than to say it is on Aboriginal Peoples traditional ancestral homelands and territories. All the while there is a growing surge of companies searching for the "next best thing" in all manner of industry and research. A recent synthesis paper on the economic potential existing in southern African countries showed that over the last several years 400 large companies were spending over $124 billion USD just on R&D on genetic resources in southern Africa, with an annual growth of 4-12%. The smallest budgets for R&D reported started at €300,000. Not surprisingly large and small companies are turning to the "genetic resources rush" of countries like South Africa, because they have in place the legal, social, and physical infrastructure to provide legal certainty and a favourable investment climate for genetic resources development. That climate has deep roots in modern South Africa.

The South African Constitution includes the right to a healthy environment among the many rights enumerated in the Bill of Rights. (That right is not included in the Canadian Charter of Rights and Freedoms.) The South African Constitution established a Human Rights Council charged with ensuring that all organs of the State are broadly representative of all South African peoples and that those government organs redress the actions of the past. (The Canadian Human Rights Commission is created by a federal act and complaints are limited to "Anyone who works for or receives services from a business or organization that is regulated by the federal government") Restitution or redress of property is a large part of the South African Constitution, as well as the right to self-determination of peoples within South Africa, including the recognition of traditional leadership and application of customary law. (The Canadian Constitution does not explicitly recognize any of the preceding, leaving it to the courts to remedy the injustices of the past.) The *National Environmental Management Act, 1998* recognizes the environment to be the common heritage of the South African Peoples, declares it to be held in public trust, and places the needs of people at the forefront of its concern, with its aim to serve the physical, psychological, developmental, cultural, and social interests equitably. (While some Canadian environmental law eludes to some overarching principles, such as the precautionary approach and "polluter pays", it stops short of guaranteeing the rights of communities and individuals.) The *National Environmental Management:*

Biodiversity Act, 2004 in many ways mirrors the *Convention on Biological Diversity* and in doing so brings into (or mainstreams within) South African governments, businesses, and society decades of enlightenment about the value of species, ecosystems, and genetic resources. (Canada does not have a national biodiversity law.)

In short, despite my University degree in biology and chemistry and two decades working with biological (and genetic) resources, most of which time also includes advocating for the rights of Aboriginal Peoples in Canada, I was quite disadvantaged compared to my South(ern) African colleagues, when comprehending the lessons they were trying to share. To me, it was a bit like trying to understand calculus without first having a firm grasp of algebra, or heading into the woods to hunt a deer without a gun or bow. The intention and earnest is there, but without the tools the task is near impossible.

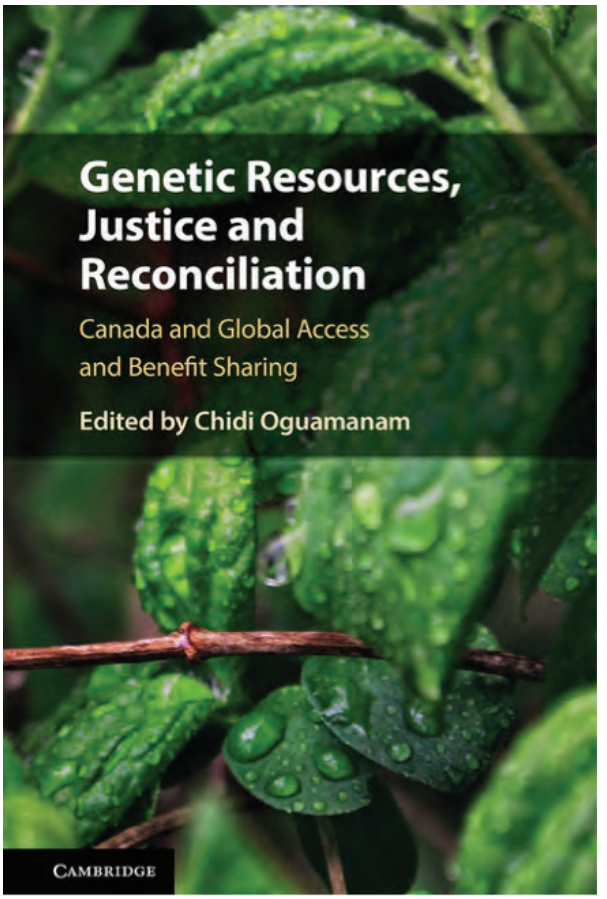
And I'm not alone. The ABS Canada community is sparse. Many are well educated lawyers and professors, leaders in their professions. MAPC too has some knowledge, as well as a handful of other Aboriginal persons across the country. Most others in Canada (public and private) don't have the first clue that there is such a thing as the *Convention on Biological Diversity* or what Access & Benefit Sharing means, let alone have heard the international frantic call for "Transformative Change" towards "Living in Harmony with Nature" and that the *Convention on Biological Diversity* and its Nagoya Protocol and Bonn Guidelines point the way. We all know (our we should all know by now) that Mother Earth cannot sustain many more years of "business as usual", of a few getting rich off of the relatively free access to resources and ecosystem services. To achieve meaningful conservation, it must be at the direction and for the benefit of people, otherwise we do not have the means to act in our own interest and that of our Mother Earth.

But what could Access & Benefit Sharing look like in Canada. Clearly, we are not a Republic like South Africa. The language of our Constitution and laws are not as explicit about environmental rights or the rights of people to the equitable benefits from development. Canada has not erupted into revolution over lands, resources, and fundamental human rights.

I am inspired by the findings of David R. Boyd in *The Environmental Rights Revolution*, 2012. He found that there is a very wide range of constitutional language, environmental laws, court rulings and practices around the world for the advancement of environmental rights (and human rights vis-á-vis environmental rights). In many cases the status of formal recognition or proclamation is not what one would necessarily expect for the advancement of rights. Just because something is written on paper, does not make it so, as the old adage goes. What is paramount is society's willingness to advance and the fortitude to make it happen. In some cases the written word is an affirmation, in others it is an aspiration, in some it is only placation.

ABS Canada has attempted to raise awareness about the importance of ABS for Aboriginal Peoples through a series of workshops and engagements with Aboriginal persons, university law professors, government officials, international negotiators, environmental non-governmental organizations, international organizations, and researchers. Many lessons of which Dr. Chidi Oguamanam has diligently and expertly compiled and edited into a free, open access publication: *Genetic*

Resources, Justice and Reconciliation: Canada and Global Access and Benefit Sharing, 2019, available for free download at Cambridge University Press: http://dx.doi.org/10.1017/9781108557122.



1. ***The ABS Canada Initiative: Scoping and Gauging Indigenous Responses to ABS***, Chidi Oguamanam
2. ***Canada and the Nagoya Protocol: Towards Implementation, In Support of Reconciliation***, Timothy J. Hodges and Jock R. Langford
3. ***Aboriginal Partnership, Capacity Building and Capacity Development on ABS: The Maritime Aboriginal Peoples Council (MAPC) and ABS Canada Experience***, Chidi Oguamanam and Roger Hunka
4. ***Unsettling Canada's Colonial Constitution: A Response to the Question of Domestic Law and the Creation of an Access and Benefit-Sharing Regime***, Joshua Nichols
5. ***Making Room for the Nagoya Protocol in Nunavut***, Daniel W. Dylan
6. ***Implications of the Evolution of Canada's Three Orders of Government for ABS Implementation***, Frédéric Perron-Welch and Chidi Oguamanam
7. ***Biopiracy Flashpoints and Increasing Tensions over ABS in Canada***, Chidi Oguamanam and Christopher Koziol
8. ***Applying Dene Law to Genetic Resources Access and Knowledge Issues***, Larry Chartrand
9. ***Access and Benefit-Sharing in Canada: Glimpses from the National Experiences of Brazil, Namibia and Australia to Inform Indigenous-Sensitive Policy***, Freedom-Kai Phillips
10. ***Access and Benefit-Sharing in the Age of Digital Biology***, Peter W. B. Phillips, Stuart J. Smyth and Jeremy de Beer
11. ***ABS: Big Data, Data Sovereignty and Digitization: A New Indigenous Research Landscape***, Chidi Oguamanam
12. ***Ethical Guidance for Access and Benefit-Sharing: Implications for Reconciliation***, Kelly Bannister

13. ***Mapping the Patterns of Underestimated Researcher-Indigenous Collaboration: Towards Independent Implementation of ABS Principles***, Thomas Burelli

14. ***ABS, Reconciliation and Opportunity***, Chidi Oguamanam

While I'm proud to wear the Maple Leaf, as it marks us as Canadians, and I hope, aspiring to be the world example of multiculturalism and inclusion, I am reminded that the flag design was itself a compromise between the ruling powers… not designed to include, but more so designed not to offend. On my trip, I was surprised to learn that none of the six colours making up the South African flag has any official meaning, an explicit invitation for each South African to identify with the colour(s) they choose and make for themselves their own symbolism. Only the Y, where the several paths of peoples and history come together and share a common future, is the dream and the goal. Whatever that future may bring, it is to be equally shared, for a common better future for all.

* I travelled with Chris Koziol, who in many ways was spearheading ABS Canada at the time. The experience would not have been possible without the efforts and encouragement of Dr. Chidi Oguamanam, who secured our invitations to attend the 2nd Community-to-Community Exchange on ABS and Traditional Knowledge, in Pretoria, SA, which was attended by predominantly African community representatives from almost all nations in Africa.

As large as 66 soccer fields and viewable from space, the Giant Flag of South Africa will be made of millions of coloured desert cacti and succulents. Located in Camdeboo, the flag is to accompany a four megawatt solar array and is meant to put the economically depressed local community "on the map" and showcase a new model of sustainable development that is community lead, women driven, and conservation focused. (Artist rendition from Google Maps, May 27, 2020)

OCEAN ACIDIFICATION – CLIMATE CHANGE'S EQUALLY EVIL TWIN

by BRYAN MARTIN

Scientists have been talking about human induced climate change for decades and the majority of the general public is now beginning to hear those cries, especially our youth. The latest Intergovernmental Panel on Climate Change (IPCC) report states that climate change will warm the ocean, increase the number of crippling storms, and change rainfall patterns which in turn will lead to more incidences of flooding and drought. All of these changes will affect our local ecosystems in one way or another. Many, if not all of these issues, are linked or partially linked to burning fossil fuels which emit vast quantities of carbon dioxide gas (CO_2) into the atmosphere.

This is not another article about CO_2 as a greenhouse gas, nor is it about climate change, but it is an issue that is directly related to our rising levels of atmospheric CO_2. Unlike climate change projections, which often come under scrutiny due to the mistrust in modeling or due to natural variations within the natural system, atmospheric CO_2 levels are measured directly and do not require modeling. In fact, since March 1958, levels of CO_2 in the air have been measured, unbiased, at an observatory in Mauna Loa, Hawai'i. Since that time, they have showed an increase from 313 ppm (parts per million) to now over 400 ppm (Figure 1; 416 ppm on February 10, 2020, up from 411 ppm the year previous). While climate change deniers have done a very good job at casting doubt on the realities of climate change, there is no denying the fact that CO_2 has increased in our atmosphere

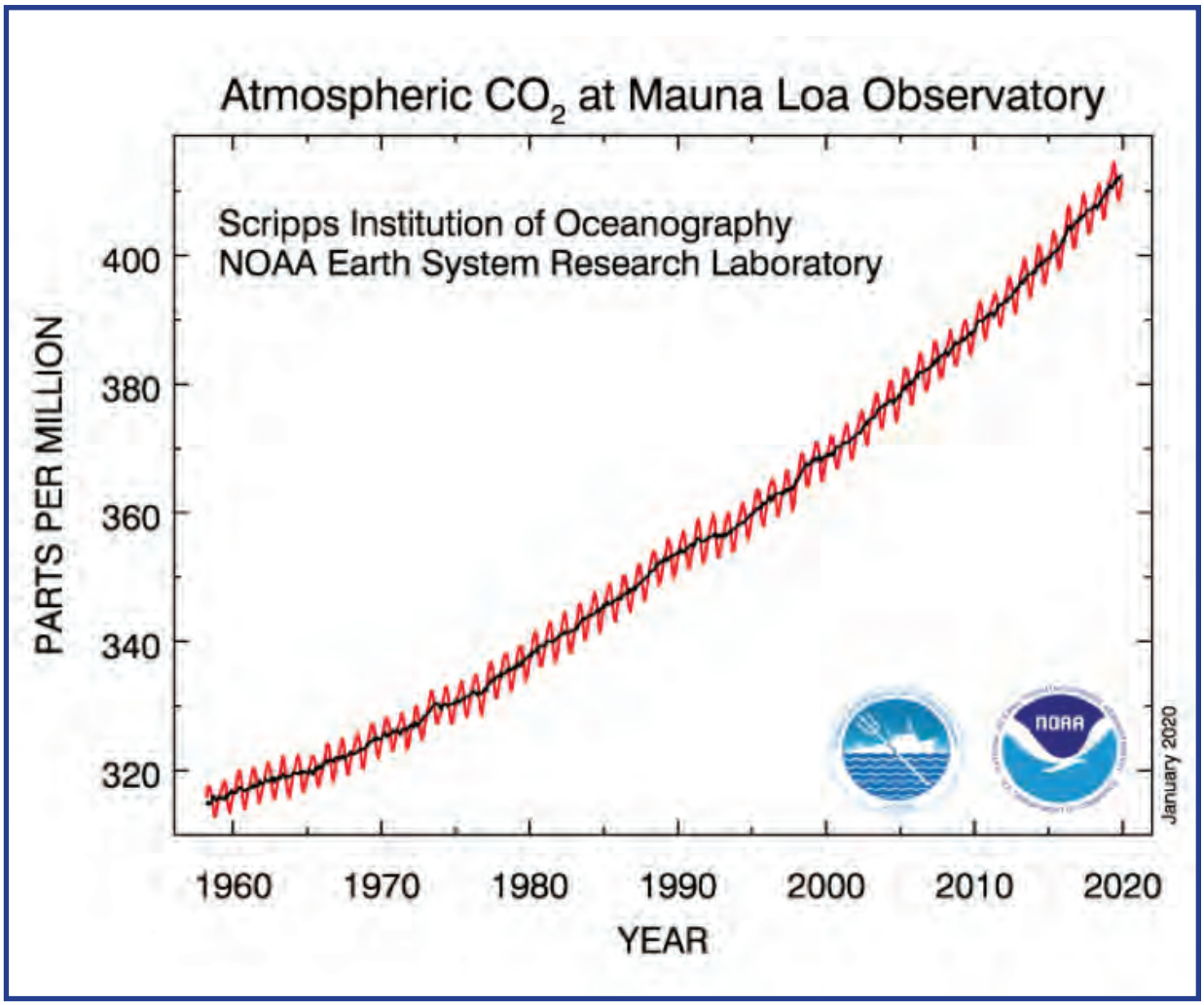


Figure 1. Atmospheric CO^2 levels measured at the Mauna Loa Observatory have shown an increase since measurements began in 1958 (313 ppm) as depicted in the Keeling curve. The black line represents the yearly mean while the zigzag red line shows the annual decrease in CO^2 when the vast number of forests in the northern hemisphere grow their leaves in spring and summer and draw carbon dioxide out of the atmosphere. The level increases again with the return of the northern fall and winter. The Keeling curve as it is known, in effect captures planet earth breathing.

since at least 1958. By drilling ice cores deep into the polar ice sheets and looking at tiny pockets of air that were trapped thousands of years ago, scientists have noted that prior to 1958, when direct CO_2 measurements began, levels had already increased by almost 12% since before pre-industrial times. What is especially frightening is that, despite a global COVID-19 Pandemic lockdown for over a month (as of writing this), with industry, air travel, and commuting having effectively come to a halt, CO_2 levels in the atmosphere have not decreased, thus illustrating the lasting effect of this gas. Thankfully, the ocean has done a really good job at absorbing much of the excess CO_2 that we have produced through a constant exchange of gas between the atmosphere and the ocean. The issue is

Often referred to as osteoporosis of the ocean, [ocean acidification] prevents shell building creatures such as lobster, oyster, crab, shrimp, and coral from extracting the calcium carbonate from the water that they need to build their shells and are thus unable to survive. - Philippe Cousteau, Jr.

that the ramifications on marine life can be devastating.

When CO_2 levels in the atmosphere increase, so do the concentrations in the near surface layers of the ocean. Unlike climate change modeling, the chemistry is straightforward and the scientific evidence for this is clear and unambiguous. The problem with CO_2 being dissolved in water (including the soda water you drink by the way), is that some of that CO_2 changes to carbonic acid when it mixes with water which in turn, lowers the pH level. Lowering the pH level makes the ocean water more acidic, in some instances to a point that is already harming marine life. The same effect can be felt by freshwater systems. In fact, the effects of ocean acidification are not so different to what was occurring in the 1970's and 1980's with acid rain (although these were primarily related to Sulphur and Nitrogen emissions). While acid rain is still occurring to a minor extent, the scale is insignificant compared to what is happening at an oceanic level with CO_2. According to the IPCC 'Special Report on the Ocean and Cryosphere in a Changing Climate', the pH of the ocean has already

decreased by an average of between 0.017 and 0.027 pH points.

A decrease of 0.01 points might not seem like much but, it is an incredibly large change when you understand the chemistry behind it. Briefly, the pH scale is used to specify how acidic or basic a solution is, with acidic solutions having a pH less than 7, and basic solutions having a pH higher than 7. The lower the number, the more acidic the solution. (Did you know that the pH of soda water averages around 4.5 due to the dissolved CO_2)? The pH scale is also logarithmic, meaning that, a change of one unit represents a change by a factor of 10, a change in two units represents a change in the concentration by a factor of 100, or one hundred times more acidic. Prior to the industrial revolution, the average ocean pH was about 8.21 units. Today average ocean pH is about 8.10, lower than it has been in the last 20 million years[1]. This means that the average acidity of the ocean is approximately 25-30% higher than during preindustrial times (remember, higher acidity means lower pH), so as you can see small changes in the pH scale can mean big changes in the acidity.

