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**Mother Earth vs. Mother Lode:
Native Environmental Ethos, Sustainability, and Human Survival**

Abstract

The development of an environmental ethos in modern times reflects Native wisdom and values, as well as recognition that traditional capitalism is a suicide pact, as Edward Abbey, said decades ago, “the ideology of the cancer cell,” random, all-consuming, and eventually lethal to its host. I will trace the development of this ethos and its adaptation in non-Native society as necessary for human survival. My primary exhibit of this adaptation will be increasing awareness of global warming and its intensifying perils for coming generations. Specifically, I will focus on the geophysical principle of thermal inertia, which describes how the system delivers evidence of temperature rise 50 years (in the air) and about 150 years (in the oceans) after the carbon-dioxide emissions that cause them. The geophysical system thus requires that our industrial and diplomatic systems respond according to the needs of the seventh generation, an accordance with Native traditional ecological ethos.

Introduction

The idea that Native peoples have something valuable to teach majority society has become quite popular. When I proposed to trace an eighteenth-century tutorial by the Haudenosaunee (Iroquois) for Benjamin Franklin forty years ago, most of my Ph.D. dissertation supervisors thought I was if not crazy, at least out of paradigm. Four decades after I startled my dissertation journey, during mid-December, 2015, I woke up in South India, having been invited to give a plenary address: “What Has Been Will Be: Native American Contributions to Democracy, Feminism, Gender Fluidity, and Environmentalism” at a Global Seminar on “Celebrating the Ancient/Contemporary Wisdom of Fourth World” hosted by the Department of English, Acharya Nagarjuna University, Guntur, India.

I was arguing that the “history of westward movement,” as it was parsed at that time, was much more nuanced than that. Discovery goes both ways in any encounter. So while Europe did not “discover” America, it was quite a discovery for Europe. For roughly three centuries before the American Revolution, the ideas that made it possible were being discovered, nurtured and embellished in the growing English and French colonies of North America, as images of America became a staple of European literature and philosophy. America provided a counterpoint for European convention and assumption. America became, for Europe and Europeans in America at once a dream and a reality, a fact and a fantasy, the real, and the ideal.

A detailed case has now been made that Native consensual democracy helped shape the thoughts of some of the United States’ founders. Decades after that, the founding mothers of American Feminism learned from Native matrilineal cultures. Today (witness the recent recognition of gay marriage by the U.S. Supreme Court) indigenous American acceptance of gender fluidity has become accepted as well. Environmental points of view (that all things are connected, for example) also have entered mainstream thought, but only after the perils of industrial pollution and alteration of the atmosphere (climate change) have become manifest. Even today, many Native American homelands remain resource colonies in the United States. One-third of the country’s “Superfund” sites (the worst pollution locations) are on American Indian reservations. Human domination of the Earth has been so thorough that even Pope Francis has called into question humanity’s subjugation of the Earth commanded by the Bible’s book of *Genesis*.

Environmental Ethos: Mother Earth or Mother Lode?

Native American philosophy often combines spiritual and environmental themes in ways that appeal to many non-Indian environmental activists today. A lively scholarly debate has flared regarding how Native Americans generally conceived of the Earth. Some ethno-historians maintain that Native Americans possessed little or no environmental philosophy, and that any attempt to assemble evidence to sustain a Native American ecological paradigm is doomed to failure because the entire argument is an exercise in wishful thinking by environmental activists seeking sentimental support for their own views. William A. Starna, professor of anthropology at the State University of New York (College at Oneonta), called the argument that Native Americans had an environmental ethic part of a recently concocted pan-Indian mythology. As he does in the face of evidence that the Iroquois helped inspire democracy, Starna asserts that modern Indian activists created the idea of Native environmentalism.

One wishes to be intellectually charitable, and not to unfairly alienate Starna, and others who share their beliefs about the recent, non-Indian genesis of the “mother earth” image. However, their assertions that Native Americans had no concept of mother earth before immigrant peoples fantasized it in their name during the twentieth-century environmental movement misses an astonishing amount of the historical record, not to mention Native American oral histories. References to “mother earth” in Native American cosmology are not scarce. They are abundant, according to George Cornell: “Native peoples almost universally view the earth as a feminine figure. The Mother provides for the sustenance and well-being of her children: it is from her that all subsistence is drawn. The relationship of native peoples to the earth, their Mother, is a sacred bond with the creation” (Cornell, 1990, 3).

