

A Raw, Existential Void in the Chest — The Impact of Environmental Anxiety and Grief on the Individual and Society

By Kate Bartholomew, Chapter Chair

Two headlines caught my attention this week, one from the *BBC News*, “Climate change: Young people very worried - survey,” and another from *Time Magazine*, “75% of the Young People Around the World are Frightened of the Future Because of Climate Change.” The period of our youth is a time that, ideally, should be opening up to expansive possibilities for the future — for optimism, for excitement, for hope. It should not be an age for growing anxiety and deepening despair. And yet that is what it has become, thanks to the undeniable reality of Climate Chaos and its increasing disruption of what had been relatively stable natural systems for millennia.

My last professional educator position was at a public charter school focused on sustainability and preparing young adults to enter the world to create a sustainable society and future. For the first time in my career I was able to honestly discuss human responsibility in ecosystem degradation and global warming; in systemic racism, a toxic planet and resource exploitation; in species’ extinction and public health threats. We were all — faculty, staff and students — speaking the same language. The problem boiled down to putting a positive spin into the narrative. After a certain point, the difficulty of shifting gears and convincing students that there were solutions available or yet to be discovered and that they could be the ones to bring about that change began to lack resonance — especially since so many were borderline nihilists to begin with even before the academic year began.

And who can blame them when they see the lackluster response to the Climate Crisis from world political leaders. Despite the lofty climate package President Biden put together, he still gave a green light to restarting drilling in the Gulf of Mexico and building smaller modular nuclear reactors. China has touted its zero carbon emissions plan yet continues to rely heavily on coal fired power plants and environmentally devastating hydroelectric dams. According to CNN reporter Ivana Kottasová, “Not a single G20 country is in line with the Paris Agreement on climate, analysis shows.” (3:02 AM EDT September 15, 2021). In one profoundly ridiculous (from an environmental standpoint) decision, El Salvador voted to make Bitcoin@ legal tender; Bitcoin@ being the most energy consumptive of all cryptocurrencies (the energy needed to “find” 5 Bitcoin@ could power the city of Albany). Soon there will be no more road left for governments to kick the can down.

Of course it’s not just governmental decision makers who appear oblivious to the dire — CODE RED — status the world is in. We have titans of capitalism — Jeff Bezos, Sir Richard Branson and Elon Musk — building rockets to go into space whether to take supplies and personnel to and from the International Space Station, market tourist space cruises, or to inaugurate humanity’s odyssey beyond earth — to Mars and beyond. The latter would elicit sublime and unbridled joy in me (being a diehard Gene Roddenberry *Star Trek* aficionado), if I didn’t recognize how dire the situation was for earth and how much that money should be devoted to solving problems here before looking beyond. These men are capitalist tycoons who play at philanthropy while expending vast sums of money for flashy sideshow ventures when they could be doing real good for humanity and the planet — and the pathetic part is, they don’t realize how readily people see through them. Certainly my students did.

Of course there’s also the new company called Colossal with \$15 million of start up money planning to resurrect the Woolly Mammoth under the pretense that these relics of the Pleistocene would help preserve the Siberian tundra and thus combat Climate Disruption. Let’s not bother to consider that the DNA required to make this extraordinary feat of genetic engineering possible will be derived from the bodies of Mammoths recovered from the rapidly thawing permafrost due to Climate Change; or that said reborn hybrids (not wholly Mammoths, rather a little Asian elephant in the mix) would be the only component of that ancient paleo-ecosystem present; or that the whole process will take decades to achieve. For the concept to have even the most minuscule hope for a positive outcome, many more elements — flora and fauna — of the extinct ecosystem would need to be recreated. As proposed, the project appears to be an outlandish waste of resources far better allocated elsewhere if combatting Climate Disruption is truly desired.

When young people — or anyone of any age for that matter — read of Mammoth resurrections or the several incredibly expensive and experimental methods of carbon sequestration or ideas of shading the earth to cool it through various (unproven) methods of geo-engineering, their level of skepticism and anxiety increases. They are very much aware of news reports featuring “increases in extreme weather events,” “the hottest summer on record,” “wildfires in the west affecting air quality on the east coast,” “Hurricane Ida brings flooding to NYC subways” and “record Manatee die off due to starvation.” And on top of all of this we have the COVID-19 pandemic still blasting its way around the globe,

randomly mutating and taking advantage of the unvaccinated pockets of people wherever it can. How can people not feel the loss of the security of the known, the familiar, the possibility of hope and a better future.

When I was young, the same age as my recent students, I remember being greeted at dawn by the most amazing variety of birdsong in the late spring and summer. There were sparrows, finches, warblers, wrens, chickadees, the occasional crow or blackbird, robins, cardinals, and more. Birds were everywhere. The barn swallows dive bombed my poor cat for hours (I actually think they were playing because they stayed just out of his impressive seven-foot range). And there were butterflies and fireflies in the hundreds — fireflies enough to light up fields like sparklers. Now, though I live only five miles away from where I grew up, the birds are sparse and the species fewer — I haven't seen a swallow in years — and the butterflies and fireflies are few and far between.

Obviously some of this could be youthful recollections seen through rose colored glasses, but the over all decreasing trend is real, and I've been observing it for decades. And every year I grieve a little more for what was and is no more. I also think of my mother who died back in the 1980s. She was always curious about the world, loved to travel, and believed in a brighter future for humanity. She was also an educator. Though I miss her daily, in some sense I am glad she is not here to see what is happening to the planet because I know how much it would devastate her, just as it is causing so much emotional and psychological anguish to so many now (in addition to the physical traumas unleashed in the wake of the impacts of Climate Chaos).

I make no claim to be anything other than a layman observer and fellow sufferer. This problem is so vast, no article I can write can really do it justice or fully explicate the breadth and scope of the issue. There are many books that attempt to do so, some of which I include at the end of this article. Just as there seems to be no clear pathway out of the predicament of Climate Disruption (or at least not one we are collectively willing to take), there appears to be no obvious remedy or cure for the accompanying anxiety and grief. But, perhaps, that's the way it has to be. Anxiety may spur us to action, and grief is not unwarranted. It is appropriate to mourn that which is lost, and, in so doing, honor the fact that it existed but now lives as a memory.

Ultimately, we must trust in the resilience and enduring nature of relationships and community to survive. Relationships with one another, with other living beings, with the planet itself, because those connections are truly the only things that matter.

Books

Emotional Resiliency in the Era of Climate Change: A Clinician's Guide by Leslie Davenport

A Field Guide to Climate Anxiety: How to Keep Your Cool on a Warming Planet by Sarah Jaquette Ray

Beyond Climate Grief: A journey of love, snow, fire and an enchanted beer can by Jonica Newby

The Climate Swerve: Reflections on Mind, Hope, and Survival by Robert Jay Lifton

A Guide To Eco-Anxiety: How to Protect the Planet and Your Mental Health by Anouchka Grose

Chapter Chair's Report

By Kate Bartholomew

Let Us Be the Root

Welcome to 2021. Three weeks ago, this would have been a much different article. Three weeks ago we all knew there was immense work ahead of us to undue the legacy of four years of utterly devastating and demoralizing environmental and social justice backsliding and disregard. We knew we would again be faced with the seemingly Sisyphean task of countering pseudoscience, propaganda and modern mythologies with fact-based, data-driven and supported findings — but this time there would be those in the halls of power capable and willing to distinguish between the two lines of discourse and judge the validity of one over the other. In short, there was an expanding swell of, I don't want to say hope, because that is too optimistic, but perhaps the ability to breathe deeply again without dread.

And then January 6th dawned. I don't wish to legitimize or lend credibility to the actions of those who stormed the nation's Capitol by including that event in this article, but it must be taken into account because it is a violent glaring symptom of a sleeping leviathan that must be addressed if we are to unite to stop Climate Change (or, more accurately, Climate Disruption), tackle the organically evolving COVID-19 pandemic and transition to a sustainable future.