How do these seemingly small changes to the ocean's acidity matter? There are essentially four kinds of dissolved carbon in seawater (carbon dioxide or CO_2, carbonic acid, bicarbonate, and carbonate), all of which exist in balanced proportions. As more CO_2 is added to seawater, more carbonic acid is formed, and therefore the balance shifts. As a result, carbonate is lost as it is transformed to bicarbonate due to increasing acidity. The problem with a reduction in carbonate in seawater is that much of our marine life uses carbonate from the water to build shells and skeletons. As seawater becomes more acidified, carbonate is less available for organisms, and therefore they struggle to build their shells. Some species simply can't survive while other must spend more energy which would normally be put to use in growing muscle and other tissues.

Ocean acidification will be more harmful to certain species than others. Unfortunately, one of the most affected groups may be phytoplankton, the base of our ocean's food chain. Already, based on the comparison of present-day samples of calcifying plankton with samples collected by Charles Darwin's team 150 years ago, some species have up to 76% thinner shells. Not all plankton have calcifying structures, and therefore not all plankton will be affected, but a large proportion of them do. A loss of any group, let alone many groups of plankton in the ocean ecosystem could be disastrous, possibly even collapsing entire food webs.

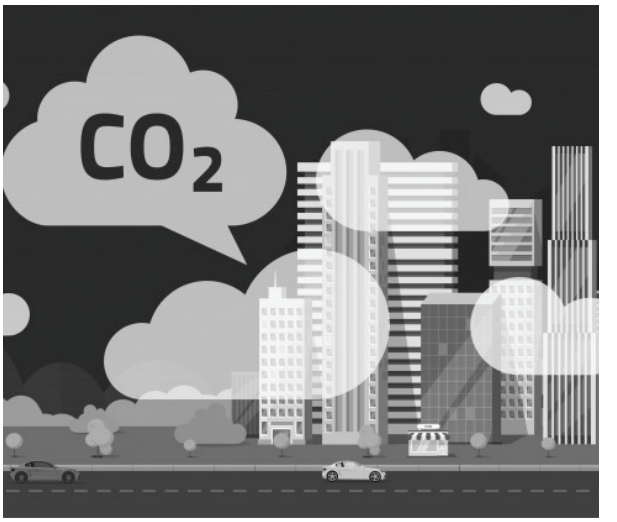
Ocean acidification is also having an impact on the larval, or baby stages, of many economically or culturally important species. Some shellfish aquaculture operations around the world are already facing troubles with seed survival due to low pH levels. This could be economically and politically disastrous as countries continue to ramp up aquaculture operations due to an increasing demand on high protein foods. Low pH events driven by upwelling and exacerbated by ocean acidification have already impacted shellfish production in the Pacific Northwest of the US and Canada. Although the problem is not yet as severe on the east coast of North America, shellfish account for nearly 50% of regional

landings by weight in Atlantic Canada and over 75% of landed value[2]. With a combined value of over 3 billion dollars per year[3], a crash in this sector would be disastrous to say the least. And this value does not include the loss of revenue from damage to the finfish industry or the plankton that many species depend on. Beyond Atlantic Canada, nearly every country that currently has suitable waters for bivalve production is expected to experience a decrease in production potential by the end of the century, driven by a combination of changing temperatures, changes in primary production and ocean acidification[4].

Interestingly, cold, deep waters are lower in pH than warmer tropical waters, and future projections indicate that 70% of cold-water corals could experience corrosive conditions by the end of this century[5]. These are the corals and sea sponges that are in the deep oceans around the world. These organisms are essential to a number of oceanic species by providing important shelter and protection from strong currents and predators, nurseries for young fish, feeding, spawning, and resting areas, and breeding areas for a host of other marine life. Some studies suggest that the Southern Ocean surface waters will begin to under saturate with respect to aragonite, a shell forming mineral, by 2050 which in turn may mean a loss of those nursery areas.

What can we do about it?

The main solution to ocean acidification is similar to that of climate change, and that is to reduce our CO_2 emissions and to increase the mitigation implementation (i.e., protection of our forests,



saltmarshes, coastal seagrasses, and freshwater wetlands). Proposed "easy fix" solutions, such as adding limestone to the ocean to increase the alkalinity, are not feasible at the moment due to the shear amount of limestone that would be required in order to make a difference. Fortunately, as with climate change, the solution is right in front of us, we must simply take the steps to reduce our emissions.

1. Fox et al, 2020. Scientific Reports. 10: 1620
2. Wilson et al. 2020. PLoS ONE 15(1)
3. Department of Fisheries and Oceans Canada, 2017. 2017 Seafisheries landed value by region, 2017.
4. Froelich et al. 2017. Frontiers in Marine Science 4:154
5. Guinotte et al. 2006. Frontiers in Ecology and the Environment 4(3): 141-146
6. Orr et al. 2005. Nature 437(7059):681-686

TECHNOLOGY

UNDERSTANDING AUTOMATIC IDENTIFICATION SYSTEMS (AIS) PURPOSE AND HISTORY

By Barry Marsman

Automatic identification systems (AIS) are designed to be capable of providing information about vessels to other vessels and to coastal authorities automatically. The three primary purposes of AIS systems are vessel traffic, collision avoidance and maritime coastal surveillance

AIS began in 1989, with the oil tanker Exxon Valdez incident in Alaska's Prince William Sound. Eleven million gallons of crude oil entered into the water from the damaged vessel's hull. This was the largest oil spill in U.S. history. As a result, the United States implemented the Oil Pollution Act, that called for the US Coast Guard to develop a vessel tracking system for tankers.

According to the U.S. Coast Guard, the purpose was to improve "situational awareness" for Seafarers and provide tracking capabilities for shore based Vessel Traffic Services (VTS). Prior to its development navigators and shore stations had primarly relied on visual navigation, analog radar and voice communications to mitgate collisions. This new technology needed to be autonomous, continuous and digital, a system that could automatically communicate and display a vessels type, location ,course and speed to other vessels and to Vessel Traffic Services with minimal or no human error.

The Coast Guard decided on a system that used VHF radio waves. At the same time, similar tracking systems were being tested around the world, more specifically by the British, Swedes, and the Panama Canal Commission.

In the mid - 1990's, the international community realized that it made sense to collaboratively work together, and began a collaboration process of development between the International Maritime Organization (IMO) and International Telecommunications Union to collectively build a system that would have a universal application worldwide. The outcome was a VHF based AIS system that is in use today world wide and that now has satellite based abilities.

HOW NATURAL CLIMATE SOLUTIONS COULD ALIGN SEEMINGLY CONFLICTING VALUES

by DANIEL JEWELL

A Second Emerging Crisis

As temperatures rise, storms intensify, and sea ice melts, most of us have accepted that climate change is already upon us. As governments, NGOs, and private businesses alike finally begin to mobilize and face this threat we're learning that there is another, perhaps just as dire, crisis emerging: widespread and devastating loss to biodiversity across the planet. A report from the U.N.'s Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) states that, as of 2019, 75% of the terrestrial environment on Earth has been "severely altered", as well as 66% of the marine environment. Up to a million species are currently threatened with extinction. The rate of extinction worldwide is anywhere from a hundred to possibly a thousand times higher than the historical "background rate" of extinction. All of these factors indicate that something is wrong in nature - the balance is off.

Some of this is directly driven by climate change, but more likely there are compounding factors. Renewable energy and projects that are labelled as sustainable often have just as much potential to reduce or degrade habitat as fossil fuel or traditional infrastructure projects. We are decimating habitats by clearing wetlands and forests to make way for agriculture. We're replacing natural forests with commercial forestry operations which often support only one tree species. There are many who are relying on a technological miracle to bring us back from the brink of catastrophic climate change, but reversing the damage done to

biodiversity has no technological fix - barring some Jurassic Park-esque reintroduction. Once a species (and its habitat) is gone, there's no coming back . Surely there must be some way of rectifying our need for food and natural resources with the balance of nature. Natural climate solutions may hold the solution.

One Solution

Natural climate solutions, nature-based-climate solutions, or green infrastructure is the concept of including living species in the design of anything from agriculture to industrial projects to city-design and more. Broadly, it encompasses projects or actions that utilize nature to restore ecosystems, mitigate negative effects of natural forces, or replace the service provided by "grey" infrastructure, all while providing co-benefits including an increase in complex habitats which may facilitate an increase in biodiversity. These projects can be complex, like establishing a seagrass bed or mangrove stand along the coast rather than (or in addition to) constructing a floodwall, or creating a wetland to clean and store water. Projects can also be simple and can be implemented alongside other projects, such as growing shade-tolerant plants on the floor of a commercial forest, or putting meadows or ponds alongside agricultural fields. All of these projects, big and small, create areas where plants and animals can survive.

Conflicting Value Metrics

Natural climate solutions are unique in that they provide benefits across a

wide range of areas, but the full extent of these benefits may not be reflected under traditional economic metrics. For example, GDP has difficulty accounting for ecosystem productivity unless someone is directly profiting from that productivity. You could say GDP has a near-sighted view, unable to see the less obvious potential benefits both economic and environmental. While some advocate for switching to an entirely different metric that would more easily incorporate diverse value-systems (there are a number of options proposed, including Green GDP, which monetizes biodiversity loss and greenhouse gas emissions), some groups have proposed methods of accounting for these "ecosystem services" within our current economic indices.

The importance of unifying our value metrics is especially clear when discussing natural resource projects. These projects, as well as most other "grey" infrastructure, are typically only assessed using "traditional" economic value indices, even when that infrastructure is intended to be a sustainable alternative to other options.

Hydroelectric facilities are a great example of how hard it can be to determine a project's value based on seemingly opposed value systems. Under more traditional value metrics, hydro projects are economically viable, have no intrinsic greenhouse gas emissions and consume no natural resources once built. They are widely considered both green and renewable.

On the other side, looking at hydro projects from a purely nature-focused perspective, dams block rivers, alter landscapes, and flood ecosystems. Especially on a local scale, hydro projects do not seem very green, nor very sustainable. Many large rivers are home to Indigenous Peoples who have relied on (and lived in harmony with) that system for countless generations. In many Indigenous cultures rivers are integral to their value systems, sometimes even being considered entities with inherent rights (which is another value system worthy of its own article). There are countless stories of Indigenous Peoples in Canada being displaced or having their way of life disrupted by dams for hydroelectric facilities or drinking water. For a few examples, look at Muskrat Falls in Newfoundland and Labrador, the Site C Dam in British Columbia, or the Shoal Lake reservoir that supplied water to Winnipeg. Changing the way that we assess hydro projects may make us more inclined to consider Aboriginal Rights, installing fish-passages, or how a reservoir may cause the buildup of mercury or methane. It may make us assess potential sites more critically, perhaps changing locations entirely.

One project, even one that is proposed in the name of sustainable development, can be considered an obvious choice for some and unacceptable to others. Oil sands projects, like the recently cancelled Teck mine, will never be accepted by those who are purely thinking of environmental impact, while some renewable energy projects are dismissed by some investors as not being profitable enough. This is an issue of conflicting values, but it is also an issue of the value metric used. We're playing the same game with two different scorecards.

The interplay of different worldviews and values associated with NCP [nature's contributions to people] produces equally diverse perspectives on aspects pertaining to conservation, equity, resilience and ways of achieving sustainable development goals.

However, this wide spectrum of values through which people attribute meaning and importance to NCP is rarely recognized or explicitly taken into account in decision making. Identifying such diversity of values of individuals and social groups is often challenging. But not doing so can undermine the very objectives of those decisions and produce unsustainable outcomes. Better understanding and recognition of the suite of values associated with NCP is thus crucial in sustainability science.

Aligning Our Values

In Canada and elsewhere we've seen an increasingly polarized response to projects that could potentially affect the environment. It feels like each project is faced with an all-or-nothing approach: for those who value protecting nature above all else, no amount of economic gain outweighs the risk of a worst-case negative impact. For those who value economic development first, the risks and negative impacts associated with extraction or other projects that negatively affect the environment are considered reasonable or even necessary. If we try and recognize these differences, perhaps we can work towards reconciling them by changing the way that we design and implement projects. Natural infrastructure is one such way that we can do this. By bringing a little green space to existing grey infrastructure projects, we can sequester carbon, filter water, prevent erosion, provide habitat (where appropriate), and generally allow nature to provide a greater benefit for people, whether at a local, regional or national scale. We can make these things fit with existing projects if we align the way that we determine a project's value, without drowning companies in new restrictions or adding exorbitant costs to said projects. It's not enough to shut down fossil fuel projects if we keep building dams that cut off critical habitat. It's not enough to ban clear-cutting forests if we're still replacing naturally diverse woodland to grow our "sustainable" commercial woodlots. We can't replace current resource industries with "green" ones that still don't consider biodiversity. We need to change our mindset to be more inclusive of factors that negatively impact Indigenous Peoples and animals who rely on the land. Natural Climate Solutions may be a step towards restoring nature's balance.

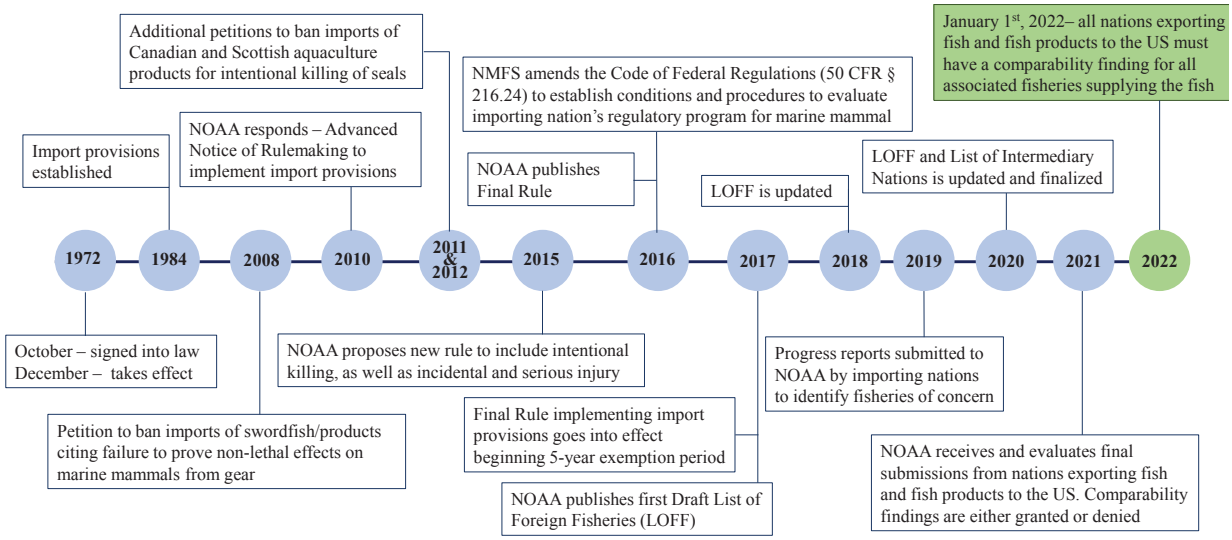
Illustration by Anna Nibby-Woods

HOLD UP - I HAVE TO CHANGE THE WAY I FISH BECAUSE THE "AMERICANS" SAY SO?

by VANESSA MITCHELL

PUTTING THE US MARINE MAMMAL PROTECTION ACT IMPORT PROVISIONS UNDER THE MICROSCOPE.

North Atlantic right whales (NA right whales) have been on the minds of a vast number of Atlantic Canadians since 2017 when we experienced a terrible mortality event throughout the Gulf of St. Lawrence. Of course, there are a number of researchers and other interested individuals who have been advancing the wealth of understanding of the NA right whales for decades, but the average person in Atlantic Canada might not have been able to pick a right whale out of a line up several years ago. Today, it is a much different story, the NA right whale has found itself the unfortunate "spokesperson" of fishing gear entanglement and vessel strikes along the east coast. As a result, it has also become the (Atlantic) vessel for publicly pushing forward the agenda to implement the import provisions of the United States' Marine Mammal Protection Act (MMPA) which affects all countries that export fish and fish products to the United States, those that would like to export to the US, and even those acting as an intermediary nation between one country and the US. The MMPA does not only address NA right whales, it is the US legislative mechanism that provides protection for all marine mammals – whales, dolphins, manatees, seals and sea lions, sea otters, and polar bears. Section 102 (c)(3) of the MMPA sets out the so-called "import provisions" in stating that "it is unlawful to import into the US any fish, whether fresh, frozen, or otherwise prepared, if such fish was caught in a manner which the Secretary of Commerce has proscribed for persons



Timeline for implementation of the MMPA import provisions

subject to the jurisdiction of the United States, whether or not any marine mammals were in fact taken incident to the catching of the fish." As you can well imagine that this has resulted in significant conflict between the fishing industry and Canada's Department of Fisheries and Oceans (DFO) as we try to navigate the requirements under US legislation by evaluating the suite of tools we are currently using and are familiar with using for the management of our fisheries before the critical date of January 1st, 2022 arrives.

Marine Mammal Protection Act (MMPA)

The US MMPA was signed into law in October, 1972 and took effect in December, 1972 and sets out a management goal of maintaining marine mammal populations at the optimum sustainable population – a level between the carrying capacity and maximum net population. Amendments were made in 1984 that established conditions to be satisfied as a basis for importing fish and fish products, particularly for nations harvesting yellowfin tuna with purse seines, but also other commercial fishing technology. Although the Import Provisions were already in place under the Act, they had not yet been implemented and, in 2008, a petition was put forward under the MMPA to ban imports of swordfish and swordfish products which had failed to provide reasonable proof of the effects on ocean mammals from the gear used to catch swordfish. In response, the National Marine Fisheries Services (NMFS) (under NOAA) published an "Advanced Noticed of Proposed Rulemaking" (ANPR) in 2010; however, NMFS received further correspondence in 2011 and 2012

CARRYING CAPACITY

the number of individuals that can be sustained ***indefinitely*** *given the available resources.*

MAXIMUM NET PRODUCTIVITY LEVEL

the greatest interannual increment in population from resulting births and deaths (can also apply to biomass growths and losses)

requesting a ban on Canadian and Scottish aquaculture salmon due to the intentional killing of seals, asserting that this type of lethal deterrence was subject to the importation ban under the MMPA. NMFS determined that the proposed rule as it was published in 2010 was not sufficient and must be broader in scope than that which was based on the 2008 swordfish petition and the Rule would have to cover intentional, as well as incidental killing and serious injury. The new proposed rule was published in 2015 for comment with the Final Rule ("Fish and Fish Product Import Provisions of the Marine Mammal Protection Act") published in August 2016 and effective January 1st, 2017 which further initiated the five-year exemption period.