Many Native cosmologies conceive of the sky (including the sun) as a masculine counterpart to mother earth, as a loving couple who are sometimes prone to many of the failings of human relationships between men and women. While the Christian *Bible* commands subordination of the earth (in *Genesis*), humankind in many native cosmologies places human beings in a web of interdependent relationships with all facets of the Creation. In this web, all things are animate, even objects, such as the pebbles under one's feet, which European languages characterize as lifeless. In the web of Native American experience, the landscape of life envelops *all* of reality.

European-Americans have been hearing Native Americans characterize the earth as mother since shortly after the Mayflower landed. Massasoit, who invited the Pilgrims to the first Pilgrim Thanksgiving dinner, faced European ideas of land tenure with a few questions of his own: "What is this you call property? It cannot be the earth, for the land is our mother, nourishing all her children, beasts, birds, fish, and all men. The woods, the streams, everything on it belongs to everybody and is for the use of all. How can one man say it belongs only to him?" (Weaver, 1996, 10)

Those who dismiss a Native ecological ethic as the invention of modern-day hippies and pan-Indianists are missing something much deeper than mere mentions of "mother earth" in nineteenth-century primary sources. They are missing the fundamental nature of many Native American traditions, the terms in which Native thought conceptualizes the land and the life it nurtures. To Roger Dunsmore, 1997, Western thought creates hierarchies and categories that do not exist in Native American thoughtways. The very cognitive map for conceptualizing life is different, as illustrated in recent time by the example of "...A Wasco Indian logger (a faller), who quit logging and sold his chainsaw because he couldn't stand hearing the trees scream as he cut into them" (Dunsmore, 1997, 7). This is a worldview in which "[T]he whole world is perceived and valued. Even the flies" (Dunsmore, 1997, 15). A sense of a web of life connecting all things framed the cognitive map of Chief Joseph when he said, "The Earth and I are of one mind" (Dunsmore, 1997, 39).

Sometimes a belief in earth as mother is reflected in Native American languages. In the Algonkian Ojibwe language, for example, "The words for Earth and the vagina, respectively *aki* and *akitun*, share the same root" (Paper, 1990, 14). Each Native people in the Americas has its own origin story, but many share common elements. The characterization of the earth in the feminine, using kin terminology, is one of these. Native American perspectives on the environment often were virtually opposite those of many early settlers, who sought to "tame" the "wilderness." Most Many Native Americans saw themselves as enmeshed in a web of mutually complementary life. As Black Elk said: "With all beings and all things, we shall be as relatives." (Black Elk, 1953, 105.)

References to indigenous affection for nature permeated the thoughts of Luther Standing Bear, who wrote: "The Lakota was a true naturalist -- a lover of Nature. He loved the earth and all things of the earth, the attachment growing with age. The old people came literally to love the soil and they sat or reclined on the ground with a feeling of being close to a mothering power....In talking to children, the old Lakota would place a hand on the ground and explain: "We sit in the lap of our mother. From her, we, and all other living things, come. We shall soon pass, but the place where we now rest will last forever....Our altars were built on the ground and were altars of thankfulness and gratefulness. They were made of sacred earth and placed upon the holiest of all places -- the lap of Mother Earth" (Standing Bear, 1978, 192, 194, 200).

Standing Bear defined his people's relationship to everything else on Earth, writing that in the native view everything is animate -- "possessed of personality," he said. He compared the world to a library, with "the stones, leaves, grass, brooks...birds, and animals as its books." (Hughes, 1983, 80) Many times, wrote Standing Bear, The Indian is embarrassed and baffled by the white man's alienation from nature, as reflected in allusions to nature in such terms as "crude, primitive, wild, rude, untamed, and savage" (Standing Bear, 1978, 196). To Standing Bear, many whites imagined Native Americans as savages to "salve...[their] sore and troubled conscience[s] now hardened through the habitual practice of injustice" (Standing Bear, 1978, 251).