What I saw on January 6th was horrific and something I thought I would never see in our country, but I also saw a great deal of anger and pain — not in the hardcore far-right extremists who took advantage of the rally-turned-insurrection for their own agendas — but from a number of regular citizens who, in their depression and vulnerability and search to be heard, turned to conspiracy groups and a President whose lies seemed to speak to their needs. I saw a throng of outraged, angry, manipulated and misled Americans. And, yes, they were and are dangerous. But it's even more dangerous if we don't try to recognize and understand what led them to this moment, because they are our neighbors, our family, our local small business people, our teachers, our healthcare workers, our out-of-work laborers whose jobs were outsourced to other countries: they are Americans too.

Bill Bishop's book *The Big Sort* posited the theory that the clustering of people with similar mindsets into geographic or cultural groups was destroying America. A more recent expression of the same concept had individuals naturally aligning themselves into like-minded "tribes" (cultural misappropriation obviously not being high on the sensitivity spectrum of the marketing gurus who co-opted the phrase). Social media does it; environmental groups do it; we do it — we end up sharing information within the closed context of our own or other like-minded groups or organizations. The result is a fractured, cacophonously-discordant interpersonal space where even those who technically speak the same language may be fundamentally incapable of cogent communication.

I recently completed a four-part workshop offered by Sierra Club National titled "Facilitating Conversations for Collective Liberation," the intent of which was to assist participants in being more effective facilitators by moving groups and individuals through conversations about white privilege, racial bias, implicit bias, micro aggressions and systemic racism. Many of the conversations were, are and will be uncomfortable and challenging — but that's absolutely necessary and expected. That's the point. Any change, evolution and growth is and should be challenging. We all left the workshops acknowledging that this evolution and growth is a lifelong, continuing process.

And is meeting the crisis excruciatingly revealed on January 6th really that different than the topic of my four-part workshop? After reading *White Fragility* by Robin DiAngelo, I see having frank and open discussions about the groups represented by people storming the Capitol and their delusional ideologies as the flip side of the coin. Until we can bridge the gaps generated by the Big Sort and establish meaningful communication among all communities (no matter how disenfranchised or deluded)— among all tribes — in America, any lasting work on Climate Disruption, solving the conundrum posed by the emerging COVID-19 threat or toward a sustainable, renewable energy future will be just as vulnerable as prior gains were to the vicissitudes of electoral politics and alternate truths.

Please don't think I am hopelessly naive in my writing — I am well aware of the other forces at play in this drama: corporate personhood, media biases, lobbyists, politicians, power brokers and the like. The list is legion. But I also know that the most basic communication boils down to two individuals sharing something in common with one another. That is the root. From that can be grown more roots, trunks, branches, stems and leaves — a whole world of possibility.

At the risk of being accused of having a pop culture addiction, I will conclude by quoting from one of my favorite recent Marvel movies lines spoken by a young Black artist who left us much too soon:

“Now, more than ever, the illusions of division threaten our very existence. We all know the truth: more connects us than separates us. But, in times of crisis, the wise build bridges: the foolish build barriers. We must find a way to look after one another as if we were all one single tribe.” ~ Chadwick Boseman as King T’Challa of Wakanda in *Black Panther*

First Nation Engagement: Choosing Restorative Justice

By: Kate Bartholomew, Chair
Sierra Club Atlantic Chapter

I sit writing this article on unceded lands taken by force from the Gayogohó: no' (Cayuga Nation) and the Onödowa'ga:' (Seneca Nation) knowing that I am, by no means, an expert on the long, sordid 500+ year history of the occupation and illegal confiscation of Indigenous Lands in North America along with the systematic ethnic and cultural cleansing that accompanied that seizure. But what little I do know is enough to induce a deep-seated visceral rage and shame for which I have yet to discover an adequate remedy. In truth, I have no right to speak on these matters because I am not Indigenous — I am a descendent of the colonizing hoard that swept across this continent with malevolent genocidal efficiency, decimating societies and cultures as they went.

Before European invasion, North America may have been home to over 18 million people living in thriving and diverse societies, speaking many different languages, embracing long-standing cultural traditions representing a diversity of origins and backgrounds. Agriculture, architecture, religion, music, art, trade and communication — all had flourished for millennia. Certainly there had been conflict, but no more than in Europe, Asia or Africa. Fine craftsmen and women created exquisite ornaments and objects from gold, silver and copper along with semiprecious stones. In short, the continent was definitely inhabited by people well adapted to the environment and living sustainably on the land.

Unfortunately, the European colonists/invaders/usurpers, driven by a variety of needs — greed, religious persecution, hope for a better life — saw little besides vast miles of seemingly empty land, unlimited resources and uneducated, “heathen” native inhabitants. By the time larger numbers of Europeans began arriving, there actually were many fewer Indigenous People due to exposure to diseases brought by the colonists. The Indigenous were a virgin population and had no inherent immunity to diseases like measles, mumps, chicken pox, cholera, or whooping cough. Whole groups of villages were wiped out; small tribes eradicated. This was even before the systematic seizure of lands by force.

Under the Doctrine of Discovery [1], found in a series of Papal decrees beginning in 1,100 A.C.E., any land not inhabited by Christians could be seized by the colonizing power, regardless of who might be living there. This was used in North America, India, Africa and other parts of the world to establish a Christian domination and hegemony over the colonial world. Buoyed by this concept, along with the uniquely American egoist theory of “Manifest Destiny,” the drive to either displace or eradicate the Indigenous population began. A seemingly endless series of broken treaties (the only sure thing about a treaty was that it would be broken), relocations to reservations, battles, disease outbreaks and death finally ended, for the most part, with the last blight in the American Indian Wars — the 1890 Massacre at Wounded Knee. By this time the former continental population of nearly 20 million had been reduced to barely 2 million.

The remaining Native Americans, having been forcefully relocated to land sometimes quite distant from their historic homes, were under the management of the federal government, now known as the Bureau of Indian Affairs. And it was this BIA that would determine how someone could prove their Indigenous heritage or whether a group of people actually had claim to being part of a Tribe or Nation. Eventually, largely due to the reawakening sparked by the American Indian Movement, there has been a push toward declaring each Tribe a Sovereign Nation with the right to self-governance, trade, self-determination, traditional lands and territories, traditional languages and customs, natural resources and sacred sites [2]. These are the key components of the United Nations “Declaration on the Rights of Indigenous Peoples,” adopted September 13, 2007. Though 144 nations supported the declaration, both the United States and Canada, along with Australia and New Zealand, opposed it.

Another point to remember is that First Nations are just as unique and diverse as are the nations in Europe, Southeast Asia or Africa — one size doesn't fit all. And within each First Nation, there can be just as many differences of opinion as there are in our state or country today. Just because the government is run by a Council of Clan Mothers and Chiefs, doesn't mean there aren't heated discussions and virulent debate. Monolithic and homogeneous doesn't exist among the First Nations any more than it does in federal politics. The BIA made it even more complicated by only recognizing one person in each Nation it will work with. The question then becomes is that person looking out for the good of the people or for more personal gain?

New York State currently has a “nation to nation” policy in place when interacting with Indigenous Nations within its borders. Unfortunately, the state chooses the same person chosen by the BIA to work with. The state also ignores other constituencies within that same Sovereign Nation who hold a different opinion. This policy applies to any form of environmental review, whether for solar or wind development, pipeline building or expansion, road building, housing

projects, urban renewal, whatever. Rather than having the developer consult with the First Nation, New York State, i.e. the Department of Environmental Conservation, should do so directly, which rarely happens. There are groups within several First Nations in the state who would prefer to deal directly with the developers, especially when some potentially significant harms seem likely to their lands or historical sites. The confusing bureaucracy doesn't help the developer, either, if they're trying to be community friendly and responsive. So, as we move forward expanding renewable energy in New York, with a goal of pivoting to actualize the Jemez Principles in our activism and campaigns, it is imperative that we ensure Indigenous People have been informed of and consulted with from the beginning of each project.