The Final Rule includes provisions for intermediary nations to ensure that the import provisions cannot be avoided at any point throughout the supply chain. Intermediary nations are required to certify that they do not import any fish or fish products from fisheries subject to an import prohibition or certify that the fish and fish products that they are exporting to the US does not contain any such fish or fish products that are subject to import provisions.

In 2016, NMFS made amendments to the Code of Federal Regulations at Title 50, section 216.24 (50 CFR § 216.24) to establish procedures and conditions for evaluating a harvesting nation's regulatory program addressing marine mammal incidental mortality and serious injury in its export fisheries to determine its comparability in effectiveness to the US regulatory program.

In 2017, NOAA published a Draft List of Foreign Fisheries for comment placing all fisheries exporting fish and fish products to the United States into either an exempt or export category. In response to the comments NOAA received, in addition to information provided by each foreign nations, the list of foreign fisheries was updated published in 2018 and again in 2020, as well as the list for intermediary nations and their products and the list wherein the MMPA import provisions do not apply. All fisheries on the exempt and export lists must receive a comparability finding before the five year exemption period ends on December 31st, 2021.

Similarly, domestically in the US, their fisheries are analyzed in one of two tiers and classified in one of three categories. Fisheries in Categories I and II correspond with the 'export' category for foreign nations and are required to either get a marine mammal authorization (by registering with the Marine Mammal Authorization Program), participate in an observer program, and/or comply with any Take-Reduction Plans for a given marine mammal stock. Those fisheries in Category III correspond with the 'exempt' category for foreign fisheries and are not required to put additional marine mammal mitigation efforts/ programs in place.

Tier 1: Considers cumulative mortality from all fisheries for a particular marine mammal stock. If total annual mortality and serious injury of the marine mammal stock is less than or equal to 10% of the PBR, all fisheries that interact with that marine mammal stock are placed into Category III (comparable to an exempt fishery) unless a fishery interacts with another marine mammal stock whose cumulative mortality exceeds 10% of the PBR.

Tier 2: Considers fishery-specific mortality

and serious injury for a particular marine mammal stock.

Category I: Annual mortality and serious injury of a marine mammal stock is greater than or equal to 50% of the PBR. *Frequent incidental mortality and serious injury of marine mammals*

Category II: Annual mortality and serious injury of a marine mammal stock is between 1 and 50% of the PBR. *Occasional incidental mortality and serious injury of marine mammals*

Category III: Annual mortality and serious injury of a marine mammal stock in a given fishery is less than or equal to 1% of the PBR. *Remote likelihood of or no known incidental mortality or serious injury.*

In essence, the import provisions section of MMPA works to ensure that the acquisition of seafood products that end up on US plates have not negatively impacted marine mammal populations either in domestic waters or in foreign nation waters. Unlike other legal tools, the MMPA is not discriminatory about the status of a marine mammal and provides protections for all, not only endangered species.

In Canada…

There are three streams for supplying information about fish and fish products to the US related to the MMPA import provisions; these are: wild capture fisheries; aquaculture; and intermediary nations. DFO's national headquarters in Ottawa are taking the lead on all three streams which is to be expected considering the vast implications that a trade barrier with the US would initiate. In 2018 alone, Canada exported $4.27 billion of seafood to the US with the smaller provinces of New Brunswick and Nova Scotia exporting just over half that, primarily in lobster and crab (DFO, 2019)[1]. Both lobster and crab fisheries, as fixed gear fisheries with vertical lines running through the water column, have been highlighted as being of a higher risk to marine mammals - an economic loss of that magnitude would be catastrophic to the Atlantic provinces.

While there have been regular discussions with NOAA officials throughout the exemption period that have helped set the path toward comparability findings, there has also been a tremendous amount of work completed domestically as the country moves toward the final submission date in March of 2021. DFO has held a number of different workshops and engagement sessions throughout their management regions. While DFO would be in the best position to provide comment on the outcomes of these meetings, it is apparent that these sessions have helped to refine and revise the list of foreign fisheries to better reflect what is occurring on the water. There are many fisheries employing a large suite of voluntary measures to maintain the risk to marine mammals minimal, but voluntary measures and lack of monitoring documentation are not able to be sufficiently evaluated for comparability to those in place in the US.

Due to the high number of mortalities to NA right whales in 2017 and 2019, a number of other management measures and considerations have come into play to help ensure their protection while in Canadian waters. These measures include closure protocols, speed restrictions, rope and buoy marking, reporting interactions and encouraging the reporting of sightings, and mandatory reporting of lost gear. Additionally, some harvesters are testing the efficacy of pop up gear (also referred to as "ropeless"

Distribution map of North Atlantic right whales. Map (by Blake McNeely, 2020) adapted from J. YOU/SCIENCE; (DATA) NOAA/FISHERIES AND OCEANS CANADA as published in Stokstad, E. (2017 Aug 24). Endangered right whales are dying in record numbers off Canada, raising alarm. Science. https://www.sciencemag.org/news/2017/08/endangered-right-whales-are-dying-record-numbers-canada-raising-alarm

and "buoyless" which are misnomers), weak links, and breakaway gear – some of which are requirements in some US fishing areas to continue fishing during periods of whale presence. Recalling that the "standard" to be able to continue exporting product to the US is 'comparability in effectiveness' to measures in place in the US, it will be imperative to understand what does and does not work in Canadian waters when it comes to alternative gear configurations. Waters in the Canadian range for NA right whales are unique and the Bay of Fundy poses challenges unlike anywhere else in the world; thus, additional local testing is necessary to ensure that alternative gear configurations will not contribute to the addition of ghost fishing gear.

North Atlantic Right Whales

North Atlantic right whales are a large species of baleen whale (reaching about 18 metres) distributed mainly along the eastern coast of the United States and Canada, with greater numbers occupying the southern Gulf of St. Lawrence as of late - occasionally these whales will also venture into the Gulf of Mexico, and even more rarely, some individuals travel to the eastern part of the North Atlantic. The NA right whale is one of the most endangered whales in the world, assessed and/or listed as **ENDANGERED** by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the *Species at Risk Act* (Canada), the *Endangered Species Act* (US), and the International Union for the

Did you know?

Right whales are individually recognizable by the patterns of their callosities (raised patches of rough skin – like a callous) on their heads that are covered in tiny crustaceans called cyamids, or whale lice (informally) that cause the callosity to appear white.

The unique shape of the callosities or other markings often influence the 'naming' of an individual whale. For example, Wolverine was so named due to the presence of three propeller cuts on his tail stock that resembled the blades of the popular Marvel character.

Right whales lack a dorsal fin and their predominantly black colouring make them difficult to observe in dark marine waters.

Conservation of Nature (IUCN).

Currently, the population is estimated to be around 400 individuals with fewer than 100 breeding females remaining. In addition to the low number of reproductive females, the reproductive cycle has also slowed down from an average of three to four years between calves to upwards of six to ten years. Considering that, we as a society are trying to recover this species, a slower rate of reproduction makes it all the more challenging for policy and management to develop and implement a positive strategic plan.

Not unlike other endangered whales, some of the key threats facing this species include vessel strikes, entanglement in fishing gear, underwater noise, and climate change. Of course, climate change throws a wrench of unpredictability into all facets of life and, like the effects of underwater noise, still needs additional research. In contrast, it is possible to take immediate action to mitigate the impacts from vessel strikes and interactions with fishing gear, but some of these solutions are contentious and can be quite costly. While vessel strikes are a critical part of the problem, mortalities associated with vessel strike are not encompassed by the import provisions of the MMPA – only interactions resulting in serious injury and incidental or intentional mortality to marine mammals that occur in the prosecution of commercial fisheries (including aquaculture) count toward a nation's contribution to the PBR. That said, the calculation of PBR is impacted by all other mortalities which effectively decreases the number of animals that could be removed from a population without impacting the productivity of the species. For clarification purposes, the PBR does not translate to an 'allowable' removal.

In some circles, it can seem harsh to focus so intently on entanglement in fishing gear when it appears as though the immediate causes of mortality are often vessel strikes; however, considering the high rates of NA right whales exhibiting signs of entanglement, it is only prudent to exert efforts to address those risks. In 2012, Knowlton et al[2]. published a 30-year retrospective study examining the rates of entanglement in NA right whales wherein 82.9% of the whales assessed showed signs of being entangled at least one, 59% showed signs of being entangled more than once, and, of the whales that had sufficient photographic documentation, 25.9% showed new wounds or scars annually. The effects of entanglement are much broader than acute mortality – it can impact the overall health of the animal and multiple aspects of behaviour, including

feeding, moving, and socializing. Imagine for a moment that you are going about your daily life and become trapped in rope that catches you through your mouth, your nose, maybe wrapped around your limbs and you suddenly cannot perform the simplest tasks to keep yourself healthy without causing further harm to yourself or completely exhausting your energy reserves. You cannot eat because you cannot close your mouth, you cannot keep up with your friends or find a mate to reproduce, you cannot breathe properly because the rope has severed your source of air, and you cannot move quickly enough to escape a bigger threat, like a cargo ship. That image might be difficult to consider, but it is a reality for a living, breathing mammal that just so happens to exist in the same area as economic activity – we do not have a "right whale problem" as is often heard; rather, we have an overlapping user problem and only one of us can come to the table. The risk posed by vertical line in the water and abandoned, lost, or otherwise discarded fishing gear is real and exploring ways to minimize that risk is valid because remember that not all mortalities that occurred in 2017 and 2019 could be traced back to the cause.

THE BIG SEAL QUESTION

Seals are always on the proverbial menu in conversations around Atlantic Canadian fisheries. As their population estimates increase and those of many commercially-valuable fish species are declining, there is often a lot of frustration about the perceived inaction on behalf of the Canadian government to help mitigate the impacts on fish communities from large numbers of hungry seals. In addition to a continuing seal harvest, which is not imported to the US and thus not impacted by the MMPA import provisions, there is a provision under Canada's existing *Marine Mammal Regulations* that authorize the issuance of "nuisance seal licences". A "nuisance seal" is defined as one that represents a danger to gear (despite efforts of non-lethal deterrence) or, based on a scientific recommendation, represents a danger to the conservation of an anadromous or catadromous fish species. Initially there was some uncertainty about the impact of the MMPA on nuisance seal licences, recognizing that the species for which the licences are issued are not considered 'at-risk', the number of animals removed on an annual basis would not be anticipated to approach the PBR level, and the lethal deterrence was permitted and regulated. More recently, after bilateral discussions between Canada and the US, it became clear that having the ability to provide the licence to kill nuisance seals during regular commercial fishing operations is in direct opposition to what the MMPA stands for and would pose a problem. In response, Canada stopped the issuance of the nuisance seal licences and advised that they would be proposing amendments to the *Marine Mammal Regulations* to revoke the authority to issue a nuisance seal licence, but would also propose to include language that mirrors the MMPA that would allow for the lethal humane 'take' of a marine mammal for the protection or welfare of the animal (prevent further undue harm from coming to the animal) or for the protection of the public health and welfare.

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Stop trashing my home

World Oceans Day

REGAINING OUR OCEAN LITERACY: THE VALUE OF OCEAN ED

by BRYAN MARTIN

Almost three quarters of the surface of globe is covered in water, yet we still call this planet Earth. Scientists often state that we know far more about the surface of the moon than we do about our oceans. This despite the fact that close to 80% of our global population lives within 200 km of the coast, many of whom depend on the oceans' bounty to survive. Although only about 2% of our food comes from the oceans, this number represents 20% of the animal protein that humans consume. Many of those consumers have no other option but to live off the ocean's bounty, especially those in developing coastal nations. While not everyone eats seafood, the ocean fulfills many duties beyond filling dinner plates: it supplies half the oxygen that we breath, absorbs a third of the carbon dioxide that we produce, plays a vital role in the water cycle and climate system, and is an important source of our planets biodiversity.

Indigenous cultures have been stewards of the ocean for millennia but the ocean is now facing challenges that no community has faced before and that are becoming increasingly acute, at an unprecedented and alarming rate. At no time in the recorded history of people on this planet has change, in and out of the ocean, happened so fast. Sadly, our collective understanding of natural systems is also at an all-time low. We are in dire need of an intervention and we need to regain our personal connection to nature. We need information to be part of the solution. We need to regain our ocean literacy.

Our lack of ocean literacy is a global problem. A recent study asked people from European countries to say three things that came to mind with respect to the ocean and climate change. “Sea level rise” and “coastal erosion” were common, but so was “nothing” and “I don’t know”. It is thus only through a renewed commitment to education, - whether actively in nature, face to face in a classroom, or through media and even by watching shows like Blue Planet – that we can begin to understand and care. We need to change the “I don’t know’s” into meaningful answers.

While on my own quest to learn about the ocean, a mentor shared an important and meaningful quotation from the world-renowned oceanographer, Dr. Sylvia Earle. Dr. Earle said, “With knowing comes caring, and with caring, there’s hope”. Those words really stuck with me and inspire me every day in my new role as the Clean Ocean (Clocean) Engager with the Maritime Aboriginal Peoples Council.

The knowing and caring come down to education, values, and attitudes. Education can either be fulfilled actively through curiosity and exploration, such as by visiting the ocean and making our own observations; or, more commonly, we can be taught by someone who already knows and already cares. Our values and attitudes are a product of our upbringing but are also related to the knowledge we gain through all forms of education. It seems as though fewer and fewer people are getting to enjoy the ocean, and thus we are losing these opportunities to increase our ocean knowledge, education and literacy. When people do visit the coast, they are often more concerned about capturing it for social media than appreciating its natural beauty. This, in turn, affects our attitudes, our knowledge and our ability to care about our oceans.

When we begin to care and understand, we can positively impact the management of our ocean resources by influencing governments and decision makers from a position of passion and education. The more people that care and understand what is at stake, the more the societal attitudes towards the importance of effective and sustainable management will change the outcomes of policy. Effective management can lead to a sustainable development of our ocean’s resources. This should be the goal of all policies and procedures surrounding our natural resources.

“In the end we will conserve only what we love. We will love only what we understand. And we understand only what we are taught” - Baba Dioum
Photo Credit: Bryan Martin

In the Mi’kmaq culture, the word Netukulimk loosely describes sustainability, or sustainable development.

It means “the use of the natural bounty provided by the Creator, for the self-support and well being of the individual and the community at large, to achieve adequate standards of community nutrition and economic well-being, without jeopardizing the integrity, diversity, or productivity of our native environment". Without sustainability, we, as a society, will continue to steal the ocean’s bounty from future generations. Continuing us down the path of ocean destruction is sad and dangerous, and preventable.

The plight of the ocean is a global issue. By advancing our collective ocean literacy and demanding that something be done by our decision makers, we can be the role models for those who follow us on the planet. We can show others that we can, and must do better. Together, through ocean literacy, we can be that role model.

There are all kinds of education; but this isn’t just about education it’s about sharing knowledge and passion, about understanding what we have, and what we might someday lose. Although children generally respond very well to ocean education because they are innately curious and easily fascinated by the ocean, I do believe that we can and must all learn, at any age. I truly believe that everyone can be fascinated by the ocean. It is everyone’s job to try and protect its future.

I lived in St. John’s, NL, for a decade, the capital city of our most eastern Canadian Province. Having the ocean on our doorstep I assumed that everyone on the island had deep connections to the sea. Many do. Living downtown, it took minutes to walk to a place where I could stare at nothing but ocean and sky. At the time, I thought that everyone in town did the same. Later, as a board member at a nearby catch and release aquarium, I was shocked to learn that some of the inner-city kids had never seen the ocean, this despite living within 10 or 15 km from the coastline. Even in coastal communities, there is a huge disconnect between people and the ocean. Even today, while living in a coastal community that is dominated with tourism, I see the disconnect of what is beyond the tangible beach. I can’t imagine the relationship that people living hundreds of km’s from the coast would have with the ocean.

So, what will I do about it? I will start a conversation about the ocean (I just have). As the Clocean Engager with the Maritime Aboriginal Peoples Council, I will be writing a variety of articles and producing various media including podcasts or videos with information on a variety of ocean topics such as ocean plastics, climate change, acidification, oil: exploration, transportation, and spills, agricultural discharge, international efforts to ocean protection, and much more. Each and every one of these topics affects each and every one of us because we all live on this blue planet. (The blue comes from the ocean by the way, did you know that?)

What can you do? You can continue this conversation. You can speak up. You can demand information and then action. You can change the world.

I look forward to talking to you about the ocean. It matters that we understand what the ocean gives us, and what will be taken away if we do not care for it. It matters that we learn about it. It matters that we love it.

Illustration by Anna Nibby-Woods

FRAZIL AND ANCHOR ICE

by KATHRYN TOWNSEND

From spring through autumn, river monitoring and conservation can be rather peaceful. While there are still physical obstacles to overcome, researchers and technicians can take direct paths to the monitoring sites, safely cutting across rivers and through the woods fairly unrestricted. Seasonal change brings new obstacles, and as winter sets in, water freezes and snow accumulates in the forest. Beyond the need to layer up, winter monitoring poses different challenges to river monitoring and conservation. Higher water levels and faster water velocities, oftentimes present in winter conditions, may force researchers and technicians to find new routes to sample sites in order to limit unsafe water crossings. In addition, thick surface ice creates difficulties when trying to measure water quality and record channel measurements like wetted width, wetted depth and other measures of habitat like water velocity or canopy cover.