Standing Bear, who watched large-scale Anglo-American immigration change the face of the Great Plains, contrasted European-American and Native American conceptions of the natural world of North America: "We did not think of the great open plains, the beautiful rolling hills, and winding streams with tangled brush, as 'wild.' Only to the white man was nature 'a wilderness' and only to him was the land 'infested' with 'wild' animals and 'savage' people. To us it was tame. Earth was bountiful, and we are surrounded with the blessings of the Great Mystery. Not until the hairy man from the east came and with brutal frenzy heaped injustices upon us and the families we loved was it "wild" for us. When the very animals of the forest began fleeing from his approach, then it was for us that the 'Wild West' began" (Standing Bear, 1978, 38)

Standing Bear was a severe critic of the whites' attitudes toward nature. He said he knew of no species of plant, bird, or animal that had been exterminated in America until the coming of the white man. For some years after the buffalo disappeared, there still remained huge herds of antelope, but the hunter's work was no sooner done in the destruction of the buffalo than his attention was attracted toward the deer. "The white man considered natural animal life just as he did natural [Native American] life upon this continent, as 'pests,' wrote Standing Bear. "Plants which the Indian found beneficial were also 'pests.' There is no word in the Lakota vocabulary with the English meaning of this word" (Standing Bear, 1978, 165).

Like Black Elk, Tecumseh, Black Hawk, and others, Standing Bear invoked the image of mother earth in his writing. Luther Standing Bear's use of the earth-mother image is particularly striking when placed next to similar language used by Black Elk which has been passed to us through accounts by Neihardt, Epes-Brown, and others. Unlike accounts attributed to Black Elk, Tecumseh and Sea'thl, however, the use of the image by Standing Bear raises no questions of interpretation, because he wrote in English acquired at the Carlisle Indian School.

[begin extract]

There is a great difference in the attitude taken by the Indian and the Caucasian toward nature, and this difference made of one a conservationist and the other a non-conservationist of life. The Indian, as well as other creatures that were given birth, were sustained by the common mother -- earth. He was therefore kin to all living things and he gave to all creatures equal rights with himself....The...Caucasian....Bestowing upon himself the position and title of a superior creature, others in the scheme were, in the natural order of things, of inferior position and title; and this attitude dominated his actions toward all things. The worth and right to live were his, thus he heartlessly destroyed. Forests were mowed down, the buffalo exterminated, the beaver driven to extinction and his wonderfully constructed dams dynamited....the white man has come

to be the symbol of extinction for all things natural to this continent (Standing Bear, 1978, 166).

[end extract]

Standing Bear also was a critic of European-American society generally, in words appreciating nature and his forefathers and foremothers that recall those of Sea'thl (Seattle), three-quarters of a century earlier. He also evoked the same sacred tree of life that was familiar to Black Elk:

[begin extract]

The white man does not understand the Indian for the reason that he does not understand America. He is too far removed from its formative processes. The roots of the tree of his life have not yet grasped the rock and soil. the white man is still troubled with primitive fears; he still has in his consciousness the perils of this frontier continent....He shudders still with the memory of the loss of his forefathers upon its scorching deserts and forbidding mountain-tops. The man from Europe is still a foreigner and an alien. And he still hates the man who questioned his path across the continent (Armstrong, xi-xii).

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An Environmental Ethos

In addition to being rooted in their homelands, Native Americans maintain historical, spiritual bonds to the land that foster attention to environmental threats. Long-time fishing-rights activist Billy Frank, Jr. said that this connection places protection of environment and its role in sustaining human and all other life “at the top of our priority list” (Russo, 2013, 235). “When we say the Okanagan [Native] word for ‘ourselves,’ said Jeanette Armstrong, “We are actually saying the ones [that] are ‘dream’ and ‘land’ together”” (Grossman and Parker, 2012, 38). Chief Willie Charlie has said: “Mother Earth is crying, and we need to pay attention to what she is saying” (Grossman and Parker, 2012, 45-46).

Commented activist and author Kurt Russo, who works with the Native American Land Conservancy: “Our courage to acknowledge this crisis, our conviction to stand up for unborn generations, our connection to nature and, through nature, to each other, and our resilience – as a family, as a species, as peoples – will determine whether we hear her cry for the agony of extinction or stand idly by and bear witness to a great dying” (Russo, 2013, 236).

“Indigenous communities are, in general, in a unique position given their history and knowledge to understand and respond to the crisis,” commented Russo “[They] are, in general, more informed and engaged than the majority of Americans or their political and corporate leaders....As place-based communities of inter-related families with historical consciousness, indigenous peoples are also more resilient, and thus able to face, rather than deflect or deny, the true magnitude of the crisis [that] will have long-lasting and potentially catastrophic consequences for every life-form and human community” (Russo, 2013, 234).