This is just as relevant — perhaps more so — when contemplating importation of hydroelectric power from Canada to augment New York's renewable energy portfolio. Any discussion of the Champlain Hudson Power Express (hereafter referred to as CHPE), a joint project of Canadian company Hydro-Québec and Transmission Developers Inc., a Blackstone Portfolio Group out of New York City[3], raises these land rights issues and much more. To begin with, under New York State's "Clean Energy Standards," [4] [CES] all renewable energy was to be generated within the state boundaries and, in addition was to include no new large-scale water impoundments. CHPE fails both those criteria and is being lauded chiefly as a temporary, [possibly] needed, stop-gap measure to bolster New York City's energy needs until adequate offshore wind and other renewables come on line. It is being considered as one of seven proposals under "Tier Four" of the CES, but it is the only proposal calling for importation of power.

Canada began harvesting energy from its vast array of rivers in earnest by constructing huge dams in the 1950s. The benefits of this new energy were delivered to Canada's large population centers, but the devastating consequences were left to First Nation communities who were displaced without consultation and whose waters and lands were poisoned by toxic buildup the methyl Mercury resulting from chemical reactions in the water impoundments [5]. Hydro-Québec was and is one of the largest players in the build-out of the hydroelectric industry in Canada, maintaining 27 vast reservoirs created by flooding Indigenous Lands, destroying native ecosystems and interrupting the natural progress of Canadian waterways and watersheds behind various dams and impoundments [6]. At the moment, Hydro-Québec is at the center of not just a few multi-million dollar lawsuits over these land disputes with a number of Canadian First Nations: "a \$1.5 billion lawsuit over existing dams, a \$500 million suit over dams on the Bessamites River and suit filed in early 2020 for \$9.1 million in damages and alleging 'institutional bad faith' by Hydro-Quebec with regard to transmission corridors for the new Romaine River dam." [7]

Hydro-Québec's strategic plan depends on building new dams. In the same year (2010) it and the private hedge fund Blackstone floated the idea of the Champlain Hudson Power Express, at a cost of \$3 billion and running 333 miles from the Quebec border to NYC, Hydro-Québec also started building its massive and controversial Romaine River dams. These are new impoundments, not the "surplus" power the company claims. The whole plan is a green washing ruse. Canada is still burning coal: use the hydroelectric power at home. And that power is generated on First Nation lands without just compensation or reparation to the people whose way of life was destroyed by impoundment construction.

The Innu First Nation of Pessamit, the Atikamekw First Nation of Wemotaci and the three Anishnabek First Nations of Pikogan, Lac Simon and Kitchisakik joined in writing letters to NYC Mayor DeBlasio and to the First Deputy Mayor expressing their opposition to CHPE and explaining, in detail, their reasoning. They spoke on behalf of other First Nations in Canada who have never been acknowledged or compensated for the harm inflicted by Hydro-Québec and its operations. The letters mention the lack of proper environmental review during construction and the failure to consider Climate Change adaptation, among many other failings, in the planning for these massive projects which forced relocation of whole communities.

These are human and Indigenous rights violations that are happening now, right next door, not in a distant developing country. And they are occurring contemporaneously when both of our countries — the United States and Canada — are coming face to face with the atrocities committed at the blight known as "Indian Boarding Schools" on both sides of the border. Both countries must come to terms with over 500 years of systematic repression, cultural obliteration and genocide. Apologies will never be enough. Real change — restorative, transformative justice MUST be the guiding principle moving forward. We can begin by listening and honoring the voices of First Nations and valuing what they say as much, if not more, than we value what others say, especially if it deals with issues impacting their lands and people. Based on this, CHPE will only result in more suffering for First Nations in Canada; more environmental destruction. We have been warned by others on this side of the border of the environmental harm likely to result to Lake Champlain and the Hudson River ecosystems if CHPE moves forward.

We have the opportunity to begin walking the path of true restorative, transformational justice; embracing and living the Jemez Principles; listening and acting from our hearts; and trying to heal centuries of destruction and desolation — we just have to make that choice.

[1] <https://upstanderproject.org/firstlight/doctrine>

[2] <http://northeastmegadamresistance.org/chpe-transmission-corridor-new-york/>

[3] <https://cen.acs.org/articles/94/web/2016/11/Dams-increase-mercury-exposure-Canadian.html>

[3] <https://www.nyserda.ny.gov/all-programs/programs/clean-energy-standard>

Chapter Chair's Report

By Kate Bartholomew

Can We Hear? Are We Listening?

[Viruses], not lions, tigers or bears, sit masterfully above us on the food chain of life, occupying a role as alpha predators who prey on everything and are preyed upon by nothing.

—Claus Wilke and Sara Sawyer, virologists at the University of Texas at Austin and the University of Colorado Boulder, respectively, in a recent *eLife* commentary on how viruses drive evolution and adaptation in human and other mammalian genomes (May 17)

“A virus can change the fate of the world; power has nothing to do with being tiny or giant! Power is something related to the power hidden within you!”

— Mehmet Murat ildan

It is May 2020, more than two months after Governor Cuomo put the state on lockdown in response to the Covid-19 crisis, and while some areas of the state have begun Phase 1 of reopening, any semblance of a return to normalcy is off on some future horizon. There is no possibility of escaping the reality that we are all living through and experiencing in every aspect of our lives each day — the fear, the grief, the isolation, the gratitude, the frustration, the confusion — we are all there together, apart, but not alone.

I need to believe that something positive will — if we choose — emerge from this pandemic crisis. I'm certain many of you have read, just as I have, the findings of drops in GHG emissions since lockdowns were initiated around the globe. People in metropolitan areas in India and Japan may be wearing masks, but it's not to protect themselves from the thick, cloying smog that once interfered with athletic events and seeped into homes. At the moment, the skies above Mumbai are clear. Unfortunately, now that the “Great Quiet” is past in China, so are the clear skies. As reported by Yessenia Funes in the May 18, 2020, edition of Gizmodo, according to a report released on the same day by the Center for Research on Energy and Clean Air, pollution in the atmosphere above China now exceeds pre-Covid-19 levels.

Perhaps the lessons we should glean from this public health nightmare should be broken into categories, beginning with “relationships.” Because this truly is a pandemic, scientists, virologists and epidemiologists around the world are, for the most part, working diligently and communicating their findings with one another in a global race to develop an effective vaccine against Covid-19, as well as treatment options. If politics and profit are, indeed, removed from this equation, this becomes a perfect archetype method for tackling the many facets of Climate Disruption and doing so swiftly. Building relationships and cooperation instead of barriers and sanctions is the only possible means to address that global emergency in time to avert unfathomable catastrophe.

Similarly, this crisis has revealed clear vulnerabilities the world's citizens face because of globalization. This brings to the forefront the need to radically rethink our economic structure and scale. With burgeoning unemployment, bringing outsourced jobs back to this country to uplift and employ capable workers and, by extension, empowering other nations to generate their own sustainable economies and foster the growth of self reliance and self-determination, seems the most logical and human-e solution. And many of those jobs could be in the renewable energy sector — wind, solar, geothermal, electric vehicle, energy efficient building design and materials — rather than seeking supply sources outside the country, build the resources to generate the needed materials here.

This is not to say that we should take this as a lesson to become isolationists — far from it. If anything, this global pause has highlighted just how interconnected we are digitally and how effectively we can engage and communicate with one another over vast distances with the expenditure of only a fraction of the amount of carbon consumed in the past. We are one digitally interconnected, interdependent population of an inherently social species. And we are also interconnected and interdependent with the entire biosphere of this planet. And there are ways we can remain globally connected and responsible by acting locally and respectfully to reduce our negative impact on this earth. We can produce and buy locally, regeneratively grown food, healing the earth and reducing the carbon footprint of transport simultaneously. We can reduce our consumption of factory produced animal products, sparing people the horror of working in the animal processing industry and saving the animals from being born into a death sentence. We can decrease our consumption of consumer products and stop falling victim to the mythology of capitalism where endless growth is the penultimate, supreme attainment, and Bill Gates and Jeff Bezos are the bodhisattvas of our culture.