For freshwater river ecosystems, one of the biggest challenges is arguably the natural phenomenon and occurrence of frazil and anchor ice. Frazil ice forms in turbulent rivers and streams by the nucleation (the formation of a crystal from a liquid in which a small number of ions, atoms, or molecules become arranged in a pattern characteristic of a crystalline solid) of small particles when the water becomes supercooled (Cunjak et al. 1998). Generally, the formation of frazil ice occurs at night when the rivers are exposed to cold air (below -10°C) during very low temperatures and accompanied by high winds (Gholamreza-Kasi, 2016). In more shallow,

Photo credits to Zachary Burrows

turbulent reaches of a river or stream these active frazil particles, and its associated supercooled water, can accumulate and adhere to one another or bond to objects in the river, such as boulders, trees, aquatic vegetation, and large areas of gravel and coarse sand, and form anchor ice (Hirayama et al. 1997; Cunjak et al. 1998). Under ideal water velocity and weather parameters, anchor ice can spread across the substrate and thicken over large portions of the channel bed. It restricts flow, oxygen, and nutrient transport downstream and into the river or stream microhabitat.

Photo credit to Zachary Burrows

Frazil and anchor ice can have both local and broad-scale negative immediate and long term impacts on the environment, including: ice jams and channel blockages (Wang et al. 2019) which can cause a plethora of problems including flooding and damaging hydroelectric dams, and roadways (Allard et al. 2011); flooding and disturbing riparian and aquatic communities (Engstrom et al. 2011); as well as reducing habitat for fish species (including Atlantic salmon fry, parr, and kelts) overwintering in these rivers and streams; and freezing the river bed substrate causing increased sedimentation, displacement of invertebrates and macrophytes, and mortality to any egg (e.g. Atlantic salmon, brook trout, and tomcod) buried in the substrate (Cunjak et al. 1998). While frazil and anchor ice are naturally occurring, deforestation, forestry practices, and other anthropogenic actions have caused increased sediment load in the river, increasing the suitable habitat for anchor ice to occur. Due to the ever-increasing anthropogenic influence and human activities listed above, suitable habitat for frazil and anchor ice to occur in rivers is increasing and suitable habitat for fish at all life stages is decreasing. Whether it is eggs of Atlantic salmon, brook trout, or tomcod buried in the substrate at risk of freezing or being smothered, or the displacement of macroinvertebrates affecting prey availability for parr and kelts, all life stages can be affected by frazil and anchor ice.

Overbank flows, when water and ice cover in the main stream channel encroach into the riparian zone, can erode and destroy well established river banks, deposit sedimentation across the natural substrate, and promote ice formation in the riparian zone. However, indirect effects of anchor ice in the riparian zone might be just as

Photo credit to Zachary Burrows

impactful as the direct effects of anchor ice in the stream, causing a range of both positive and negative effects on riparian plants. On one hand, an ice sheet in the riparian zone can protect the vegetation from ice shoves that would typically scour the bank and rip vegetation from their rooted habitat. On the other hand, riparian ice might persist longer into the spring then snow, potentially delaying the onset of the growing season, inhibiting oxygen exchange and increasing the occurrence of mould and other negative limitations to growth. Studies show that the effect of ice disturbance on riparian plants vary between species, such as the position of buds on shrubs and trees. Dwarf shrubs for example, with terminal and lateral buds above the ice sheet are most heavily affected, showing dead leaves and stems later in the season directly caused by ice scour.

Ice disturbance has also been shown to affect species composition and richness in the riparian zone. For example, riparian plant species richness is higher at sites with anchor ice, while dominance is lower. This is in accordance with the intermediate disturbance hypothesis (IDH), originally developed by Connell (1978). IDH suggests that species diversity is maximized when ecological disturbance is neither too rare nor too frequent. At intermediate levels of disturbance, diversity is maximized because species that thrive at both early and late successional stages can coexist. However, at high levels of disturbance all species are at risk of going extinct. Contrastingly, the ice can also be physically attached to the river ice and erode the riparian ground and vegetation due to fluctuating water levels, thereby reducing species richness. Receding water levels might leave suspended ice attached to the bank which in turn can easily collapse, tearing off bank

material, rooted vegetation from the bank, or de-limb trees and shrubs.

Another impact of anchor ice is that it can alter the roughness of the bed substrate, freezing and displacing macroinvertebrates and macrophytes residing in the stream substrate. The displacement of macroinvertebrates can severely limit food availability for emerging salmon fry and other fish species in the spring. In regards to fish and their various life stages, overwintering in rivers and streams with appropriate conditions, frazil and anchor ice can fill and freeze the interstitial spaces (water-filled space beneath riverbeds and between substrate particles, which is an important habitat for many aquatic organisms). A significant amount of frazil or anchor ice limits oxygen and nutrient transportation downstream, in turn smothering fish eggs, and reducing habitat and shelter for juvenile and adult fish. After spawning, adult Atlantic salmon (kelts) overwinter in deep pools. Frazil and anchor ice can limit habitat availability and the ability to move within pools to more suitable microhabitats based on changing conditions, which is an important factor for winter survival. Kelts, for example, have been observed resting beneath shelf ice to conserve energy and avoid predators. Salmon parr may also use ice cover for protection when not occupying substrate shelters. If these substrate shelters become filled with frazil and anchor ice, parr and kelt habitat is reduced and they have to expend more energy for predator avoidance and food foraging.

While frazil and anchor ice usually only adheres to aquatic vegetation and boulders found in rivers and streams, it will occupy non-traditional areas if conditions align. In some instances, anchor ice has been found to adhere to cobble and gravel substrate, sometimes in thick layers. The Inner Bay of Fundy Atlantic Salmon In-Situ Egg Incubation Project Team found that frazil and anchor ice will also adhere to PVC, the main material of the Egg Incubation Baskets that were incubated with salmon eggs and buried in artificial redds this past November. While some of the incubation sites showed the presence of frazil and anchor ice, it did not often form thick layers over the baskets or the substrate over the baskets, and was easily removed. The Team is hopeful the frazil and anchor ice was removed before water flow, and therefore oxygen, to the eggs was restricted. Any negative affects caused by the frazil and anchor ice will not be known until the eggs hatch and emerge in May and survivability is determined.

Even during the winter months, with surface ice covering the rivers, there is still a very active world hidden beneath the ice. Just like this unseen world, we are unable to see the immediate consequences of our actions. For example, cutting trees leads to increased sediment, creating ideal conditions for frazil and anchor ice to develop and decreasing suitable habitats required for native species in the river. It is with this in mind, that we must maintain our efforts to preserve natural ecosystems. When it comes to the environment and delicate habitats, out of sight must not equal out of mind; we must always be cautious of our impact on the environment.

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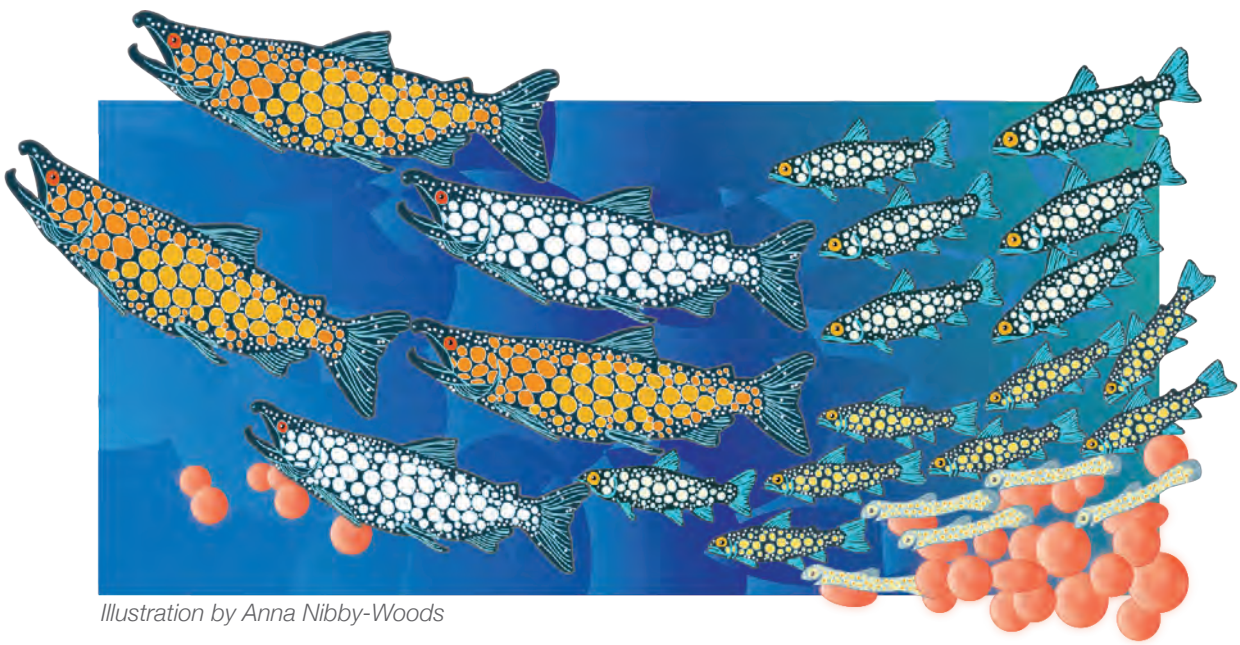


Illustration by Anna Nibby-Woods

5 WATERSHEDS PROJECT

by CHELSEY WHALEN

The Maritime Aboriginal Peoples Council's Five Watershed Project is funded through the Department of Fisheries and Oceans, Ocean's Protection Plan, Coastal Restoration Fund. This five year project will address issues of coastal erosion and physical barriers to fish passage in the Chiganois, Debert, Folly, Great Village and Portapique watersheds, within the Cobequid Bay of the inner Bay of Fundy, in Nova Scotia. Four out of five of these watersheds are considered critical habitat for the endangered inner Bay of Fundy Salmon (iBoF), and once had healthy populations. Before the project began, little was known about the project area, or about the rivers that are within them. Today, we are still uncertain as to why the population dropped so drastically, although many believe it is due to over fishing, loss of habitat, and predators along the migration routes.

In order to discover more about the watersheds, the field technicians and project manager perform a wide range of field assessments. These assessments include water quality data collection, habitat assessments, fish surveys, culvert assessments, and assessments through the Canadian Aquatic Biomonitoring Network. This information, as well as information collected during community engagement sessions was all considered when making the restoration plan. During the summer of 2019, two large projects were undertaken by the Five Watersheds Project, a culvert remediation project, and instream restoration work.

In June of 2018, field technicians and the project manager identified a culvert that was very deformed along an unnamed tributary to the Folly River. The Folly River is considered critical habitat for the iBoF Salmon, as it has the necessary riffle, runs and holding pools which are important in all life stages of the fish. Ice formation in the pond upstream of the culvert has caused it to crack, and point upwards. Downstream of the culvert is a vertical drop, which creates a barrier for fish passage. The culvert length, and water depth inside the culvert posses another barrier to fish passage. Because this location is

Images Taken Before Construction (Upstream/Downstream) of the Installation of the Alaskan Steeppass at the Severely Damaged Culvert located on the Folly River, Lower Debert, Nova Scotia. Photo Credits: Blake McNeely

critical habitat for iBoF salmon, the Department of Fisheries and Oceans (DFO), and the Department of Transportation and Infrastructure Renewal (TIR) met with the project manager to discuss options of remediating the culvert.

During the meeting that took place in October of 2018, the project manager explained her concerns for this location, and how there is likely no fish passage. The Department of Transportation and Infrastructure Renewal was involved in the process because they have ownership of the culvert. Unfortunately a complete culvert replacement or bridge installation isn't feasible as items have already been added to the capital plan until 2022, and a temporary solution must be implemented.

To prepare for future work, TIR contracted Bob Rutherford and his consulting firm (Thaumas Environmental Consultants Ltd.) to perform further assessments, and to develop a solution for the downstream end of the culvert. Generally with hung culverts, a solution is to install a chute system from the culvert to the water. However, in this case, the vertical drop from the culvert to the water was too much and another option had to be developed. Instead, the Alaskan Steeppass Denil design was used for this location. The Alaska Steeppass is prefabricated to match the length and width needed for each different location. Inside the structure is many sets of complex baffles which controls the water velocities. These baffles help reduce the water velocity inside the denil, which allows the fish to travel through.

On September 5th, 2019 the project manager and lead field technician met Bob Rutherford, his assistant Beth and an Adopt-A-Stream technician at the Folly river location. Although this exact technique has not been completed by Bob and his team before, he quickly explained the plan to Five Watershed staff. To help backwater the culvert and provide an attachment point to the denil, an aluminium attachment piece was fastened on the downstream end of the culvert. Second, a rock gabion was made with concrete blocks, wood, and galvanized wire. This structure was lowered into the water directly under the culvert, and twenty-seven concrete blocks

Images taken after constuction (Upstream/Downstream) and Installation of the Alaskan Steeppass Denil System on the Folly River, Lower Debert, Nova Scotia. Photo Credits: Blake McNeely

were placed carefully into the gabion. The gabion was made to allow the denil to rest on it, taking pressure off of the culvert. The gabion was placed on a slant, which followed the slope of the plunge pool. The rock gabion was held in place with rebar so it wouldn't shift overtime. After a few adjustments were made with the rock gabion, the denil was lifted on top of the rock gabion and fastened to the culvert attachment.

Upstream of the culvert, TIR used a large excavator to remove the damaged portion of the culvert. After it was removed, large rock was used to armour the bank to protect it from erosion.

During the installation of the denil, small Brook trout were trying to jump into the culvert. This is very promising, and fish passage will be monitored at this location for the remainder of the project. The installation of the denil opens up 2.5 km of linear habitat for all life stages of iBoF salmon and other fish species.

The second location that was undertaken by the Five Watersheds team is the installation of 8 digger logs on a tributary to the Portapique River, called Cook Brook. Cook Brook is a small, cold water stream that runs into the Portapique river. If installed correctly, digger logs have many advantages to a stream. They help to support the natural riffle run sequence in a stream, and create pools to enhance trout and salmon habitats. They help sort fines that could be detrimental to fish eggs, provide better spawning areas, and the newly formed pool catches leaf litter which supports a wide range of insect population.

The location on Cook Brook was chosen based on habitat assessments that were completed during the summer of 2018. The project manager sent the compiled habitat assessment data and images to a representative of the Nova Scotia's Salmon Associations Adopt-A-Stream program. After receiving the analysis of the assessments performed, three areas were added to the restoration plan based on the level of concern, feasibility of remediation and value. The Cook Brook location was undertaken during the field season of 2019 for many reasons, it had a great amount of canopy cover, abundant

Digger Log Installed at Cook Brook to Improve Fish Habitat, Portapique, Nova Scotia. Photo Credits: Blake McNeely

food availability, good water chemistry, and good spawning substrate but lacked pools.

Two Adopt-A-Stream representative prepared and laid out the digger log locations for the Five Watersheds team. Before any stream remediation took place, the project manager and lead field technician performed a fish survey with the use of an electrofisher. The team found many Brook Trout, American Eel, and Black Nose Dace in pre-existing pools, but there was a lack of fish presence in the areas that were identified as digger log locations. The team began the installation of digger logs during early September, and the last one was placed with the help of Cobequid Salmon Association members, and an Adopt-A-Stream member at the end of September. This work was very labour intensive, but to see how instant the pools are made by the force of the water is very remarkable! The Five Watersheds team will continue to monitor the digger logs to ensure they are working properly, and they will also perform additional fish surveys to see if fish are using the new pools created by the digger logs.

The Five Watersheds staff is looking into a new, less invasive method to determine the presence or absence of fish species, more specifically invasive and endangered. With the guidance from DFO advisory members, staff members took part in an Environmental DNA training session. Environmental, or eDNA is a collection method that uses environmental samples such as soil, or water to identify species presence based on DNA. When organisms interact with the environment, they shed DNA into their surroundings that can be picked up in a sample and analyzed for DNA using species specific primers. Our field technicians will strategically plan and sample the rivers of the Five Watersheds to monitor for invasive species such as Small mouth bass and Chain pickerel. As of right now, no invasive species have been identified. But, the project manager and field technicians will be moving further up into the watershed to continue sampling. The water samples will be collected with the use of the Halltech Osmos DNA backpack, and the samples will be sent to a qualified lab that has the appropriate primers to identify the target species. The collection of the water samples is a delicate process as the DNA begins to degrade over time and must be stored appropriately, and shipped efficiently. This information will help the project manager and field technicians develop and implement a restoration plan.

The Five Watersheds staff are very pleased with the progress of the project. Other areas of fish habitat concern such as erosion control/bank stabilization, and hung culverts are being explored for future restoration work. To be kept up to date on the project, and field work, follow us on our Instagram page: @FiveWatershedsProject.

COLOURFUL BROOK TROUT: AN INDICATOR SPECIES OF A HEALTHY ECOSYSTEM

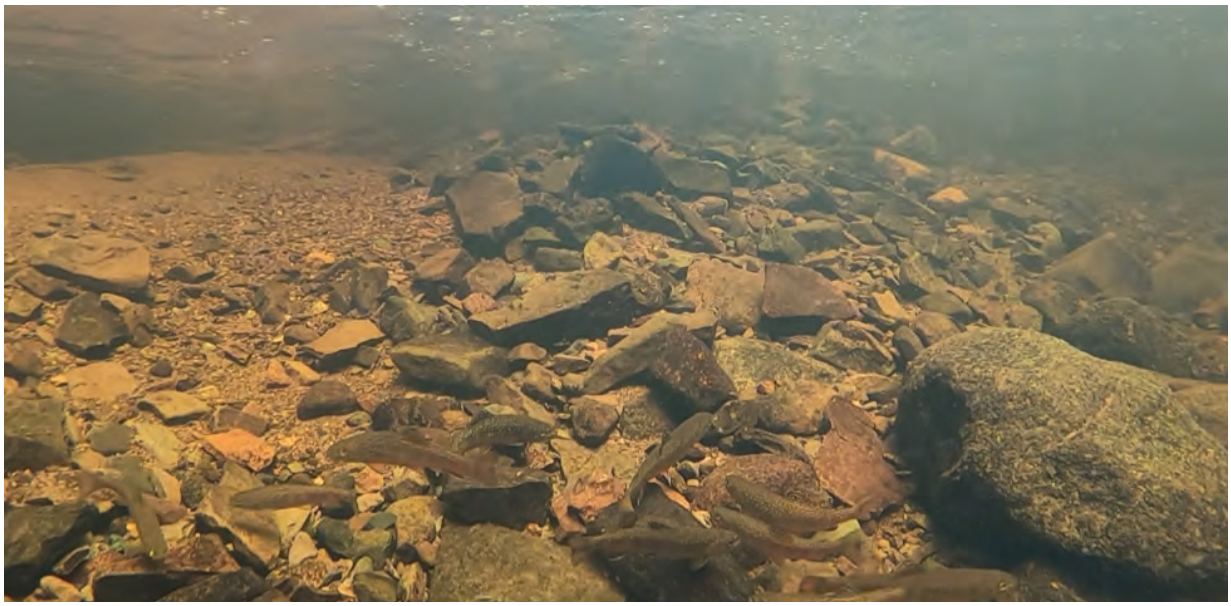
by ZACHARY BURROWS

Enclosed by old growth, fifty-foot mature trees, a seemingly undisturbed brook gently meanders through a mixed-wood Acadian forest. Surrounding the brook is a myriad of vegetation types: golden and white birch, black and white spruce, balsam fir, willow, dense thickets of alder, eastern hemlock, eastern white pine, ferns, grasses and sedges of all kinds, golden rod, tall meadowrue, bunchberry, strawberry; the list goes on. The substrate in the brook is a medley of sizes too, from boulders larger than a foot, small cobble and coarse gravel, to fine sand. The water flowing through the brook is clear and looks clean enough to drink straight from the source. Cell phone reception is non-existent. Aside from the occasional rumble of a pickup truck or the mechanical buzz of an ATV, the only audible tones from within the forest are the melodic calling of songbirds, the dancing movements of the canopy and the calming trickle of water. Access to this brook is down a long dirt road, with only a few residential homes spaced several hundred meters apart.