Daniel Wildcat, Yuchi member of the Muscogee Nation of Oklahoma and a professor at Haskell Indian Nations University, Lawrence, Kansas, speaking at the University of Colorado-Boulder's Center of the American West on September 29, 2011 said that, until recently, Native people were members of tribes, not nation-states, with a relationship to nature that defined species on which people depended for survival in familial terms, as relatives, not as exploitable resources. The bison on the Great Plains, salmon among the Coast Salish, and corn across much of today's North America (Turtle Island), was "the central relative we acknowledged" (Berry, 2011).

Indigenous environmental activism (including visceral opposition to development of extractive industry) stems from long historical experience with resource colonization, which works in synthesis with a spiritual ethos that invests animus in everything natural. While European religions often restrict their blessings to humanity, many Native Americans interpret "all my relations" to mean *all* of nature. -- animate and not. This respect for nature is fundamental and enduring, and at the root of traditional Native American responses to economic development. Definitions of "balance" are couched in this context, counterpoising protection of "mother earth" with an immigrants' ethos that seeks a "mother lode," rooted in *Genesis* ("Go forward, multiply, and subdue the Earth"). Naomi Klein, in *This Changes Everything: Capitalism and the Climate* (2014:183) writes of industrialists who "view...nature as a bottomless vending machine."

Awareness of economic development's costs also animates the non-Indian environmental movement. "This, then, is the nemesis that modern Western man, together with his imitators...has brought upon himself by following the directive given in the first book of *Genesis*," wrote the great English historian Arnold Toynbee. "That directive has turned out to be bad advice, and we are beginning, wisely, to recoil from it" (Toynbee, 1973, n.p.).

Energy Colonization Today

Until the late twentieth century, expanding European empires (including the westward-moving United States of America) shared ideologies and economic models that viewed nature as a mother lode of resources without limit. The writings of Karl Marx are as bereft of respect for natural limits as those of Adam Smith. By about 1970, however, limits on expansion were becoming obvious, and so was new-found respect for an indigenous view of Earth as mother, with necessity for reciprocity.

Even as Native American environmental ethics inform the direction of environmental philosophy, however, many Native nations have become resource colonies of fossil-fuel companies, and toxic dumps for other corporate enterprises. Pollution nearly inevitably follows resource exploitation. Native peoples in the United States today often live on ruined, exhausted land, suffering toxic consequences. *Fully one-third of the Superfund sites declared by the Environmental Protection Agency in the United States are on Native lands.* Many reservation residents are dealing with illnesses due to the use of their lands for several decades as industrial dumps and mine sites, suffering the acute effects of exposure to dioxins, PCBs and other persistent organic pollutants in several Native communities, most acutely in the Arctic, where Native consumption of sea life (their traditional diet) has been curtailed and Inuit mothers are sometimes warned not to breast-feed their infants. Mothers' milk may be toxic.

Environmental provocations afflicting Native American peoples in the United States range from uranium to kitty litter – from the toll of uranium mining on the Navajos, to the devastation wrought by dioxin, PCBs, and other pollutants on the agricultural economy of the Akwesasne Mohawk reservation in northernmost New York State. As with the Akwesasne Mohawks, some of the most serious problems span international borders. The Yaquis, whose homelands span the U.S.–Mexican border, have been afflicted with some of the same pesticides as the Mohawks on the U.S.–Canadian border.

Some of the environmental problems faced by indigenous peoples in the United States strain one's sense of credulity. Witness the Eskimos of Point Hope, Alaska, who have learned that their land had once been proposed as the site of a new harbor to be created with nuclear weapons. The harbor was never created, but the Point Hope Eskimos still found themselves hosting uninvited nuclear waste. Other Alaskan Eskimos have found their reindeer rendered inedible, polluted with a number of heavy metals. The Western Shoshone of Nevada have come to call themselves "The most bombed nation on Earth," a reference to a neighboring test range for nuclear weapons and (more recently) a now-stalled proposal to open a national waste-uranium repository at Yucca Mountain.