Certainly we have also witnessed the weaknesses of current fossil fuel and nuclear energy sources when faced with the unpredictable consequences of a global pandemic. Demand vacillates wildly, while supply is impacted by worker safety concerns and illness in the worldwide fossil fuel industry. And the nuclear power sector offers even more frightening scenarios to contemplate. Just what is a minimum safe staffing (skeleton crew) for a nuclear reactor; who determines that guideline; and do we trust them? Social distancing and added PPE are not always feasible in the nuclear power sector, creating a transmission potential in some parts of the facilities not so unlike that faced by the meat packing industry.

This pandemic — with all the panic, fear, suffering and upheaval it has generated — has so wrenched us away from any pattern of reality we have ever known that, in many ways we are adrift, temporarily, as we wait for the whirlwind to pass and land to appear. I've read accounts for people claiming this is a message from Nature to reconsider our behaviors. If this is so, I'd say it's long overdue, but I am not one to be anthropomorphic about a whole system of systems. I think instead this is a rare opportunity where the whole human species is being given a glimpse of a different paradigm and has the chance to choose whether to go back out into the world after the lockdown ends and keep their eyes open and choose the change or instead to leap back into the old skin worn before and close their eyes.

Long ago a friend of mine told me that in Tibetan Buddhist tradition being born as a human being was considered an auspicious event and a right juncture, because only in the human form was there the ability to attain enlightenment. I may be wrong, but in my mind this series of events is offering our species the possibility of an auspicious event and right juncture — to transition away from a culture of endless growth, greed and exploitation to one of a sustainable and respectful relationship to all life. I sincerely hope we accept the gift being offered.

Chapter Chair's Report

By Kate Bartholomew

A Path Back from the Abyss

I confess over these past four years I felt a certain empathy for Priam's daughter, the mythological Cassandra, bestowed with the gift of prophecy but fated never to be believed. By no means do I aspire to such lofty a distinction, but, ever since November 2016, I've been warning all who would listen what the dangerous implications of this administration could be for our nation and the world...and look where we are now.

In less than 45 months, this administration has bulldozed through environmental, civil rights, health care, immigration, economic policies like a two-year-old in a temper tantrum on steroids. Landmark regulatory acts like the Clean Water Rule and Clean Water Act, the Clean Air Act, the Endangered Species Act, the Migratory Bird Treaty Act of 1918 and the National Environmental Policy Act might as well have been faded tissue paper streamers for all the respect they were given. And then began the ramp up to build the environmentally devastating Border Wall.

Almost immediately after moving into the White House, the current resident began the process of withdrawing from the Paris Climate Agreement. He also began the process of defunding, disempowering or discrediting federal agencies by hamstringing and gagging the employees, cutting funding, and choosing people to lead the agencies whose core values were often, at best, completely disinterested in the agency they were going to lead. This was the fate of the EPA, NOAA, Department of Energy, Department of the Interior, Department of Education, Department of Housing and Urban Development, Department of Agriculture and the Secretary of State to list those that rise to surface of the quagmire.

And not just the environment has been targeted — let's not forget the ever lengthen list of travel ban countries and their similar characteristics, or rescinding DACA, or the policy separating families at the border, or rescinding Title IX guidance clarifying protections for transgender students, or defunding Planned Parenthood, or withdrawing from the U.N. Human Rights Council, or ... the list is seemingly endless. I'll end the litany with a somber tribute to those who have and are suffering through this Covid-19 pandemic. Whether our 200,000+ mortality can be laid at the feet of any set of actors, I think it is fair to argue that dismantling a National Pandemic Task Force might not have ranked up there as a wise move for a genius.

But, at long last, there is enormous energy and vitality — and justifiable anger as well — and a solution to reclaim the direction of our nation and the planet is just a few short weeks away on November 3, 2020, when you can make your will known at the local state and national levels. Choose the leaders YOU want to represent you. And you need not wait until November 3rd to vote: there are three separate options available for all New York State voters this year because of the pandemic. You can:

1. Request an Absentee Ballot.
2. Vote early beginning daily October 24th through November 1st at one of the designated polling places in your county.
3. Vote as you normally would on Tuesday, November 3, 2020.

Check out the details at your county Board of Elections online. The number of early voting locations varies by county population. I live in a county with very few residents, so we only have one early voting location.

One final issue I want to raise because it's something I've heard rumbling in the background more frequently in the last few years but especially since the emergence of the Me Too Movement and now Black Lives Matter. The gist of the murmured discontent follows the basic thread of "we're an environmental organization, not a" then you can supply the descriptor, be it social justice, gender equity, racial justice, voting rights organization. That's when I pause and realize how terrifying this change and upheaval is for everyone. It's mind boggling to recognize that racism, sexism, environmental destruction and abuse all have their root cause in a willingness to detach from and exploit the other. It's terrifying to recognize that unconsciously I have participated in a system that enslaves and oppresses People of Color and Indigenous People for hundreds of years. But by owning that and actively working to change myself and that system, I can hope to become part of that vibrant kaleidoscope of strength, compassion, equity and power that will change and heal the planet. And so can you.

Our Final Message

*We leave these
echoes
for our cousins
across the
vast salt sea*

*Messages and markers
to follow
when the voices of
long ancestors call them back
to join the
bones of the plesiosaur,
megalodon, archaeopteryx*

*We watched flowers
erupting into
wonder among the
many shades of green*

*New feather-winged and
fur-bearing hooves or
clawed running creatures
unfold from the ruin of
darkness, ice and fire
while honoring our dead
already waiting in
the dreaming*

*The crush of
plastic and
poison and
garbage and
two-leggeds
killing us for sport
and food and
to fill the yawning void
where their mercy and
compassion should
reside*

*Overwhelms
because we were
impediments to dams for
powering polluting cities
of destruction
rivers of chemicals flowing in
streams through our
failing waters
called us to the
diaphanous silence of
the dreaming*

*We follow our gentle
younger friends
the baiji,*

*recently cast
into eternity*

*No young are
spawned in
the dreaming*

*No mates are sought as
moon phases shift through
far long memories of
pure, slow waters and
clear, fresh skies float
through bones decaying
into eternity*

*Nothing new emerges in
the dreaming,
only long memories and the
slow, ancient ebb of
forgetting*

~ for the Chinese paddlefish, declared extinct 1/8/20
<https://apple.news/APNME8qbcTfCI3TdbDpOTdA>

~ K. E. Bartholomew

Whatever Glows Might Not Make You Stronger: Hope and Nightmares All Around

By Kate Bartholomew, Chair
Sierra Club Atlantic Chapter

This September marked the first anniversary of the UN Treaty on the Prohibition of Nuclear Weapons. The International Campaign for the Abolishment of Nuclear Weapons (ICAN) had advocated for this treaty for over 10 years. During March, June and July of 2017, treaty language was crafted with input from 135 nations and a number of individuals. The text was completed on July 7, 2017, and opened for signatures on September 20, 2017. It will enter into force once duly designated representatives from 50 nations have signed the document and then those same states have become legally bound to the treaty through the process of ratification by their governing bodies. Once this process is complete for 50 nations, the Treaty will become active, though it will remain open for others to join. For this historic accomplishment, ICAN was awarded the 2017 Nobel Peace Prize.

This year, to commemorate the first anniversary, a high-level ceremony was held at the UN in New York City on September 26, 2018. Security was incredibly strict, not even permitting NGO partners, such as Physicians for Social Responsibility, to attend. During the ceremony, seven new nations signed on and four more ratified the treaty, bringing the total to 69 signatories and 19 ratifications. Again, the treaty will not go into effect until 50 nations have both signed and ratified it, but the September 26th signing did move that date closer.

It is important to note that the treaty offers a path for nuclear states — those hosting nuclear weapons as well as those actually possessing nuclear arsenals — to join the signatories. Those nations hosting nuclear weapons must agree to have them removed by a specified date, and those possessing arsenals must agree to destroy the weapons in a prescribed manner by a set date. The full treaty text can be found here: <http://www.icanw.org/treaty-on-the-prohibition-of-nuclear-weapons/>

Last year, as you may have read in a previous *Sierra Atlantic*, the Atlantic Chapter sent a resolution asking the National Sierra Club to support the Treaty on the Prohibition of Nuclear Weapons to the national Council of Club Leaders. Despite some interesting and sometimes awkward exchanges, it passed the CCL and went on to the National Sierra Club Board of Directors. That group also voted in favor of a slightly modified (but essentially the same) resolution, meaning that the national Club supports the Treaty on the Prohibition of Nuclear Weapons.