Down the dirt road approximately one kilometer from a rural highway, a bridge just wide enough for one vehicle crosses the waterway. Slightly upstream from the bridge, at the confluence of two meandering brooks, there is a five-foot deep pool with a clear view to the bottom, with three large, two-foot wide boulders contained within. Overhanging the pool are two trees, a white birch and a black spruce, with intertwined, matted roots, whose impressive foliage provides an abundance of cover and shade for any life below the canopy. Where the two brooks meet, water flow has caused erosion on the left bank, revealing the intertwined tree roots. Approximately thirty feet downstream from the head of the pool is a gently flowing riffle with exposed cobble and gravel.

Staples Brook is a tributary of the Chiganois River, located in the Upper Belmont area of Colchester County, that flows into the Northern Minas Basin of the Inner Bay of Fundy through Cobqeuid Bay. The pool and everything around is located in Mi'kma'ki, the traditional ancestral homelands of the Mi'kmaq, Maliseet, and Passamaquoddy Peoples, far removed from any urban development. Slightly northwest of the brook is a proposed wildlife protected area of several hundred hectares of dense forest, with a patchwork of Provincial crown land dispersed around the area.

During the summer of 2019, approximately thirty brook trout, ranging in size and age, called this pool on



Brook trout, or Atokwa'so'k in Mi'kmaq, are a one of three freshwater trout species in Nova Scotia, but are the only native freshwater species. They prefer cold-water and are intolerant to environmental degradation, making them a great "canary in a coal mine" indicator species to pollution. Photo Credit: Zachary Burrows

Staples Brook home. Impressively, these freshwater fish can be seen in abundance from the banks of the brook, as the crystal clear and clean waters reveal a hidden home. Brook trout are a freshwater species of the char genus Salvelinus (think Arctic Char), of the salmon family Salmonidae. Of the three main trout species found in Nova Scotia (the other two being rainbow and brown), brook trout is the only native species. Commonly known as brookies, speckled trout, or spotted trout- or in Mi'kmaq, Atokwa'so'k- they are found primarily in freshwater bodies throughout the province: large and small lakes, ponds, rivers and streams. Traditionally, brook trout are a potamodromous species, meaning their seasonal migrations only occur in freshwater. Unlike Atlantic salmon who migrate to saltwater to mature and grow out approximately 3 years after hatching, brook trout remain in the freshwater for the entirety of their life cycle. Like everything in nature however, there are exceptions: some mature brook trout are "sea-run", meaning they migrate to the ocean in the spring to feed on marine life until late summer, when they migrate back to their freshwater spawning grounds.

To the untrained eye, juvenile brook trout and juvenile Atlantic salmon are physically indistinguishable. Their colouration is very similar, both having pronounced parr marks (melanin bars or blotches) and countershading, with red dots across their lateral line. In comparison, Atlantic salmon tend to be slightly brighter in hue with a more reflective sheen, while juvenile brook trout have a darker, more mottled complexion. As juveniles, both brook trout and Atlantic salmon external colouration blends with the substrate below, allowing the fish to be cryptic and conceal their presence from predators. Both brook trout and Atlantic salmon are fusiform fish with an equal number and arrangement of fins. One key physical identifier that aids in distinguishing one species from another are the white tipped fins of brook trout. With practice, the white tipped fins can be identified on small juvenile fish while mature brookies boldly display their white tips, making them easily identifiable even from the riverbank of clear waters. Mature brook trout also have very distinguished blue halos around the red dots of their lateral line. Juvenile brook trout still display the blue halo, but to a much less intense degree. As they are both members of the salmon family- Salmonidae- It is understandable why brook trout and Atlantic salmon display similar physical characteristics, and are considered cold water species. They occupy the same freshwater habitat during juvenile life stages. When sexually mature, both male brook trout and male Atlantic salmon will develop a pronounced lower jaw, known as a kype. One genetic and morphological distinguishing characteristic of a salmonid is that they store fat in their muscles, unlike other species of fish called Gadoid (cod, hake and their

relatives) who store their fat in their liver. This makes salmonids desirable for consumption because the meat is fattier, juicier and therefore, considered tastier.

When brook trout and Atlantic salmon mature, the two species divert from their similar appearances and develop more uniquely distinguishable physiological characteristics. For Atlantic salmon, altering their internal and external physiology is derived from a necessity to adapt to a new marine environment. They develop a more metallic, shinier complexion to camouflage themselves from predators in the open ocean. The transformation of Atlantic salmon results in a dramatically different looking fish than its juvenile predecessor. Brook trout however, do not alter their appearances so profoundly. Certain features become more pronounced or intensify, such as their white tipped fins or their orange colouration, but they do not transform altogether. A brook trout is identifiable throughout all its life stages given the same defining characteristics.

In Nova Scotia, brookies are an indicator species, acting as a sort of 'canary in a coal mine' that indicate environmental change and potential degradation. Not as tolerant to environmental change as other freshwater fish, brook trout are a great bioindicator as there are sensitive to the quality of their habitat and reductions of populations can indicate a change in the environment. Brook trout have specific habitat requirements: They demand cold-water, with an optimal maximum water temperature between 10°C and 16°C. Climate change is a great threat to brook trout, as warming waters degrade their freshwater habitat (unlike other fish like white suckers who are tolerant of warmer waters). Brook trout are more sensitive to warm water than brown trout and Atlantic salmon, and are widely considered the most sensitive salmonid to warm water. According to NS Adopt-a-Stream, experts in understanding the freshwater environment in Atlantic Canada, "maximum water temperature is a major factor in the reductions in the populations of both [Atlantic salmon and brook trout]," and is considered the most significant factor when addressing overall habitat quality for salmonids. When water temperatures rise during the summer, they require adequate instream cover like large boulders, undercut banks or rooted vegetation to escape the heat. Warm water fish are able to tolerate higher temperatures with as little as five percent instream cover and are more adaptable to changing environmental conditions. Not only is instream cover important, brook trout require an abundance of deep pools to escape the extreme temperatures; brookies need between 30% and 60% of pools within any given stream habitat. Deep pools act as a refugia for brook trout, with lower water temperatures at lower depths. Various water quality parameters must be met for brook trout as well: they are only able to tolerate an annual minimum or maximum pH between 6.5-8, while other fish can tolerate pH values as low as 5 and as high as 9.

Lower water temperatures, abundance of riparian vegetation proving thermal cover, neutral water quality values like pH, a variety of habitat, including a plethora of pools and varied substrate composition are all characteristics typically found in an area with little pollution and degradation. In areas of human disturbance, the environment often times gets altered and negatively impacts brook trout. Removing vegetation from the riparian zone reduces stream shading, increasing the temperatures of the river. Timber harvesting often increases the amount of silt in the river, altering the natural meander of a stream, in turn decreasing the amount of pools by filling in deep crevices with silt. Increasing silt decreases the amount of instream cover, as larger boulders that once provided cover and shade become further imbedded into the river with silt that fills in the interstitial space between substrate. According to the Canadian Department of Fisheries and Oceans, "climate changes and land use practices have increased water temperatures and decreased flow rates and water levels," and in Nova Scotia, "habitat degradation was related to warmer water, fewer salmonids and increased stream size". A study on the relationship between increased water temperatures and the population of brook trout in Nova Scotia rivers proved that a slight 2 degree increase in summer mean water temperature would result in a 50% loss of suitable cold water stream habitat for brook trout. In a stream, an increase in mean annual temperature results in a decrease in suitable habitat for brook trout and a simultaneously increase in suitable habitat for warm water temperature species like perch, bass, eels and brown bullheads (competitors of brook trout), and will thus out-compete cold water species.

Brook trout are freshwater species integral to knowing the status of biodiversity and quality of our ecosystems. Many agencies use brook trout as an in indicator of aquatic health. Kejimkujik National Park in western Nova Scotia monitors brookies health and abundance through creel surveys, where anglers

Staples Brook is a tributary of the Chiganois River, located in the upper Belmont area of Colchester County, located in the Cobequid Bay of Nova Scotia. Far removed from any significant source of urban or rural development, Staples Brook is a relatively undisturbed brook with few anthropogenic pollutants. Photo Credit: Zachary Burrows

Staples Brook has a plethora of pools suitable to house brook trout. Within the five foot deep pool are several large boulders providing thermal cover for the cold-water brookies. Downstream is a small riffle, providing oxygen downstream with the gentle aeration from moving water. Photo Credit: Zachary Burrows

collect data about brook trout using barbless fly-fishing techniques and catch and release protocol. The Canadian Department of Fisheries and Oceans, the United States Fish and Wildlife Service, as well as provincial agencies all use brook trout as indicators on critical and significant river systems. Monitoring an indicator species allows conservation agencies gain an understanding of the ecosystem without a full-scale, all-intensive study as brook trout have such a narrow freshwater habitat range. If we were to solely monitor a freshwater species more tolerant of pollution like white suckers for example, we would only react when environmental degradation had occurred beyond repair. In such a case, all other species that are not as tolerant as white suckers would suffer. By monitoring a susceptible species like brook trout, we know that all other species that are more tolerant will survive any type of environmental change.

Unfortunately, unlike bright yellow canaries in coal mines, brook trout are an inaudible, seemingly invisible freshwater fish out of the public eye. For miners, canaries were invaluable as they were shockingly bright, adding colour to a dim environment, and visible to everyone. Their movement indicated life and stability, and their death meant imminent danger to everyone below the surface. Brook trout are hidden underwater, away from everyone. They will not tell us when their population is declining. They will not indicate that their habitat is in jeopardy. They will not go suddenly. Instead, it will be a slow decline, and we will only realize before it is too late. It is our responsibility, our duty, our burden, to ensure these fresh cold-water fish are not signalling the coming of greater change. The devastating impact of climate change in our waters hopefully awakens us to be more vigilant, and to begin to understand the value of brook trout as an indicator of the health of our waters.

1. Nova Scotia Department of Agriculture and Fisheries, Nova Scotia Trout Management Plan: Final Draft, Fall 2005. Retrieved from: https://novascotia.ca/fish/documents/special-management-areas-reports/NSTroutManplandraft05.pdf
2. Nova Scotia Department of Agriculture and Fisheries, Nova Scotia Trout Management Plan: Final Draft, Fall 2005. Retrieved from: https://novascotia.ca/fish/documents/special-management-areas-reports/NSTroutManplandraft05.pdf.
3. MacMillan, J.L., D. Caissie, T.J. Marshall, and L. Hinks. 2008. Population indices of brook trout (Salvelinus fontinalis), Atlantic salmon (Salmo salar), and salmonid competitors in relation to summer water temperature and habitat parameters in 100 streams in Nova Scotia. Can. Tech. Rep. Fish. Aquat. Sci. 2819: 41p. Retrieved from: http://www.dfo-mpo.gc.ca/Library/335476.pdf#targetText=Many%20Nova%20Scotia%20streams%20warm,(Salmo%20salar)%20in%20summer.

THE CLOCEAN'S ENDEAVOUR

by BRYAN MARTIN

If you hadn't guessed it from my previous article in this Mawquatmuti'kw issue, Regaining our Ocean Literacy, I am a science communicator and general ocean advocate. With so much confusion surrounding topics such as climate change, marine pollution, whales, fisheries, and the many emerging ocean topics, the group at MAPC (the publishers of this magazine) decided to do something about it. MAPC, along with a few of Canada's Government departments, have created a role to help advance discussions on how to enhance collaboration and partnerships in marine safety and environmental protection. Enter the Clocean Engager, short for Clean Ocean Engager. The engager will enable off-reserve Indigenous and local communities to take on a greater role as they relate to the design and implementation of the transportation system and environmental protection measures. The Clocean Engager will help disseminate Canada's Ocean Protection Plan, Canada's Ocean Strategy, and will shed light on how the United Nations Convention on the Law of the Sea plays a role in ocean conservation and our maritime safety.

One of the ways the Clocean Engager will do this is by facilitating collaborative management and promoting partnerships in marine safety and environmental protection. Increased collaboration will help Indigenous People at the community level, government, and not-for-profits learn from each other, whether through western science or traditional knowledge. All parties can reap the benefit of a cleaner ocean, safety while in and around the ocean, and healthier ecosystems. The Clocean goals are meant to be proactive wherever possible, fostering positive and open partnerships. These collaborations are necessary in order to gather information from as many reliable sources as possible and to ensure that various points of view are covered. Through a broad array of voices, we can provide honest and sincere advice that will be lasting and uncontested.

First and foremost, the Cloceans project is primarily science driven. However, like all things related to our environment and our ocean, there is also a need to clarify the roles of policy and law and how they relate provincially, nationally, and internationally. We

"If we are to make the right decisions, however, we must understand how things work in the oceans and how they interact: and we must recognize the role of the oceans in our life-support system and its value for humankind" – International Oceans Institute...

must look at how all these are interconnected with Traditional Indigenous Knowledge and the traditional 'laws', whether through Netukulimk, or other.

How do we get there?

The Clocean project is primarily a science communication role. In collaboration with Indigenous groups, government, select not-for-profits, and research professionals, we will start a dialogue through interviews focused on emerging topics affecting our maritime waters. These topics and discussions will be compiled into an informational video series. Throughout the series, we will discuss not only who uses the ocean and why but also how the ocean supports and provides for us. We will look to the past and attempt to predict what the future ocean may look like. We will discuss some of the policies that may assist or inhibit ocean protection, and how you can help through citizen science, and how the community and country can help through supporting a Blue Economy. Throughout the series we will include interviews with elders that discuss the worldview of the Mi'kmaq to the earth and its ocean and how they may relate to each particular topic. We want to encompass two-eyed seeing to the extent possible, combining western science with traditional knowledge.

But why now?

Maritime history, culture, and livelihoods have been shaped, and continue to be shaped by the ocean. We are a true maritime people, whether we identify as Indigenous or not. New challenges are threatening this environment which puts our way of life at risk and globally, we all depend on the ocean to survive. Through the Clocean project, we will promote the vision and message that all peoples, Rightsholders and stakeholders can learn to understand the challenges our ocean is facing. As we work towards re-building marine ecosystems together, we will leave a cleaner shoreline and healthier ocean, one teaming with life for future generations of Indigenous Peoples and settler communities within our Maritime Provinces, for today and into the future.

GEAR MARKING - HOW DOES IT HELP MARINE MAMMALS LIKE THE NORTH ATLANTIC RIGHT WHALE?

by VANESSA MITCHELL

Early in 2019, then Minister of Fisheries, Oceans, and the Canadian Coast Guard Jonathan Wilkinson made a commitment to implement gear marking in fisheries on Canada's east coast in 2020. The concept of marking fishing gear is not a new one, nor has it only arisen as an after effect of the two "unusual mortality events" for North Atlantic Right Whales in 2017 and 2019, outside of Atlantic Canada that is. Minister Wilkinson's commitment was primarily in response to concerns around mortality and serious injuries to North Atlantic Right Whales as a result of becoming entangled in fishing gear, but what does it really do in terms of protection? The short answer is, for whales, nothing really, but for fishermen, it can be the difference in additional forced management measures or closures and fishing (relatively) normally.

DFO has maintained that the intent has never been to place blame on any given sector or individual harvester, but does offer an advantage in the blame game with the United States. Fixed fishing gear poses a severe risk of entanglement to marine mammals when deployment of gear occurs in areas of overlap at the same time that marine mammals are present. In brief, fishing gear can be categorized into two broad groups: fixed or passive gear, like lobster traps, crab pots, gill nets, and long lines that are deployed for a period of time allowing fish to come to it; and mobile or active gear, like seines, dredges, and trawls where harvesters actively chase fish.