Canada, which often prides itself on an allegedly humane civil-rights record regarding indigenous peoples, has become a major source of indigenous environmental contamination and conflict. The Innu of Labrador have been afflicted with sulfide mining, aluminum smelting, and noise pollution from squadrons of military aircraft. Some of the most intense resource exploitation in Canada takes place in remote locations, such as among the Lubicon Cree of northern Alberta, whose lands were so inaccessible in 1900 that treaty makers completely missed them. Today, roads have opened their lands to massive oil drilling and logging. The lands of the Cree in Quebec have been scarred by widespread dam building near James Bay that has contaminated large areas with toxic methyl mercury, as well as other pollutants. Uranium mining has decimated the Dene in Canada's Northwest Territories much as it has ravaged the Navajo in the Southwestern United States. The catalogue of indigenous environmental issues in Canada spans the range of resources -- from hydropower, to diamonds, uranium, gold, silver, and sulfide, aluminum, oil, and natural gas. Several first nations in Alberta been scarred by the development of oil from tar sands.

Global Warming and Natural Limits

Today, the most pervasive and urgent illustration of mother-lode thinking's unsustainable legacy is global warming, as levels of greenhouse gases rise to dangerous levels. The fossil fuel age dawned just as the United States became the Earth's most powerful economy, built across an expanding territory with surging immigration (mainly, but not entirely, from Europe). Exploitation of coal, followed by oil and natural gas between the mid-nineteenth and early twentieth centuries introduced machine labor representing the equivalent of a billion horses (or 3 billion human slaves). Not coincidentally, perhaps, human slavery became economically as well as politically obsolete. As an illustration of just how much human labor was transferred to fossil-fueled machines between 1800 and 1970, consider that the number of human hours of labor going into an acre of wheat declined from 56 to 2.9. For an acre of cotton, the same figure declined from 185 to 24. The raising of food has become as

mechanized as the manufacture of anything else: seven calories of energy (mainly fossil fuels) by 2014 was required to produce one calorie of food (Johnson, 2014, 14, 19, 39). This revolution in energy generation increased production of heat-retaining greenhouse gases in Earth's atmosphere.

As part of Earth's natural cycle, the greenhouse effect (which scientists call "infrared forcing") is very necessary to life on Earth. Without it, the planet's average temperature would be minus 2 F. It is the added warming provoked by human combustion of fossil fuels that causes a problem. Like chocolate, a little is a good thing; too much is toxic to the system. Fossil fuels provide us comfort and convenience, and altering their use in a fundamental way presents the challenge of the century – and, most probably, for several centuries to come. Unless we wean ourselves from fossil fuels, and do so quickly, the *real* problems will begin after the middle of the twenty-first century. Sir John Houghton, one of the world's leading experts on global warming, told the London *Independent*: "We are getting almost to the point of irreversible meltdown, and will pass it soon if we are not careful" (Lean 2004, 8).

The due bills for our use of fossil fuels is now being served. By 2015, scientists had figured that "burning the currently attainable fossil fuel resources is sufficient to eliminate the [Antarctic] ice sheet" (Winkelmann, et al., 2015). This study was directed at Antarctica only, but all other ice would melt at the same time. How much time may be required to produce an ice-free planet? No one really knows. At present rates of increase, the actual burning of fossil-fuel reserves may take place within a thousand years. Complete melting of the ice, factoring in delays of thermal inertia, may require several thousand years. The momentum of this inertia would be irreversible, however.

Global warming is a deceptively backhanded crisis in which thermal inertia delivers results a half-century or more *after* our burning of fossil fuels provokes them. Our political and diplomatic debates react *after* we see results. Political inertia plus thermal inertia thus presents the human race and the planet we superintend with a challenge to fashion a new energy future *before* raw necessity – the hot wind in our faces – compels action. Global warming is dangerous because it is a sneaky, slow-motion emergency, demanding that we acknowledge a reality centuries in the future with a system of individual, legal, and diplomatic reaction that reacts in the past tense. Ken Caldeira, a researcher at Stanford University's Carnegie Institute of Science one of the study's four co-authors, told Chelsea Harvey of *The Washington Post*. "The legacy of what we're doing over the next decades and the next centuries is really going to have a dramatic influence on this planet for many tens of thousands of years" (Harvey, 2014).

In 2016, the atmospheric level of carbon dioxide breached 400 parts per million in all areas, at all seasons. Levels of methane and nitrous oxides, the two other principal greenhouse gases, also reached record levels by substantial margins. During 2015 and 2016, world temperatures, stoked by El Nino conditions, surged to a new record as well, above 2014's previous high. "We're moving into uncharted territory at a frightening speed," said World Meteorological Organization Secretary General Michel Jarraud (Warrick, 2015). Radiative forcing of these gases had increased 36 per cent since 1990.