Physicians for Social Responsibility (PSR) has adopted a new campaign: Back from the Brink. The idea behind this long-range campaign is to encourage a vast array of organizations, groups, municipalities, villages, churches, foundations, boards, etc. to pass a simple, five-part resolution designed to provide a means for nuclear powers to scale down — step “back from the brink” — leading to disarming and destroying their arsenals. The hope is that, as ever greater numbers pass this resolution, the growing list of names will force the governing bodies of these nations to reconsider their positions. Certainly, with the current residents in the halls of power in DC, and the finger that is poised over the nuclear football, we in the United States have more than a little reason for concern. For those desiring more information about this campaign, please go to <https://www.psr.org/blog/resource/back-from-the-brink-a-call-to-prevent-nuclear-war/>

As important as the treaty is, it's a sad fact that the slow Armageddon of aging nuclear power plants and the ever-growing stockpiles of nuclear waste persist, accumulating around the country and the world. I fear this is an example of the languid frog placed in a pot of cold water being slowly brought to a boil. The current administration, in addition to seeking an upgrade and revitalization of our nuclear arsenal, is also intent on reviving Yucca Mountain as a permanent nuclear waste repository and certifying multiple interim storage facilities — of course in environmental justice communities — so high-level nuclear waste can be shuffled around the country in sometimes substandard transport casks. This is the stuff of nightmares — so I'll save the details for the next installment in the nuclear cliffhanger.

We must extinguish Prometheus's Fire for the sake of the earth and the future

By Kate Bartholomew

Atlantic Chapter Conservation Chair

Over the years, whenever I've come across references to the myth of Prometheus and his punishment for bringing the gift of fire to humanity, I've always felt the gods meted out an unfathomably harsh punishment. How could pilfering the simple gift of fire warrant having your liver torn out and eaten by an eagle every day for all eternity? But recently I've begun to consider the myth through a different lens - just what was the nature of the "fire" Prometheus stole from the gods to give to humankind?

Immediately after observing the success of the world's first test of a nuclear weapon, code name "Trinity," on July 16, 1945, at Alamogordo Bombing and Gunnery Range in New Mexico, J. Robert Oppenheimer, then the director of the Los Alamos Laboratory, recalled thinking of two specific lines from the Hindu holy book, the Bhagavad Gita:

If the radiance of a thousand suns were to burst at once into the sky, that would be like the splendor of the mighty one ...[Chapter XI, Verse 12]

And:

Now I am become Death, the destroyer of worlds. [Chapter XI, Verse 32]

Perhaps, metaphorically, the awesome and horrible potential of nuclear fission is the fire Prometheus snatched from the safekeeping of the gods to deliver into the immature, reckless, myopic and xenophobic hands of humankind. If that were the case, perhaps his punishment is not so ill conceived as I first imagined.

To illustrate this recklessness - and willful disregard for the health and safety of others - one need look no further than the U.S. nuclear weapons tests conducted over the course of several decades, as well as their Soviet counterparts. Spurred by fear of the potential threat of a Nazi nuclear weapons program, the United States, at the direction of President Franklin Delano Roosevelt, had directed the formation of a U.S. equivalent. For the first test - code name Trinity - which used a "gadget" essentially identical to the bomb dropped on Nagasaki several weeks later, the team in charge wasn't certain it would work, and if it did, they weren't sure what its yield would be in megatons. There was even an infinitesimally small chance the explosion would ignite the atmosphere and incinerate the planet. Enrico Fermi was taking bets on that possibility. Even the weather wasn't optimal - but President Truman wanted it to happen before the Potsdam Conference - involving the USSR, the U.S. and the U.K. - began on the 16th, so, the "gadget" was detonated early in the morning on the 16th.

If I were to evaluate each and every nuclear and thermonuclear test series and explosion conducted by all the acknowledged (and suspected) nuclear armed nations, this would be a treatise, not an article. Instead I will mention only a few truly disturbing highlights. In total, the U.S. alone conducted 56 series of tests beginning with Trinity on July 16, 1945 (Alberta series), and concluding with Divider on September 23, 1992 (Julin series). That translates into approximately 1,054 individual tests over the course of 47 years.

A number of the test series - of which there were many - involved human observers, military personnel engaged in maneuvers, military equipment and structures to assess damage and radiation doses, as well as animals to test blast impact and safety materials and/or devices. When people were involved, all known safety precautions were taken - but, this was all new. Everyone was learning on the fly. It was a very exciting opportunity for collaboration between theoretical and experimental physics - the scientists didn't know what they didn't know, so it was very much a "let's try it and see what happens" mentality. The concept of acute radiation sickness was a relatively new diagnosis, having appeared first after Wilhelm Röntgen intentionally exposed his fingers to X-rays for an extended period of time in 1895. Marie and Pierre Curie both suffered from toxic radiation poisoning due to their pioneering work with radium, and it led to her death from aplastic anemia in 1934.

Tragically, soon after the Trinity test there would be no shortage of human subjects to study to determine the impact of exposure to extreme levels of ionizing radiation. The survivors of the bombings of Hiroshima and Nagasaki, later known

as *hibakusha* - explosion-affected people, and their children, would provide a wealth of medical and scientific data to pour over for decades and with which to conduct varied epidemiological studies. They would also endure decades of discrimination because the long term effects of exposure to ionizing radiation were so poorly understood. Was it contagious? Would children conceived later suffer birth defects? There were no answers at the time.

Returning to the purposefully destructive use of nuclear fire, we can't forget to briefly delve into weapons development and testing during the Cold War - and the "nuclear arms race," along with the M.A.D. Policy (Mutually Assured Destruction or Deterrent, I suppose). After the two bombs were dropped on Japan, it seemed as if anyone who could was scurrying to design a bigger, more efficient, more precise, more versatile, more something nuclear explosive. The U.S. Army even conducted illegal human experiments on non-consenting citizens to determine the effects of different doses of plutonium exposure. Paranoid obsession is too mild a term to describe the level of xenophobia that drove this madness. At one point the weapon designers were even contemplating a nuclear grenade, but they couldn't figure out how a soldier could use it and not be killed.

Among the improvements made to the original nuclear bomb design was to add a second stage - a fusion, or thermal stage - hence was born the thermonuclear bomb circa 1952. Basically, the first fission reaction triggered the second fusion reaction between two heavy isotopes of water, releasing massive amounts of energy, which, in turn, triggered a secondary fission reaction. Obviously these weapons were vastly more powerful, more complicated, and, when in development, a lot more unpredictable. The largest thermonuclear bomb the U.S. ever tested - "Bravo" (Castle series), March 1, 1954, on Bikini Atoll - had a yield of 15 megatons - three times what was calculated - because of unanticipated reaction properties of a lithium isotope. Due to the unanticipated yield and less than optimal weather, the fallout immediately hit two inhabited islands and a Japanese fishing boat - and sparked public outrage over atmospheric testing, along with the birth of the Godzilla franchise (I'm actually totally serious).

Castle Bravo was, I hesitate to say small, but it was moderate in comparison to the largest bomb the Soviets ever partially tested. "Tsar Bomba" - our name, they called it "Ivan" - was designed as a three stage thermonuclear bomb with a yield of 100 megatons. There is some evidence to suggest that the third stage was actually multifaceted as well. The problem with testing the completed device was that they didn't know if the pilot and the plane would survive. So, on October 30, 1961, a partial bomb - stages one and two - with a yield of 50 megatons, was dropped at their test site north of the Arctic Circle. The fireball could be seen for 600 miles, the mushroom cloud rose 40 miles into the atmosphere, all the buildings at the testing facility were destroyed and the pilot almost didn't make it anyway.