Canadian harvesters are already required to mark their gear with the vessel registration number associated with the

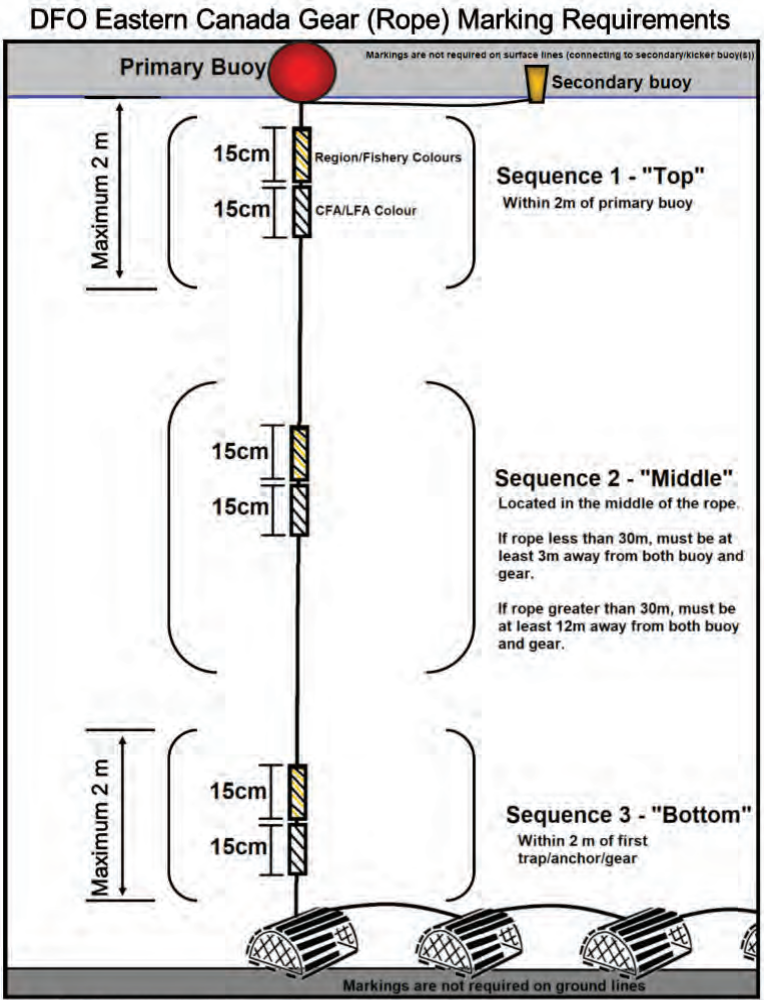


Diagram illustrating the sequence and distancing requirements for marking rope. Provided by DFO for advisory purposes

licence or information identifying the owner of the gear per section 27 and 29 of the Fishery (General) Regulations under the Fisheries Act. In many cases, rope that remains on an animal that has become entangled is no longer carrying the gear or the buoy with that information affixed, leaving only rope which is largely unidentifiable on its own. In 2018, some gear marking requirements went into place for the snow crab fishery occurring in the Gulf of St. Lawrence in which crab fishing areas were identified using coloured markings (either interlaced twine or tape) every 27.4 metres along the length of the primary buoy line – these colours remain the same moving forward.

Gear marking requirements are also in place in the United States, but what is required and the mechanism of application varies between state and federal waters and between states. For example, using paint or tape to display the marking on rope are both acceptable in US waters; however, Canada has elected to employ a consistent approach of interlacing coloured twine directly into rope. In additional to the difference in the medium used to mark rope, Canada will also be running their marking scheme vertically, as opposed to the horizontal 'stacking' of stripes seen most often in the US Atlantic fisheries.

Perspectives on the rope marking requirements have been varied; however, the greatest qualm has been around the timeline of implementation that DFO put in place. In late December of 2019 (prior to Christmas), a Notice to Fish Harvesters was issued describing the rope marking requirements that was expected to be in force for the 2020-21 fishing season. While

there had been discussions about the Minister's commitment and the expectation, this was the first concrete piece of information from the department and it left many confused about some of the details. Further, because of the mode of distribution, via email to the various lists held by DFO management, many individual harvesters did not receive the notice directly; in fact, some learned about the requirements from various forms of media rather than DFO directly. There were a number of concerns raised that the timeline did not provide sufficient time needed to acquire the necessary materials and then prepare their rope for the season. For the Maritimes region, raising those concerns with DFO resulted in staggering the timeline of implementation with some fisheries now beginning July 1st, 2020 and the latest January 1st, 2021. For those fishing in the Gulf of St. Lawrence, where the greatest number of North Atlantic Right Whales has been observed for the past few years, there has been no change to the timing requirements.

Directly, there is no benefit to the conservation or recovery of a species, like the endangered North Atlantic Right Whale, from the rope marking measure. This is primarily a measure for identifying the area of entanglement which may, over time, help to identify those areas with high rates of entanglement, allowing for prioritization of targeted risk mitigation measures. While risk assessments have provided a general understanding of the risk to North Atlantic Right Whales in areas of overlapping use between the whales and fisheries and additional analyses are feeding into predictive models, animal behaviour is dynamic. For example, the static closure zone that was implemented in 2018 in the Gulf of St. Lawrence was based on observations of 12 whales; in 2019, the static closure was based on the area where 90% of the North Atlantic Right Whales were observed the year prior. At the end of 2019, it was evident that more whales were observed in areas outside of the static zone and were subsequently subject to dynamic closures. In contrast, the 2020 North Atlantic Right Whale management measures eliminated the static closure in the Gulf of St. Lawrence removed in favour of a fully dynamic closure model. Evolving management measures demonstrates the lack of predictability even with the suite of tools available and further illustrates the eagerness to explore alternative fishing gear configurations, like pop-up gear (also referred to as "ropeless" or "buoyless"), from those most impacted by closures in their fishing areas.

In combination with the management measures, including rope marking, harvesters are required to report any lost fishing gear; however, this has been met with some contention over when gear is considered 'lost'. For some, they do not consider their gear lost until the end of the season when it has not been retrieved. It is also mandatory to report if gear that has been previously reported as 'lost' has been retrieved. In addition to ghost gear retrieval initiatives, like Operation Ghost in 2019 which removed over 100 crab pots and 9km of rope in the Gulf of St. Lawrence over three days, and the funding made available for efforts to remove ghost fishing gear (Sustainable Fisheries Solutions and Retrieval Support Contribution Program), the reporting

requirements fall in line with international commitments and efforts to control and remove ocean plastics and other marine debris from the water.

BRIEF HISTORY OF GEAR MARKING

Gear marking was initially a tool recommended to help identify the source of abandoned, lost, or otherwise discarded fishing gear (ALDFG), sometimes lumped into the term of "ghost fishing gear". There are a number of ways that fishing gear and equipment can end up in the ocean and it is not always deliberate. Weather, operational fishing factors, and gear conflicts are thought to be the greatest factors influencing the rate of ALDFG (MacFadyen, Huntington, & Cappell, 2009) ; however, the causes are not well documented, even where there is documentation of lost gear. Both causes and prevalence vary in space and in time and, when discussed, are anecdotally reported on based on prior known incidents, like conflicts between mobile and fixed gear, for example, or recent weather events. Most nations which require reporting of lost gear are similar to the form in Canada which requires information about the target species, the type and number of units of gear, and last known location. This is not to say that the causes are not important; in fact, better understanding about the causes could result in targeting management, policy, legal measures, and best practices to minimize the risk of losing gear within a given area – but it is more challenging in that previously lost gear would need to be retrieved and examined, alongside ample engagement and awareness-building with harvesters in all sectors.

After a great deal of expert consultation, FAO published voluntary guidelines on the marking of fishing gear in 2019.

This section barely skims the surface of the topic of ALDFG, ocean plastics, and marine debris – all of which are much broader than can be encompassed in a short article focused on rope marking efforts in Atlantic Canada. Rope marking itself being only a small part of the code to decipher the big picture of ALDFG.

CANADA AND THE IMPLEMENTATION OF GEAR MARKING

In 2018, Canada, and other nations, adopted the Ocean Plastics Charter which included a commitment to accelerate the 2015 G7 Leaders' Action Plan to Combat Marine Litter and prioritize clean up initiatives for ALDFG. Although the rope marking requirements are only in place in the Atlantic provinces in Canada, the commitment to address ALDFG applies nationwide. Part of these commitments resulted in a Gear Innovation Summit which was held in Halifax in February, 2020 to present information about tools and mechanisms to help address ALDFG and marine mammal entanglements. Having been part of the conversations around ALDFG and rope marking for decades, Canada is part of the Global Ghost Gear Initiative and has also hosted and co-sponsored technical consultations on the marking of fishing gear.

DFO's rope marking regime in Eastern Canadian waters applies to all non-tended fixed gear fisheries and will identify the region (Maritimes, Gulf, Newfoundland and Labrador, or Quebec) and the fishery (lobster, crab, longline, gillnet (small pelagic and groundfish), among others).

	Gulf (blue)	Maritimes (black)	Nfld/Lab (red)	Quebec (green)	Multiple areas
Toad Crab*	purple*		purple	purple	
Rock Crab	blue	blue	blue	blue	
Lobster	yellow	yellow	yellow	yellow	
Whelk	white	white	white	white	
Snow Crab	orange	orange	orange	orange	orange
Gillnet (small pelagic)	grey	grey	grey	grey	
Gillnet (groundfish)	brown	brown	brown	brown	
Longline	pink	pink	pink	pink	
Squid (trap)			green		
Cod (trap/pot)			red		
Shrimp trap		green			
Hagfish		black			
Red Crab		red			
Jonah Crab		purple			
LFA 41 (offshore lobster)		red/white pattern			
Scientific licences	black/white pattern	black/white pattern	black/white pattern	black/white pattern	

Table of overall region/species colours. Note that toad crab in Gulf area 24 is represented by white marking. The dotted areas are those where there is no active fishery for the given species in that management region. This table has been reproduced from information contained within a DFO Notice to Fish Harvesters (Gulf region) on April 22, 2020.

Using the specifically-designated twine, commercial harvesters will be required to separate the rope strands and weave the two strands of twine representing the region and the species into it, ensuring that the interlaced section is no less than 15cm for each sequence (top, middle, and bottom, regardless of the length of the rope) along the primary buoy rope. For lobster, snow crab, and toad crab (the latter in the Gulf region and Quebec only), a second sequence of twine will be interlaced for another 15cm (at minimum) to represent the lobster fishing area. The top sequence must occur within two metres of the primary buoy; similarly, the bottom sequence must occur within two metres of the trap, pot, anchor, or gear. After causing some initial grief with harvesters due to the ambiguity in defining the location of the middle sequence, the middle section was defined relative to the overall length of the rope. As exhibited in the diagram if the overall rope length is less than 30m, the marking must occur at least three metres from both the buoy and the gear and if the overall rope length is greater than 30m, the marking must occur at least 12 metres from the buoy and the gear.

CHALLENGES

Some of the challenges that have been seen so far are largely related to the availability of a vast amount of the coloured twine in a short time, additional

PART 1

	Lobster (yellow, except LFA 41)		Snow crab (orange)	
Gulf region (blue) except for snow crab in 12, 12e, and 12f which is yellow)	23	red	12	none required
	24	green	12e	yellow
	25	none required	12f	blue
	26a	white	19	green
	26b	black	multiple	yellow
	multiple	yellow		
Maritimes region (black)	27		North-ENS	none required
	28		23	green
	29		24	black
	30	**yellow/black pattern**	4x	blue
	31a	pink	multiple	yellow
	31b	purple		
	32	white		
	33	orange		
	34	none required		
	35			
	36			
	38			
	41	none required		
	multiple	yellow		
Quebec region (green) except for snow crab in 12, 12e, and 12f and Toad crab which is yellow)	15	red	12	none required
	16	green	12a	green
	17	black	12b	blue
	18	blue	12c	pink
	19	brown	12e	yellow
	20a	white	12f	blue
	20b	grey	13	none required
	21	orange	14	white
	22	none required	15	orange
	multiple	yellow	16	red
			16a	none required
			17	black
			multiple	yellow

Lobster and snow crab colours by region and fishing area. This table has been reproduced from information contained within a DFO Notice to Fish Harvesters (Gulf region) on April 22, 2020. *(graph continued on next page)*

costs of procuring the twine, and taking the time to interlace it into rope. Currently, there is uncertainty related to the length of time that the twine colouring will remain viable in harsh marine environments. While it is understood that there will have to be regular maintenance associated with ensuring that the twine remains vibrant enough to identify the region, species, and fishing area (where required), the rope is subject to salt, sun, and regular wear which fades coloured

PART 2

	Lobster (yellow, except LFA 41)		Snow crab (orange)	
Newfoundland & Labrador region (red)	3	red/white pattern	2J North	blue
	4	black/white pattern	2J South	blue
	5	yellow/black pattern	3a	black/white pattern
	6	orange	3b, 3c, 3bc	yellow/black pattern
	7	green	3d	black/blue pattern
	8	black	4	yellow/green pattern
	9	brown	5a	red/white pattern
	10	grey	6a	pink/blue pattern
	11	none required	6b	red/green pattern
	12	red	6c, 8a	orange
	13a	blue	9a	black
	13b	yellow	3LNO <65'	purple
	14a	white	3LNO >65'	grey
	14b	purple	11e	pink
	14c	pink	11w	red
			10a inner	brown
			10a outer, 10b, 11s	white
			outside 8 mile	yellow
			Area 12 inshore	green
			13	none required

Lobster and snow crab colours by region and fishing area. This table has been reproduced from information contained within a DFO Notice to Fish Harvesters (Gulf region) on April 22, 2020.

material over time. Other challenges come in the form of questions that may need some time to answer – if rope is retrieved from the sea floor after a long period of time, will the twine colour still be identifiable – if the rope is retrieved from an entangled marine mammal, will the identifying features still be attached?

Another option of rope marking that had been discussed, but as of February 2020 has been removed as a permitted form of marking, is the use of a transparent tracer tape that is located inside of the rope throughout the entire length. The tracer identifies the country, the species, and the fishing area. This type of marking must be ordered from a supplier, it is not a process that can be completed by the harvester, like interlacing twine. In order to identify the fishery from which the rope was lost, it must be retrieved – unlike the observable interlaced twine. More recently, the tracer option has been replaced with rope that is integrated with the colour scheme throughout the entire length of rope which eliminates the need to manually interlace strands of twine and can be purchased through regular rope suppliers when the time comes to replace existing rope.

1. Macfadyen, G.; Huntington, T.; Cappell, R. Abandoned, lost or otherwise discarded fishing gear. UNEP Regional Seas Reports and Studies No.185; FAO Fisheries and Aquaculture Technical Paper, No. 523. Rome, UNEP/FAO. 2009. 115p.

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HOME OF THRIVING PACIFIC SALMON POPULATION GOLDSTREAM WATERSHED

by BLAKE MCNEELY

The Goldstream Watershed is located on Canada's west coast, specifically Vancouver Island. This popular watershed is home to a thriving Pacific salmon population and one of Canada's largest waterfalls. It is also a frequently visited popular tourist attraction. The river is home to three different species of Pacific salmon: Chum, or dog salmon, Coho, and the largest species, the Chinook.

Pacific salmon spend the first few years of their lives in their natal rivers. After this stage of their life, they will migrate out to the estuaries of the river, and then further on towards the ocean. Here they will spend the remainder of their adult lives until it is time for them to spawn. Despite migrating vast distances, the salmon will search out the river they hatched from, and make one final journey back up its waters. Here the salmon will spawn, and die, completing the life cycle once more. Each species of salmon can spend a different amount in both the ocean and the river, at the start of their lives. Pink salmon, the smallest of the Pacific salmon, spend only a few days in their natal river as they start their ocean migration almost immediately after hatching. They will spend two years in the ocean before returning to spawn. The Chinook salmon, on the other hand, can spend three to five years in the ocean before returning to spawn.

Each species of salmon utilizes a different section of the watershed in which to spawn. The Chum, smallest of the three species, lack the power and stamina to travel over large falls, and as a result, they often use the lower reaches of the watershed to spawn. The Coho are larger and stronger allowing them to travel further up the

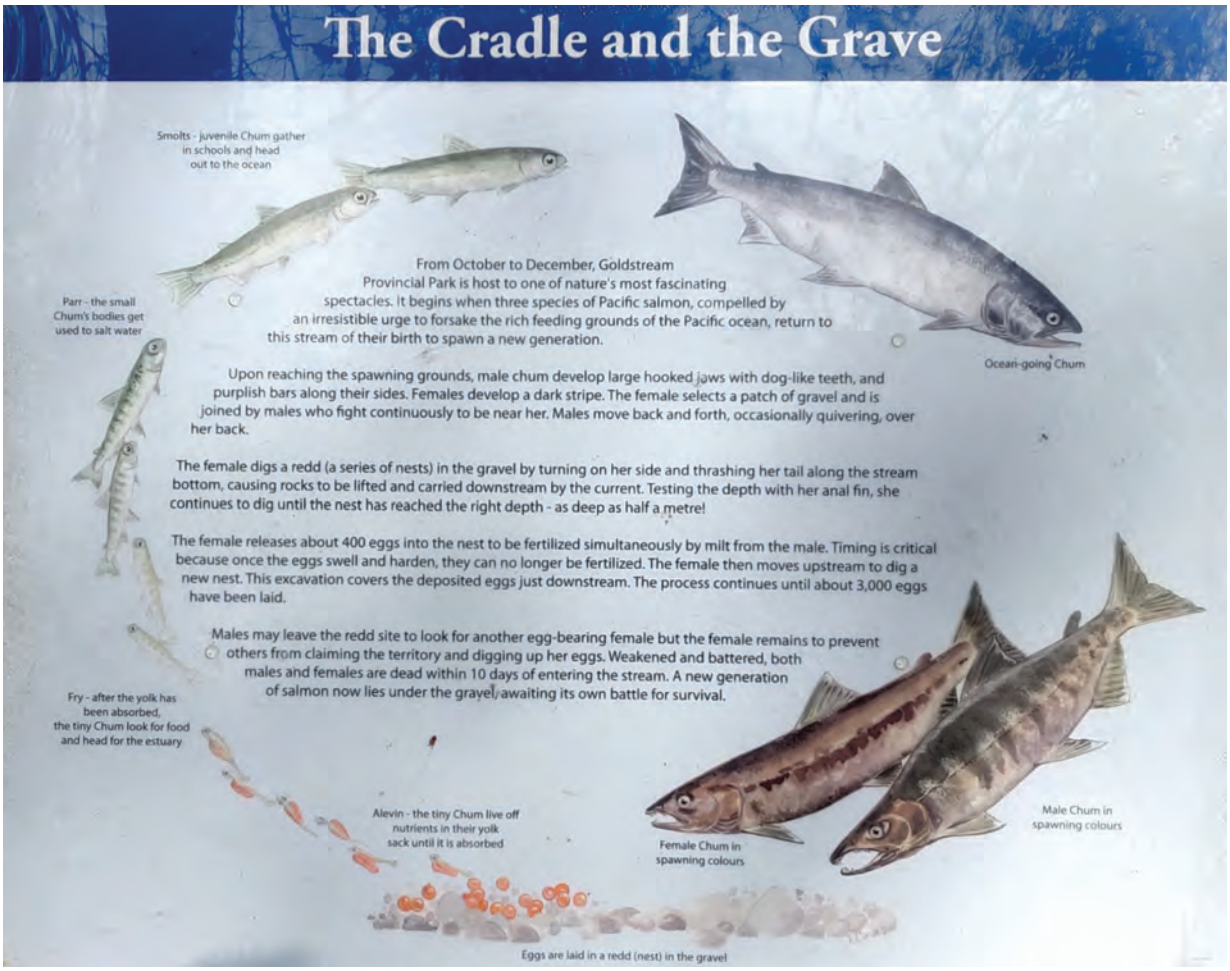


Photo credit: Blake McNeely. Signage along the trail at Goldstream Watershed, BC

watershed to deposit their eggs. Chinook are even larger than Coho and are able to jump over all but the largest falls. This ability allows them to reach the highest, most pristine areas of the watershed to spawn. A healthy population of sea-sun Cutthroat trout also travel upriver, but not to spawn. The Cutthroat follow the spawning salmon into the watershed in order to feed on their freshly laid eggs. The Pink salmon, Sockeye salmon, and steelhead trout spawn in watersheds all along the coast of B.C but are absent from the Goldstream watershed.