Fortunately for humanity and the world, in the aftermath of the paranoia of the Cold War, people and, more slowly, (most) nations of the world recognized the horror of nuclear weapons and nuclear war. There were no winners with these devices - from manufacture and construction to detonation and fallout - everyone on every side loses. The anti-nuclear movement launched during the Cold War, which claimed among some of its first members physicists who had been instrumental in initiating the nuclear age but who later deplored the unrelenting and senseless proliferation of death - Albert Einstein, Andrei Dmitrievich Sakharov, Eugene Rabinowitch, and Sir Joseph Rotblat among others - continues to thrive and as evidence (and high level nuclear waste) mounts concerning the dangers of nuclear power, opposition has expanded to encompass that manifestation of Promethean Fire as well.

To see so many people actively aware and finally opposing this seductive nemesis is at once exhilarating and devastating. Exhilarating because many people working together with a united purpose is power - but devastating because much of the awareness was purchased by the cost of watching the effects of reckless, improperly vetted or considered use of new scientific discoveries barely out of infancy. And those costs were in human lives. Since 1959, there have been more than twenty nuclear arms control treaties. Some are area specific, some are multinational; some deal with testing, some deal with arsenal size. There's the Strategic Arms Limitation Treaty I (1972) and Strategic Arms Limitation Treaty II (1979). Then the Strategic Arms Reduction Treaties (I - 1991, II - 1993 and the New II - 2010), not to mention the 1996 Comprehensive Test Ban Treaty, of which several countries are currently in violation. And there are still estimated to be 4,000 actively deployed nuclear warheads of the 10,100 believed to remain in the world. That's down from around 68,000 in 1985. These remaining devices are unequally distributed among the eight declared nuclear weapon states, the one undeclared (Israel) and the five nations with weapons sharing agreements (Belgium, Germany, Italy, Netherlands and Turkey).

This significant reduction might seem comforting, but it is proceeding far too slowly and recent political developments internationally make the presence of even one nuclear warhead one too many. But from this murky miasma of ignorance, politics and the deadly vestiges of a bygone era of paranoia and fear arises a signpost signaling a path forward into a better, cooperative, accountable and peace-oriented future - a future without nuclear weapons. Between March 27 and 30, 2017, and June 15 to July 7, 2017, member nations and other involved parties met at the United Nations in New York City

to draft a Treaty on the Prohibition of Nuclear Weapons. It was adopted on July 7th with 122 member nations voting in favor. Naturally those nine countries possessing nuclear weapons or hosting nuclear weapon bearing contingents on their soil neither participated in nor voted for the legally binding treaty. The Treaty was opened for signatures from member states on September 20, 2017, and will take effect 90 days after the 50th signature is registered.

To further recognize the importance and significance of this Treaty, on October 6, 2017 the International Campaign to Abolish Nuclear Weapons, the sponsor organization of the Treaty, was awarded the 2017 Nobel Peace Prize.

The Sierra Club has for the past 50 years always held a strong policy against further development, testing deployment and first use of nuclear weapons. How could one conceivably justify nuclear weapons from an environmental point of view? Earlier this year at the Annual Board of Directors and Council of Club Leaders Meeting in Washington, D.C., CCL Delegates from the Atlantic, Ohio and Michigan Chapters sponsored the following Resolution:

The Council of Club Leaders requests that the Board of Directors facilitate a process for amending Sierra Club policy to state that the Sierra Club supports the United Nations legally binding instrument, The Convention on the Prohibition of Nuclear Weapons, leading toward their total elimination.

The Resolution was drafted by members of the Sierra Club Nuclear Weapons Working Group and the Sierra Club Nuclear Free Core Team. As Atlantic Chapter's CCL Delegate, I'm pleased to announce that the CCL passed the Resolution without modifications - 36 in favor, 14 opposed, 7 abstaining - and sent it on to the National Board of Directors where the Policy Committee approved the following modified version and sent it on the full National Board of Directors for approval:

History proves that the production and testing of nuclear weapons poses grave environmental risks. The cost to human life and health and the environmental devastation caused by the use of nuclear weapons is unthinkable. Sierra Club supports the efforts of the International Campaign to Abolish Nuclear Weapons, recipient of the 2017 Nobel Peace Prize, and supports work towards global ratification and implementation of a verifiable, binding UN treaty with the goal of reducing and eliminating nuclear weapons.

What's in Your Glass of Water?

By Kate Bartholomew, Atlantic Chapter Conservation Co-Chair

Just how certain are you about the quality of the drinking water emerging from the faucet in your sink every day? Or the water in which you bathe, wash your clothes or steam your vegetables regularly? Do you really know what's in the water you drink?

Probably these aren't among the top 500 issues that hover near the apex of your stack of priority concerns — until a crisis breaks and it becomes glaringly apparent that these are questions we all should be asking. Like the residents of Flint, Michigan, whose drinking water was contaminated with lead and other chemicals when, as a cost-saving measure, their water supply was switched to the Flint River and certain treatment measures were eliminated. Or like the residents of Hoosick Falls, New York, who in 2015 discovered their town's water supply was contaminated with Perfluorooctanoic acid (PFOA), a water and oil repellent used in the production of non-stick cookware, microwave popcorn bags and stain-resistant carpeting now being phased out.

And now, thanks to the release of an analysis of federal data compiled by the Environmental Working Group, a non-profit, non-partisan organization dedicated to protecting human health and the environment, it seems well over two-thirds of Americans — 218 million individuals — in all 50 states, may be living with unsafe levels of dangerous, cancer-causing hexavalent chromium in their drinking water.

Unfortunately, hexavalent chromium is also one of the very, very many chemicals utilized in industry that are either untested or under-tested for health impacts and safety. Industries benefit enormously from having this testing status remain in limbo. To learn more about this newly revealed threat to our water, go to <http://www.ewg.org/research/chromium-six-found-in-us-tap-water>.

All this begs the question: How do we really know what's in the water we drink? If your water is sourced from a municipal water supply, you can contact your municipality or county water board to obtain details about how your water is treated, what it's tested for and how often. Usually these are tests and treatments mandated by state and federal regulations. This information will also reveal any parameters for which tests aren't being run. Please realize that the EPA recognizes only 88 regulated drinking water contaminants, and this list includes microorganisms, inorganic and organic chemicals, disinfectants, disinfectant byproducts and radionuclides. Not all of these substances are acknowledged to cause the range of damage they're capable of inflicting. Chromium, without being considered separately according to its three forms — chromium, trivalent chromium and hexavalent chromium — is noted as causing allergic dermatitis. Nor are all the sources of these substances recognized or identified.

If your water supply is a well, spring or other surface water source and a mortgage was involved, the property had to pass a water quality test indicating the presence of potable water before you purchased your dwelling. That sounds reassuring, but what constitutes "potable?" When I purchased my home in 1988, the well passed with flying colors. When I moved in, all that emerged from the faucet was liquid black sludge. I called the Watershed Inspector to complain, and his response was: "Well, yes, it has the consistency of swamp water, but it's free of fecal coliform bacteria, which is what we test for." Wonderful! I had a huge overgrowth of iron bacteria. After digging up one massive boulder/well cover followed by a heavy chlorine shock treatment, I finally, I hope, had potable drinking water.

Ultimately, you're never going to truly know EVERYTHING that's in your water because for some substances chemical tests aren't readily available or costs are too prohibitive or it's not a substance raising any concern yet. However, the best way to learn about your water is to contact a certified lab and pay to have it tested. There are filters that can remove many harmful contaminants. Hexavalent chromium is removed by quality reverse-osmosis filters, as are many other chemicals. If you visit Environmental Working Group's website, there's a whole page devoted to water filtration system recommendations. The real issue is cost. Any suite of reliable and extensive water tests is going to be cost prohibitive — \$500 or more — while home filtration units are equally expensive. Even faucet models can run into hundreds of dollars.

Consider that the 1.3% of freshwater on the planet that is surface water is the water used by humanity and every other species to maintain life. It's becoming ever more polluted, approaching the point of being beyond recovery. Add to this the continued growth in human population and its insistence on embracing water-intensive diets and it's impossible to ignore the looming water catastrophe on the horizon. According to the World Health Organization, by 2025 half the world's population will be living in water-stressed areas. By 2050, that number will be two-thirds of the population.

Potable drinking water will be more valuable than gold if it can be protected and maintained. But to accomplish this, knowledge is key: knowing what's in the water now and how to prevent further contamination in the future.

Climate Change: Adaptation Isn't the Answer

By Kate Bartholomew, Atlantic Chapter Conservation Chair

First, the rallying cry was to “Stop Global Warming!” and whatever would be the particular dire results du jour resulting from that environmental disaster. Then, as the ominous 350 ppm of CO₂ in the atmosphere drew closer, was reached, then surpassed, the mainstream dialogue shifted from one of halting climate change to one of adapting to climate change. Was this movement to pragmatism over idealism driven by the realization that there were already too much climate altering GHGs in the system to avoid some impacts on the planet? Or was it driven by the very uniquely human selfish unwillingness to face hard choices and make the sacrifices necessary to stave off disaster? The answer would be fodder for those far wiser and with much more time to ponder than I. What I do know for certain is that not everyone, not every species, is able to sign on for the adaptation option.

Adaptation isn't an option if you're an American pika, *Ochotona princeps*, whose habitat consists of alpine terrain above the tree line on mountains, and whose body is very well adapted to these cold conditions. Any significant warming or drying of the environment will cause your body to overheat. Since your habitat is already so high on the slopes, there's not much room left to migrate upward in altitude before you run out of mountain. Of course, that's also assuming the alpine meadows upon which you rely for sustenance will adapt rapidly enough to colonize higher up. Unfortunately, the time frames extrapolated from the most recent IPCC findings offer little hope for species in predicaments similar to the American pika. There simply won't be enough time for organic evolution to enable pikas to adapt to warming temperatures (or for primary succession to establish new alpine meadows) before the species simply runs out of space and food, and disappears forever. For instance, in Glacier National Park, the pika may disappear not long after the last glacier is predicted to melt away in 2030.

The polar bear is in much the same predicament. So much of *Ursus maritimus*'s life cycle is tied to the Arctic sea ice — it's a marine mammal — that the shrinking and eventual disappearance of that vital component of its environment is already negatively impacting the species' chances of survival. Although the polar bear is thought to have diverged from the Brown bear (*Ursus arctos*) between 400,000 and 600,000 years ago and has survived past episodes of climate warming, proving itself capable of adapting to some degree, that was before the ubiquitous presence of technologically intrusive humanity. Today, when polar bears seek out new sources of food — new territories — they inevitably risk encountering humans, which, just as predictably, will always end badly for the bears.

In an article by Scott Waldman in the February 15, 2017, edition of *Scientific American* (reprinted with permission from Climatewire), a survey of 130 previous studies determined that climate change has had a particularly devastating impact on threatened and endangered species — and that this impact has been vastly underestimated. Of all the species maintained on the International Union for the Conservation of Nature, close to half of the mammals and a quarter of the birds have suffered increased threat due specifically to climate change. The studies show that the most impacted are those with highly specialized diets or very restricted habitats.

Of course, it makes perfect sense that a species already on the brink — or close to it — without accounting for the myriad alterations to its environment wrought by climate change, could much more easily fall over the edge into oblivion than a species that wasn't already in such a weakened state. But even those robust, adaptable generalists are not immune to environmental changes.

What are some of the threats posed by climate change that impact our co-inhabitants of planet earth so dramatically? Patrick Barkham's piece in *The Guardian* (January 19, 2017), while examining the ten species most endangered by climate disruption, also highlighted many of the threats. Rising sea levels will eradicate species whose habitat consists solely of areas just a few meters above sea level. Increasing ocean temperatures and acidification spell disaster for corals and all species dependent on them, as well as for any marine organism with a shell or exoskeleton. Then there is the ubiquitous interplay of phenology and synchronicity. Evolution has honed and fine-tuned interdependence among species and with the environment over many thousands of years. Now climate change is abruptly intruding on this symphony with cacophonous results.

Animals with very restricted habitats due to metabolic mandates, such as the white lemuroid ringtail possum (*Hemibelideus lemuroides*), will soon disappear in a warming world. And while the polar bear may be able to adapt to an altered earth, including by interbreeding with its brown bear cousins (something that happens infrequently already, but will increase in frequency as the planet warms), one of its primary food sources, the ringed seal, is not so fortunate. The ringed seal depends on the sea ice for denning, for raising its pups, for the krill living on its lower surface — no more ice, no more seals.

Not as much attention has been paid to Antarctic species, but the Adelie penguin numbers have declined significantly since 1970. Warming ocean water provides fewer fish for their diet, meaning they switch to less nutritious krill, and earlier melting at nesting sites brings higher infant mortality — eggs can't survive sitting in pools of melt water.

Sea turtle species will suffer a variety of deleterious impacts from a warming planet. More powerful storms will pummel and erode nesting grounds. Warming oceans will shift the currents and alter the abundance and location of food sources. Also, since more than one factor determines the gender of a sea turtle, warming sands will ensure an increasing predominance of females in the populations — until the sands become too hot and whole clutches of eggs fail. Once the percentage of females in the population reaches a critical point, the species will be beyond recovery.

With respect to abrupt climate change, phenology — or the timing of events — is, in a way, the Achilles heel of evolution and the handmaiden of extinction. The biosphere consists of a multiplicity of interconnected relationships that have evolved over thousands — even millions — of years. The fact that plants were able to colonize nearly every part of exposed land on the planet was due not just to the evolution of vascular tissues, but also to the development of a relationship — a symbiosis — with a group of Mycorrhizae fungi (and Rhizobium bacteria in legumes). Some of these relationships are broad, but many are very specific, examples of what is known as co-evolution.

In these relationships, timing can be everything. If you're a Baird's sandpiper (*Calidris bairdii*), an arctic wading bird, the warmer temperatures induce you to mate earlier, but that means your eggs hatch before the peak season for the insects that are your primary nutrition source. Thus, your chicks are less hardy and less likely to survive to adulthood. If you're a Yucca moth, your life cycle is intimately tied to the Yucca plant. If the plant blooms too early, you'll fail to pollinate it, fewer plants will exist in the next generation and less food will be available to the next generation of Yucca moths.

No species exists in isolation — including *Homo sapien sapien*. Everything is interconnected and interdependent. Humans tend to think of ourselves as set apart from the rest of life on the planet. We're somehow unique, solitary and extraordinary, as if an enlarged cerebrum, self-reflective awareness, language, etc., give us the right to determine the fate of all other life on the planet. That strikes me as the extreme of self-centered narcissism and hubris.

As a prime example of this tendency, we need look no further than some the plans for adaptation being touted in various halls of power. For some, the answer to adaptation appears to be throwing multiple rapidly developed, insufficiently vetted technologies (carbon capture and storage, various forms of geo-engineering, tampering with the ocean) at a vast global problem engendered by centuries of willful ignorance about our impact on and interrelationships with all other living things. For others, the problem becomes one of structurally altering existing infrastructure to meet the demands of the altered environment for those already fortunate enough to be living there. For most of humanity, it will mean becoming climate refugees and hoping the 3% will have compassion for the 97%. None of these responses gives any priority to rest of the living biosphere.

I hate to disagree with Paul Simon and Art Garfunkel, but we aren't rocks or islands, we are each, ourselves, ecosystems — microbiomes — and repositories of evolutionary history. Each human being contains roughly the same number of non-human cells (bacteria, archaea, fungi and viruses) as human cells, and this doesn't include the microinvertebrates, bacteria and fungi that reside on the surface of the body. Some of our non-human residents actually exist as historic relics in our genomes, while others are helping us today by producing substances we need (our *E. coli* synthesizes Vitamin K for us).

It would therefore be prudent for us, before embarking on a self-centered adaptation crusade, to examine if and how climate disruption might directly affect our own micro-symbionts. The "other" is not only outside in the sky, the ocean and the forest, it's also inside in the stomach, mouth, kidneys and lungs.