Their spawning location is not the only way these salmon can be differentiated. In the Pacific all these species are difficult to tell apart from one another with a similar silver sheen. As they enter the Goldsream River to spawn each salmon species changes to a different color. The Chum salmon turns to a deep olive color with vertical red streaks up its side. The males develop a large hooked jaw called a 'kype' and grow very large canine like teeth, hence the nickname 'dog' salmon. While other species of salmon do develop large fangs during spawning, the Chum has the largest. The slightly larger Coho has a less distinct color pattern during its spawn. The entire fish turns a dark red and green,

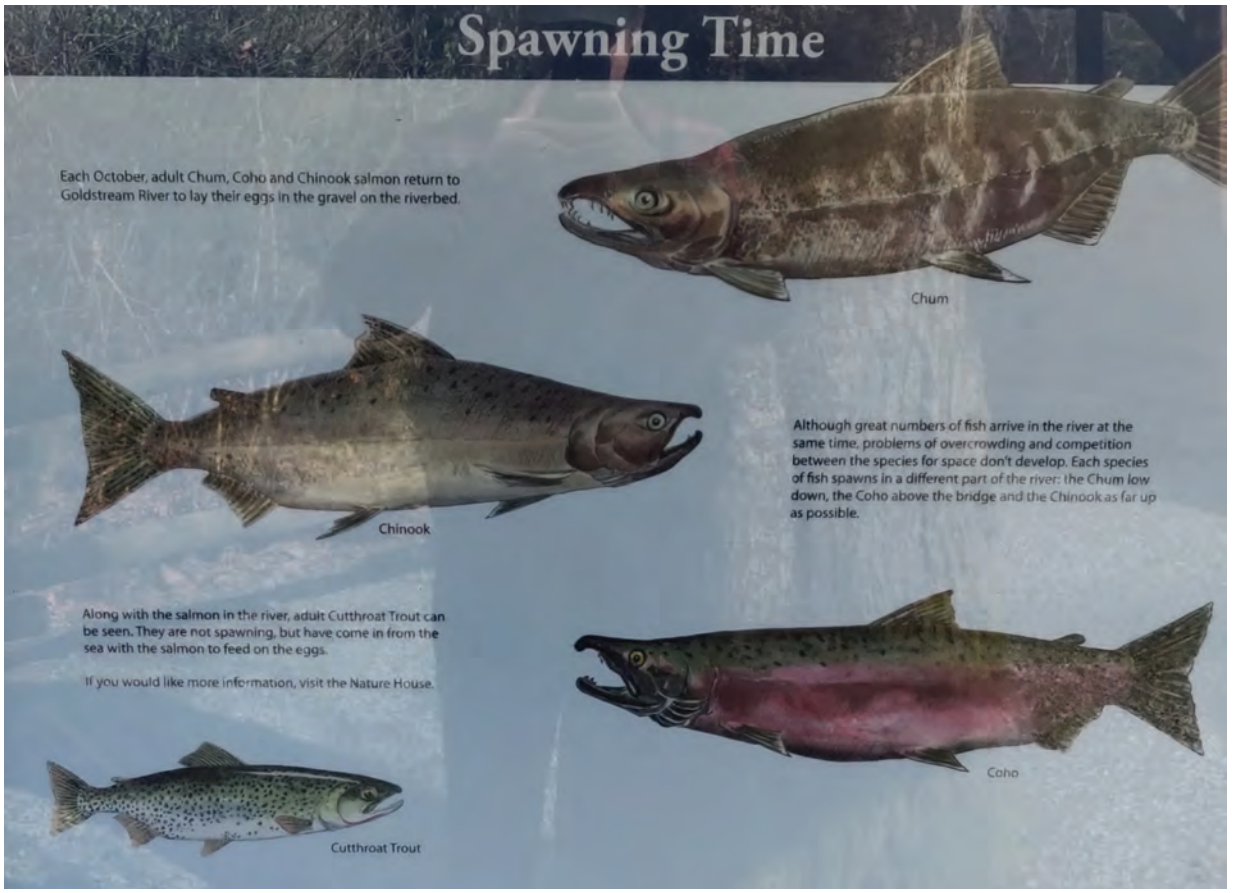


Photo credit: Blake McNeely. Signage along the trail at Goldstream Watershed, BC

with a less uniform pattern. The Chinook is similar to the Coho in that it does not have a very distinct pattern akin to the Chum. It changes to a dark, almost copper color and can have some dark red sections along the body. Chinook salmon have two distinct types of males that take part in the spawning event: hooknoses and jacks. A hooknose is a male that has made its ocean going stage, spent 3-5 years feeding, and then returns to their natal rivers to fight for spots next to spawning females. They use their large, hooked jaws to fight other males in a show of dominance. A jack is a younger Chinook, about 2 years of age, which has spent its entire life thus far in its natal river. These jacks are smaller than the larger hooknose, and have to rely on sneaking if they hope to secure a spot next to a female long enough to fertilize the eggs.

The salmon serve as more than just a popular tourist attraction within the provincial park. The Malahat, Pauquachin, Tsawout, Tsartlip, and the Tseycum bands still practice traditional fishing techniques in the Goldstream River. The Saanich people called the river the Selekta River, and used it for thousands of years as a staple food source. They referred to the salmon as 'Ceas', which means elder brother. One of their legends states that the salmon are some of their people who were transformed into salmon while under the ocean. When they returned to the rivers,

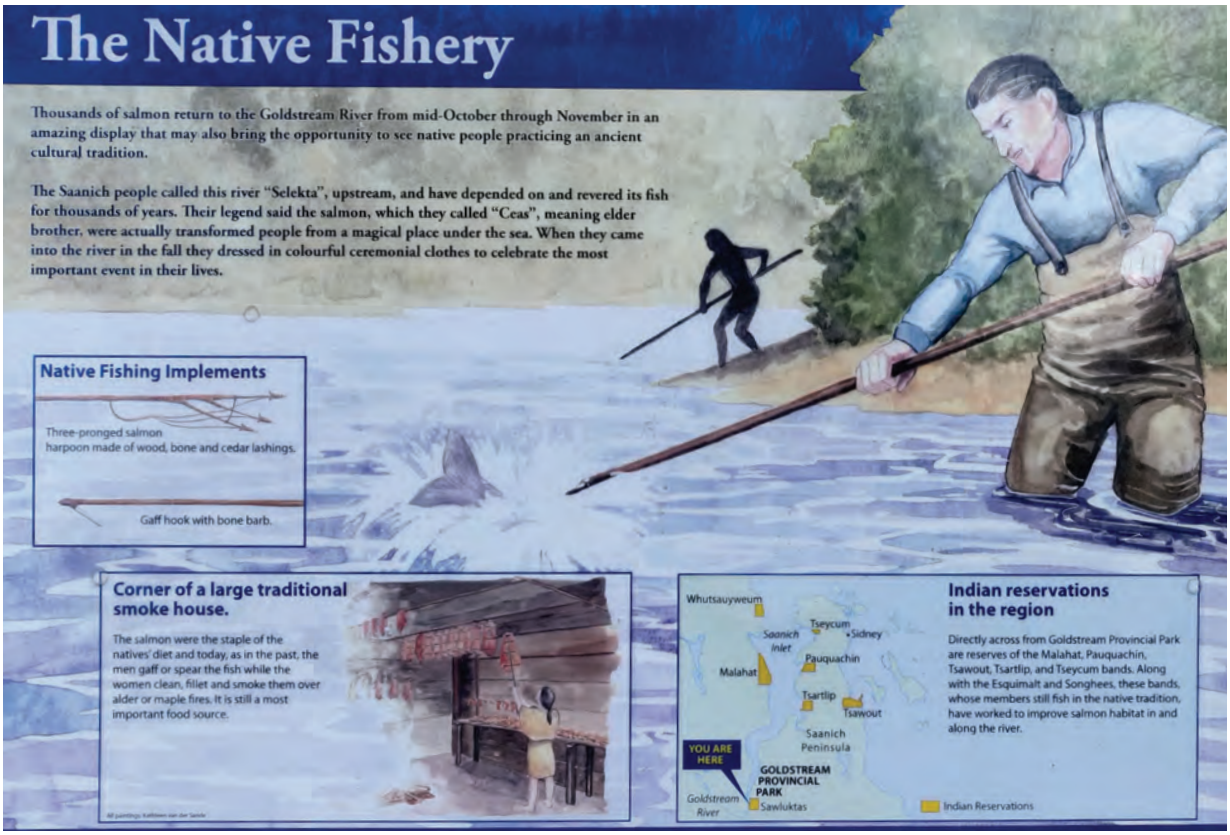


Photo credit: Blake McNeely. Signage along the trail at Goldstream Watershed, BC

they would be dressed in their colorful ceremonial clothes to celebrate the event. The people of these bands fish using traditional tools called gaff hooks and harpoons. The gaff hook consists of a long pole with a barb, made of bone, on the end. One person, armed with a gaff hook, will position themselves at a certain, narrow point in the river, while a second person will walk towards them, scaring salmon towards their partner. As the fish swim by the legs of the person with the gaff hook, they will attempt to hook the salmon and pull them to the shore. A three pronged salmon harpoon made of wood and bone is also used to harvest salmon. The salmon, once harvested, are taken to a smoke house where they are cleaned, filleted and hung-over maple and alder fires to smoke.

The surrounding ecosystem also greatly benefits from the salmon run each year. After spawning, the salmon die leaving their bodies to liter the river and its banks. Once the animals and insects have eaten their fill, what is left of the salmon, found scattered throughout the surrounding forest, decomposes releasing an abundance of nutrients collected from the ocean into the soil. This process is essential, as 80% of the nitrogen found in these forests can be traced back to the ocean. This ocean to land nutrients transfer is what enables the trees in

the Goldstream watershed to grow to enormous sizes. Red cedar and Douglas firs can be found throughout the watershed, towering over the river.

The Goldstream nature house is nestled in the forest near the estuary, with Mount Finlayson sitting behind it. The nature house is a popular spot for kids of all ages. It contains entertaining, informative, and interactive displays, all relating to the complex ecosystem of the Goldstream Watershed. They even have a Chum Parr on display to help visitors understand the different life stages of the salmon that inhabit the river. The most impressive feature put on by the nature house is their annual salmon count. A system of cameras, which can be viewed by visitors, is used to count the incoming number of salmon each year and this data is displayed on a large graph in the nature house. Several displays highlight the other species that call the Goldstream watershed their home, and demonstrate their importance to the food web. There are five different species of gull in the Goldstream watershed, for example, which contribute to keeping it clean. Despite these species looking very similar, the nature house, and informative signs around the main river, do a very efficient job of highlighting differing features.

After visitors have spent some time in the nature house and the main branch of the river, another attraction is right around the corner. On the tributary, Niagara creek, there is a waterfall, which is nearly as tall as the falls connecting Lake Ontario and Lake Erie. The falls in Ontario

Photo credit: Blake McNeely.

are 51 meters and the falls along Niagara creek, a close second at 47 and a half meters. This is a popular attraction where tourists can climb up the side of the

Photo credit: Blake McNeely.

mountain next to the falls, onto the old train trestle that sits above the Niagara Creek canyon. To reach the trestle, hikers must climb 90 meters up over 3 and a half kilometers. After a strenuous hike, with most sections involving very steep inclines, hikers are rewarded with a stunning view of Mount Finlayson, the Goldstream River, and its estuary.

Over the last decade, there has been a sharp decline in number of returning salmon. In 2011 a truck carrying fuel crashed, and had its contents leak into the river, likely killing the juvenile salmon. A total of 43,000 liters of gasoline, and 700 liters of diesel was deposited into the river in April, right around the time the salmon would have been emerging from their eggs. Despite this, the return three years later was not as low as was expected. Luckily, the spill occurred low in the watershed and so only the Chum were affected. As the Coho and Chinook spawn in the upper reaches of the watershed, the returns for these salmon were close to normal. The 2019 count was the highest it has been in a long time with roughly 30,000 salmon returning to spawn. With continued help, this watershed has a bright future as one of the most productive watersheds on the southern part of the island.

GOING VIRAL: TESTING BC SALMON FARMS FOR PRV

by DAN LEWIS

Wild salmon are on the brink of extinction in the Clayoquot Sound UNESCO Biosphere Region near Tofino, on Canada's west coast. There could be several factors at play, but with 20 salmon farms on the migration routes of wild salmon, that seemed like an obvious place to look for answers. That's why Clayoquot Action launched Going Viral, a project to field-test Clayoquot Sound salmon farms for the highly contagious piscine orthoreovirus (PRV).

The method we used was developed by independent biologist Alexandra Morton. Because fish farms in British Columbia use open-net pens, things flow in and out. Sea lice, bits of decomposing farmed fish, and viral particles flow out freely to pollute the marine environment.

This means we can take samples from fish farms and test them for pathogens. We approach the farm very closely, stand on the prow of the boat with aquarium nets on poles, and scoop up bits of flesh, fat, feces or fish scales. Sometimes this takes just minutes; other times we strained our eyes for an hour in order to fill a couple of vials.

The samples were placed in a virus preservative and shipped to the Atlantic Veterinary College for testing.

The results: of the farms stocked with fish during the study period, all but one of Cermaq's eleven active farms tested positive for PRV; all of Creative Salmon's four active farms also tested positive for PRV. The lab has done further testing on our samples to confirm that the virus Clayoquot Action is finding is the Atlantic PRV-1a sequence variant.

It is alarming to confirm that a virus from the Atlantic Ocean has been found on Atlantic

Creative Salmon fish farm Clayoquot Sound, BC

salmon farms in a UNESCO Biosphere Reserve on the Pacific Ocean. Did it originally come from Norway or Iceland back when companies were importing eggs (30 million in total)?

It is of particular concern that Creative Salmon is rearing Pacific Chinook in their farms that tested positive for this virus. One has to ask where Creative got it from – could it have come from Cermaq's farmed Atlantics, or is Creative's Chinook hatchery infected?

Pacific salmon respond to this virus differently than Atlantic salmon. In Atlantic salmon, PRV causes Heart Skeletal Muscle Inflammation (HSMI); which makes it hard for fish to feed themselves, evade predators or swim up rivers to spawn. Farmed salmon—constantly being fed as well as protected from predators—often recover. In Pacific Chinook, PRV fills the red blood cells until they explode, overwhelming the liver, causing organ failure and causing the fish to become jaundiced, turning yellow. In sockeye, PRV causes lesions to form on the heart.

Creative's salmon are processed at a fish plant in Tofino, made famous a couple of years ago when photographer Tavish Campbell dove and filmed the bloodwater spewing into the harbour. Although the visuals of the blood gushing out of that pipe were disturbing, what was truly alarming is that

Bonny Glambeck & Dan Lewis collect fish farm samples. Photo credit: Jérémy Mathieu

the blood was tainted with PRV. That means that wild fish swimming through Tofino Harbour are being exposed to PRV, and currents are carrying viral particles into the Sound. Because fish breathe through their gills, it is dead easy for viral particles to get into the blood of wild fish.

The BC government did a review of all fish processing plants in 2018 due to public pressure, but in the end merely recommended a finer mesh filter and chemical attenuation of the blood so it doesn't look red. Campbell returned to dive the Creative Salmon fish plant again in 2018 and 2019. Despite Creative's new filtration system, the effluent tested positive for PRV every time.

It's not easy to find PRV in wild salmon, because unlike salmon in captivity, they do not have the luxury of being fed and protected from predators. One study found more wild fish tested positive for PRV closer to fish farms; and fewer and fewer wild fish testing positive for PRV as you move further away from salmon farms, or up the mighty Fraser River. This suggests wild salmon exposed to salmon farms are becoming infected, and that infected salmon have difficulty swimming up river to spawn and reproduce.