Granted that humans are fairly resilient, but as climate change creates more and more refugees, and population centers become more congested, it's important to remember another group of organisms that will be on the move thanks to a warming planet — infectious disease vectors. Diseases that were previously confined to tropical and subtropical regions of the world will shift north and south. The microbiomes of people living in those areas will not have encountered these pathogens and will be vulnerable, as will their human hosts. We may discover adaptation to be less viable than originally thought.

Each species lost to extinction weakens the entire biosphere, which is an organic, living system. It's capable of responding to extinctions — even to mass extinctions — but it's uncertain if there has ever been one of this magnitude that occurred so abruptly.

Living trees, our true fortune

By Kate Bartholomew, Atlantic Chapter Conservation Co-Chair

When I was young, trees defined my universe. Whether it was the stately black walnut across the driveway that provided shade in the summer and delicious nut meats in the fall, or the small grove of older maples keeping watch outside my bedroom windows every night, trees pervaded my life. I was beyond fortunate to be raised in a rural setting, especially when I think of the unkempt orchard of heritage apple trees, where I played and gathered wild black raspberries, and the sprawling crabapple under which my sandbox was built. Trees were friends, animate beings — I talked to them, read to them, hugged them and hid among them. This theme grew exponentially when, in sixth grade, I discovered Tolkien's Middle Earth and began looking for Ents, tree herders, wherever I went in the woods.

One very clear memory from that distant time is of two beautiful country roads, both dirt, running almost parallel to one another. One road was seasonal, with no houses along its entire length, while the other was dotted with perhaps nine residences. Both were lined with a magnificent variety of tall trees — beech, oak, hickory, maple, walnut — all rising upward and meeting to form the apex of a canopy over the roads. In summer they were lush green tunnels of coolness and autumn brought on the scintillating reds, yellows and golds, so it seemed one was traveling down the nave of a cathedral with the sun blazing through stained glass. To the young person I was, these roads were magical.

Then town road crews decided that the inhabited road needed to be widened to ensure better maintenance for its residents. That marked the end of one of my beautiful, magical tunnels. In my youthful naiveté, I pleaded with my parents to do something to stop this horrible destruction, but of course, there was nothing they could do, so the trees fell. The second road managed to survive intact for another few years before several people began to build homes along its length — then the trees came down. I often wondered if people chose to build on those roads because of the magical quality of the arboreal tunnels. If so, it was a sad irony that their desire to live within that beauty caused its destruction.

In my studies at university and beyond, I've come to appreciate how incredibly amazing and vital trees are to the entire biosphere. Trees have adapted to nearly every environment on the planet. There are even fossilized trees on Antarctica under the ice, indicative of a time when the continents were in a different position from now. Certain trees represent some of the oldest living organisms on the planet — second only to certain species of fungi.

The fact that trees — and plants in general — have been so successful colonizing and flourishing on land and in so many varied environments is because of a special symbiotic relationship established in the very distant geologic past with a certain group of fungi. These fungi live in the roots and root nodules of members of the plant kingdom and biochemically alter atmospheric nitrogen to make it accessible to the plants.

Then there's photosynthesis. Admittedly, it's far from the most efficient biochemical reaction ever seen, but it is what evolved and enabled plants to harness the photon energy in sunlight to produce carbohydrate food energy for use as food or other needed metabolic functions. Plants — trees — can feed themselves by making their own food within their own bodies. That's pretty astounding. That means that the tallest tree that ever lived, a Mountain Ash or Eucalyptus tree (*Eucalyptus regnans*), called the Robinson Tree in Tasmania, which grew to the height of 470 feet, was able to do so purely through the products of photosynthesis. Not only that, water, being essential to photosynthesis, is transported up these vast heights mainly by two simple mechanisms, both of which rely on the special properties of the water molecule known as cohesion and adhesion: capillary effect and transpiration pull.

We, and all other living organisms, would be in sorry shape if photosynthesis had not evolved, given that it's the source for about half the oxygen we breathe. And it is also the reason there has not been an over-abundance of carbon dioxide (until recently) in the atmosphere, because photosynthesis uses carbon dioxide to make glucose molecules from which plants synthesize all the other compounds they need. Thus it's apparent that trees are doubly important due to their photosynthetic property: they provide oxygen to the environment and remove carbon dioxide from the air.

Unfortunately, not all trees are created equal in terms of their effectiveness with carbon dioxide absorption, nor are all of them just as beneficial when it comes to mitigating climate change. Young, growing trees absorb more carbon dioxide than do mature trees, and lighter, broad-leafed trees will be more beneficial in reducing warming than will dark-needed conifers. Conifers absorb more ultraviolet radiation than deciduous trees, trapping heat near the earth's surface. Because they do not shed their needles, this happens year round. Deciduous trees, on the other hand, shed their leaves in the fall, leaving the ground open to the sunlight, which will be reflected back into the atmosphere when the ground is snow covered.

I feel very honored to know three exemplar foresters, all of whom practice an extremely low-impact, compassionate type of forest management. Two follow closely First Nation teachings with regard to nature and place. That is the attitude that should be cultivated whenever it is necessary to remove or manage trees for some reason. Trees aren't a commodity — they are homes to other organisms, sources of oxygen, sinks for carbon dioxide, sources of food for some animals — they are microcosms in and of themselves.

Which brings me to a question I have no clear answer for: If trees are of such critical importance to the health of the biosphere, why do they continue to be harvested, cut down, clear-cut (pick your own terms) in such vast numbers with seemingly no regard for the consequences? Of course, that is not the only threat leveled against the forests of the world. Global commerce has brought with it unwelcome and aggressive, non-native, invasive species that can destroy forests just as easily as a chainsaw. How do we balance our genuine need for wood and wood products — need, not want — with the valuable ecosystem and climate adaptation services trees provide? The answer to this question requires a paradigm shift. One way not to answer the question is to continue allowing corporations to define what sources of energy we can and can't use. Nor should we continue to allow federal agencies to occupy and take our land by force to destroy trees for a pipeline that may never be permitted to be built or a well pad to drill for climate-destroying methane. We must tear away the fabric of manipulation and deceit to take back decision-making power for ourselves, our children and our planet.

Recently, I suffered a real-time vivid flashback to the desecration of those two roads from my childhood, only this time it wasn't a road, it was a stand of sugar maples — a sugar bush — on a family farm in Pennsylvania. This time there was no public safety rationale to validate the felling of 90% of the active sugar bush, just a filing with FERC (Federal Energy Regulatory Commission) of a "Certificate of Public Need and Necessity" to build a pipeline to connect to another pipeline to take fracked gas from Pennsylvania either to Canada or to Massachusetts for export. The need and necessity was that of the corporation's stockholders. To make the situation even more darkly ludicrous, the pipeline would run through both Pennsylvania and New York, but the company had yet to receive all the necessary permits in New York and it is still uncertain whether those permits will be issued. The trees may have been cut for no reason.

Members of the family-owned maple syrup business tried to appeal to the pipeline company to circumnavigate the sugar bush, to no avail. They refused to sign a lease and so the property was taken by eminent domain. Activists gathered at the site hoping their presence would stop the cutting, but a federal judge put the fear of heavy fines and jail time into the equation. Accompanied by automatic assault rifle-toting federal marshals, the chainsaw crew arrived during the week of March first, and within two days had felled the entire lot of young, vibrant sugar maples — trees that had begun offering their sap for syrup several weeks before. Perhaps to further insult the earth and the spirit within, crews left the trees where they fell. The company's practice is simply to bring in a massive chipper and mulch the trees where they fall to "get them out of the way."

The sight of the armed federal marshals terrified a bus of school children as it drove past, though one brave young soul found the courage to yell out the window, "Stop cutting our trees!" We need thousands more just like him if the forests, the trees are to prevail. The answer all boils down to, Who decides? Do we allow some faceless corporate bureaucrat or political appointee to make decisions about our forests, our trees? Or do we, ourselves, take back that authority to regulate the woods and paths and glens that we know and love? I believe this is perhaps the only way to prevent further forest devastation and even more harmful impacts to the biosphere. There are no Ents in our world to be guardians of the forest. It's up to us.