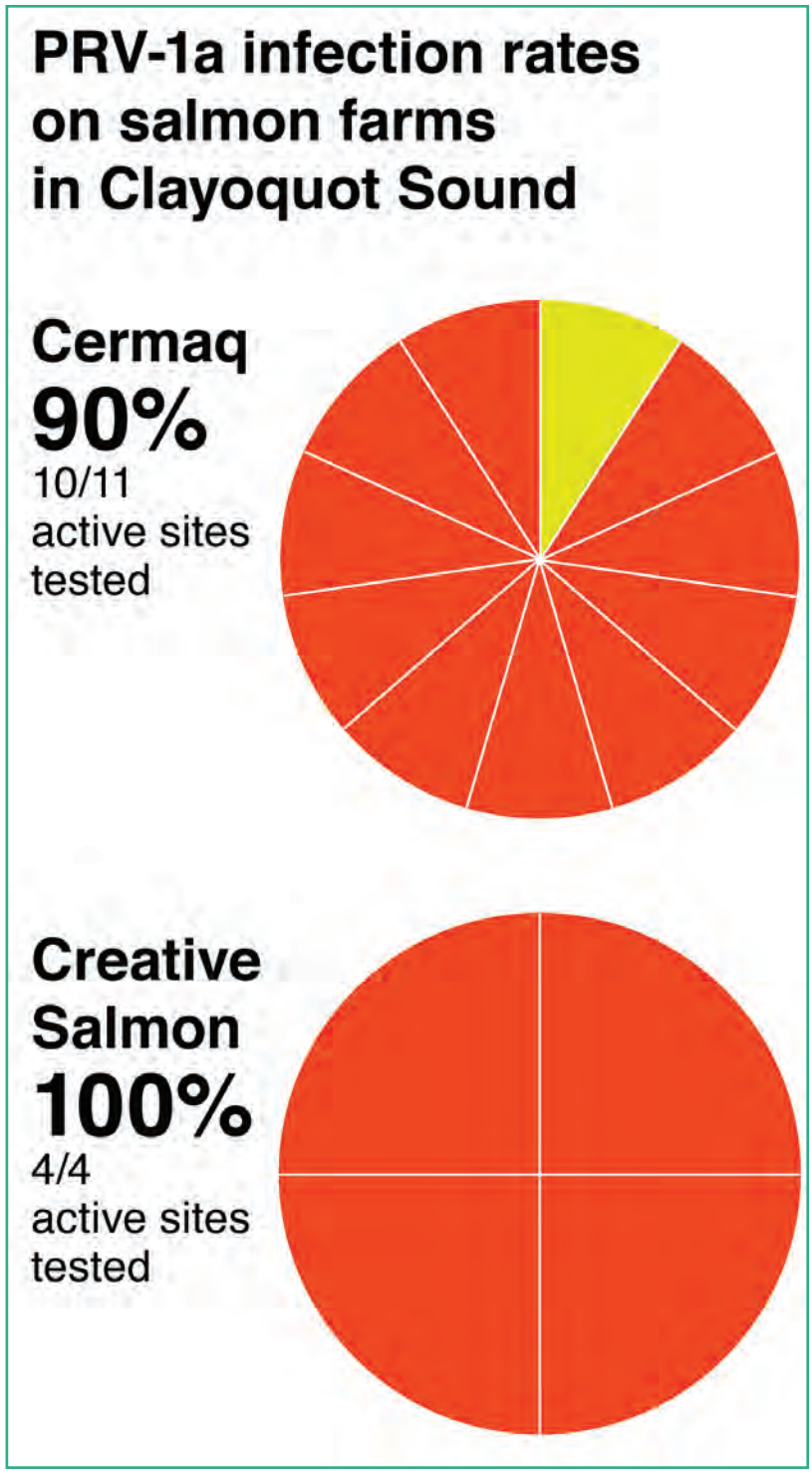
The federal Liberal government promised during the 2019 election to remove open-net pen salmon farms from BC waters by 2025. This was reflected in the mandate letter to Fisheries Minister Bernadette Jordan, and Tofino MP Gord Johns (NDP Fisheries critic) is determined to push hard for early legislation—to ensure an

orderly transition for workers and communities.

Washington State passed legislation in 2018 to protect their wild salmon by removing open-net pen salmon farms from their waters. This leaves British Columbia as the only jurisdiction on the west coast of North America permitting open-net pen salmon farms. In the interim, Washington is not allowing PRV infected fish to be put into salmon farms. In fact, they have ordered that 1.8 million fish be destroyed, rather than put their wild salmon at risk (the industry has been unable to find uninfected fish with which to stock their farms).

In BC, three lawsuits have successfully challenged DFO's policy of putting PRV infected fish in farms. However, DFO managers continue this dangerous practice, perhaps because the industry complained to the court that prohibiting the transfer of PRV infected smolts from hatcheries into the farms would "severely" impact them.

There are two important reasons why we should not allow PRV infected salmon into BC open-net pens: salmon farms amplify viruses and broadcast them to the surrounding environment, and salmon farms allow the virus to breed, mutate, and become more virulent as happened in Norway.



With the extinction trajectory that BC's wild salmon are on, it's past time to for DFO to immediately stop the transfer

Clayoquot Sound, Vancouver Island's last great rainforest. Photo credit: Sander Jain

of PRV infected fish into open-net pen salmon farms.

Dan Lewis is Executive Director of Clayoquot Action, a grassroots conservation society in Tofino.

Read the full report here: https://clayoquotaction.org/goingviral-report_final/

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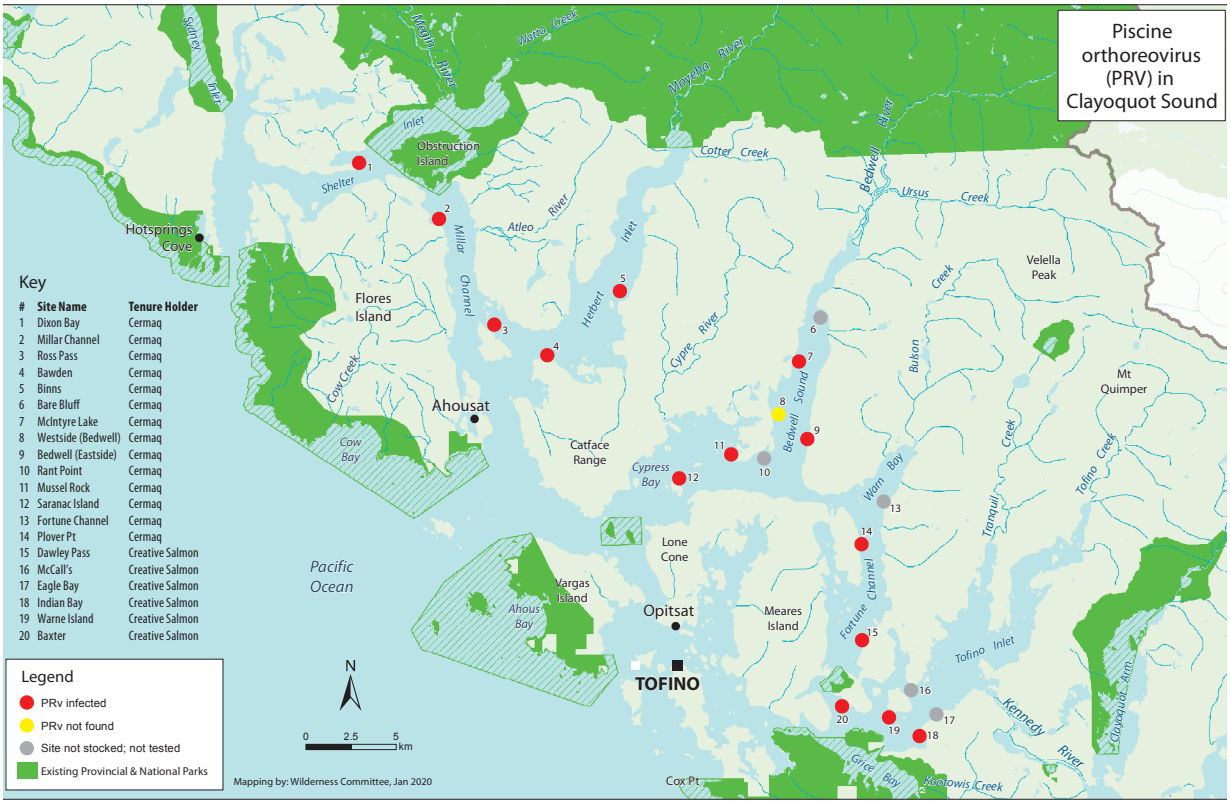
Piscine orthoreovirus (PRV) in Clayoquot Sound
Key
Site Name Tenure Holder
1 Dixon Bay Cermaq
2 Millar Channel Cermaq
3 Ross Pass Cermaq
4 Bawden Cermaq
5 Binns Cermaq
6 Bare Bluff Cermaq
7 McIntyre Lake Cermaq
8 Westside (Bedwell) Cermaq
9 Bedwell (Eastside) Cermaq
10 Rant Point Cermaq
11 Mussel Rock Cermaq
12 Saranac Island Cermaq
13 Fortune Channel Cermaq
14 Plover Pt Cermaq
15 Dawley Pass Creative Salmon
16 McCall's Creative Salmon
17 Eagle Bay Creative Salmon
18 Indian Bay Creative Salmon
19 Warne Island Creative Salmon
20 Baxter Creative Salmon
Legend
PRv infected
PRv not found
Site not stocked; not tested
Existing Provincial & National Parks
Hotsprings Cove
Obstruction Island
Shelter Inlet
Millar Channel
Flores Island
Ahousat
Cow Creek
Cow Bay
Atleo River
Herbert Inlet
Catface Range
Cypress Bay
Cypre River
Bedwell Sound
Cotter Creek
Bedwell River
Ursus Creek
Velella Peak
Bukson Creek
Mt Quimper
Warn Bay
Tranquil Creek
Tofino Creek
Lone Cone
Pacific Ocean
Vargas Island
Ahous Bay
Opitsat
TOFINO
Meares Island
Fortune Channel
Tofino Inlet
Kennedy River
Clayoquot Arm
Grice Bay
Hootowis Creek
Cox Pt
N
0 2.5 5 km
Mapping by: Wilderness Committee, Jan 2020


EXCLUSIVE REPORT
GOING VIRAL
Norwegian Salmon Farm Virus Threatens Clayoquot Chinook
CLAYOQUOT ACTION
C·S·I

A COMPELLING REASON

Water Offerings – Restoring World Views of the Sacred: Our sister from Teslin, Yukon, Autum Skaydu.U Jules, makes an offering of thanks to the water in the tradition of her Tlingit First Nation. On a rocky shore looking out at the Atlantic Ocean in Antigonish, Nova Scotia, Autum makes an offering of tobacco and sage and recalls the teachings of her Tlingit Elder, Virginia Smarch - "Part of the land; part of the water", acknowledging the unbreakable sacred bond of indigenous people and the natural world. Women are known as the keepers of water and at the time of their first moon cycle, they are more powerful than they will be for the remainder of their lives, therefore, young Tslingit women enact water offerings for seven to nine days at this time. One offering involves taking a rock from Alaska, the Tslingit point of origin, and placing it in Canadian waters, establishing the continuity of wisdom and lineage. Autum notes that there must always be exchange, so if one removes a rock, there needs to be a tobacco offering. Forgetting this synchronicity and exchange is what produces disease.

Gwendolyn Myring Colman
Excutive Director
GPI Atlantic

Photo caption: Autum Skaydu.U Jules in Antigonish, Nova Scotia, where she participated in the Coady International Institute 2019 Indigenous Women's Leadership program and shared traditions of sacred offerings with 23 young leaders from around Turtle Island. Photo Credit: Candace Royal.

IKANAWTIKET

environmental respect l'environnement

The objective of IKANAWTIKET Environmental Incorporated is: to promote the preservation of the natural environment by educating and informing the public about environmental issues, biodiversity in the Maritime Provinces, Aboriginal culture, Aboriginal worldview, and traditional knowledge in relation to the environment.

IKANAWTIKET advances education by undertaking research which is made available to the public, providing training and instruction, offering courses, seminars, convening conferences, meetings and developing educational tools related to understanding and respecting the environment.

The charitable work of IKANAWTIKET Environmental Incorporated benefits the community by preserving and protecting the environment through the preservation, protection, and restoration of habitats, and increasing the public's understanding about the environment and its importance to all life.

"Is controlling nature worth destroying our environment and our biodiversity, killing our young, and poisoning our food, water, and air?"

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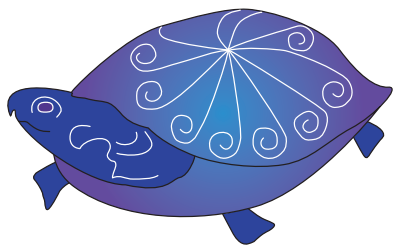
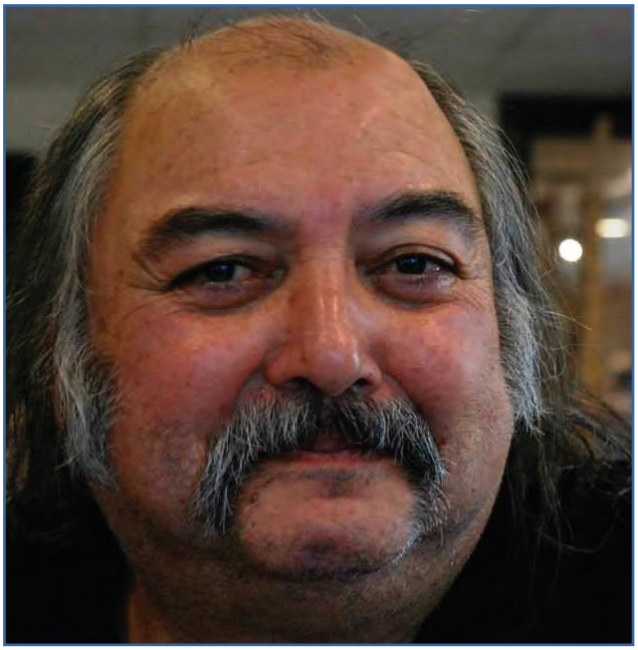




a message from

ALAN SYLIBOY

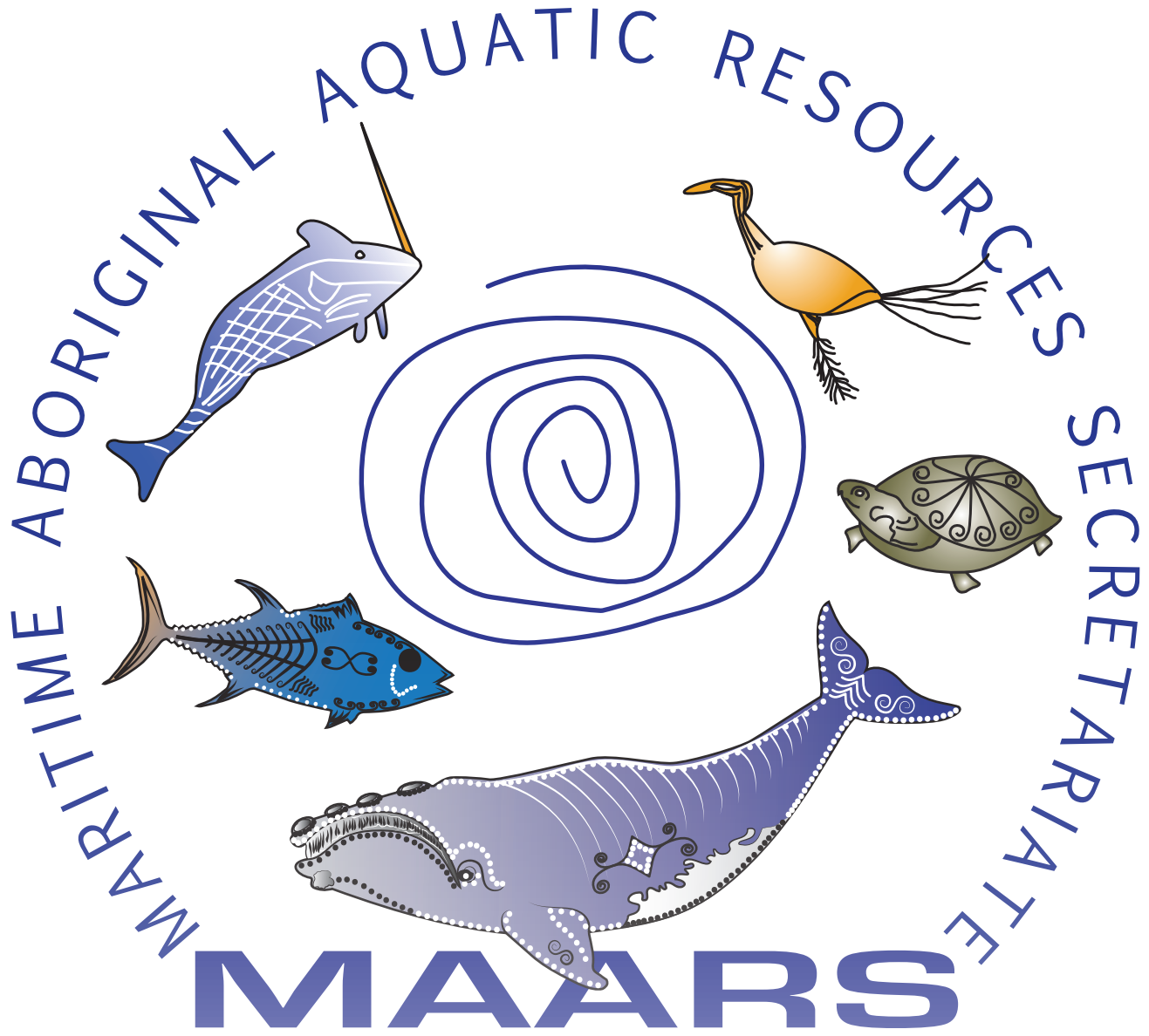
"The whale still has connections to the land because it must come to the surface to breathe. Its songs are about the relationship between the Universe and Mother Earth. Its medicine asks you to find and acknowledge your own personal history, and to recognize and honour what you know. Look to your past and find the whales song that will release the music to sing your memories. Do not be afraid, because to visit your memories is to reconnect to your whole self, and to bring harmony to your spirit."

The World Wildlife Fund tell us that Humpback whales roam the open seas, with regular migrations from feeding grounds at high latitudes to calving grounds in lower latitudes. Named for the distinct hump behind the dorsal fin, this agile and acrobatic whale often leaps out of the water and slaps its tail and flippers on the water's surface. Humpback whales manage to sustain their enormous bulk on a diet of small fish, krill and plankton. Along with ship collisions and the degradation of their habitat due to pollution, the greatest threat to whales is entanglement in fishing gear, also known as bycatch.

Whales are at the top of the food chain and have an important role in the overall health of the marine environment. Whales play a significant role in capturing carbon from the atmosphere; each great whale sequesters an estimated 33 tons of CO2 on average, thus playing their part in the fight against climate change.

Unfortunately, their large size and mythical aura does not protect them; six out of the 13 great whale species are classified as endangered or vulnerable, even after decades of protection. An estimated minimum of 300,000 whales and dolphins are killed each year as a result of fisheries bycatch, while others succumb to a myriad of threats including shipping and habitat loss.

https://www.worldwildlife.org/species/whale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