During December, 2015, January, 2016, and February 2016 (meteorological winter), temperatures not only set world records, but did so by the largest margins (anomalies) since record-keeping began, about 1880. Record temperatures continued, month by month, through at least July of 2016, the hottest month on record world-wide.

February's global temperature was 1.35 degrees C. above the 1951-1980 average, exceeding the previous record anomaly set in January, 1.13 degrees C., according to NASA's Goddard Institute for Space Studies. December, 2015 was 1.11 degrees C. above the same set of averages. Higher latitudes were the warmest: "Much of Alaska into western and central Canada, as well as eastern Europe, Scandinavia and much of Russia were at least 4 degrees Celsius (roughly 7 degrees Fahrenheit) above February averages, according to NASA/GISS," according to Weather.com (February 2016).

As radical rises in worldwide temperatures startled scientists early in 2016, James Hansen and 18 co-authors published a study in the open-access journal *Atmospheric Chemistry and Physics* (from the European Geophysical Union), making a case that several meters in sea-level rise could take place within a century, not the several hundred years projected by many scientists. "My interpretation is that this is the beginning," Hansen said. "And it's one or two decades sooner than in our model" (Gillis, 2016). "I think almost everybody who's really familiar with both paleo and modern is now very concerned that we are approaching, if we have not passed, the points at which we have locked in really big changes for young people and future generations," Hansen said (Mooney, 2016). Limiting global temperature rise to 2 degrees C. (3.6 F.) over pre-industrial levels, as recommended by recent diplomatic efforts such as the 2015 Paris accords, will not prevent climate-driven changes that will force evacuation of many coastal cities, Hansen and colleagues warned.

The science is evident on this matter, but the mother-lode mode of thinking still enjoys something of a lock on the political rhetoric of the United States' Republican Party. Witness the party's 2016 nominee, Donald Trump, dismissing the entire body of evidence in one word ("Hoax!"), as he argued for increased mining of coal to restore jobs in an industry that even the capitalistic marketplace has decided is obsolete.

Dawn of the Anthropocene

Increases in levels of greenhouse gases in Earth's atmosphere are part of a broader, intensifying, trend in a geological epoch now widely called the Anthropocene, in which human activities have been the primary force altering the planet, "sufficiently to produce a stratigraphic signature in sediments and ice that is distinct from that of the Holocene epoch" (Waters, et al., 2016). The Anthropocene actually began tens of thousands of years ago, with the first use of fire and deforestation, but intensified with the advent of fossil fuels about 1800 C.E. By 1950, humanity's role in shaping of the Earth system was dominant, as population and industrialization exploded.

The controlling role of humanity includes not only infusion of carbon dioxide, methane, and other greenhouse gases into the atmosphere at levels previously unknown in the natural system after the Pliocene, 2 to 4 million years ago (with consequent increases in temperatures) but also rising levels of several artificial pesticides and herbicides, lead, fly ash and other forms of air pollution, fertilizers, plastics, and radioactivity, due to testing of nuclear weapons. Nuclear radioactivity from past tests will be detectable in ice and sediments for at least 100,000 years. The amount of plastic manufactured each year equals the weight of the entire human race. Most of it decays only slowly, and ends up in landfills or the oceans. As human population has increased, extinction rates of other species have risen at an accelerating rate. "Unlike with prior subdivisions of geological time, the potential utility of a formal

Anthropocene reaches well beyond the geological community,” commented Waters and colleagues in *Science* (2016). “It also expresses the extent to which humanity is driving rapid and widespread changes to the Earth system that will variously persist and potentially intensify into the future.”

Several well-known climate scientists, writing in *Nature Climate Change*, said in 2016 that our decisions on energy use during the next century will lock in changes in Earth’s environment for millennia to come. “The next few decades offer a brief window of opportunity to minimize large-scale and potentially catastrophic climate change that will extend longer than the entire history of human civilization thus far,” wrote the 22 climate researchers, led by Peter Clark, from Oregon State University (Mooney, 2016).

The scientists said:

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Most of the policy debate surrounding the actions needed to mitigate and adapt to anthropogenic climate change has been framed by observations of the past 150 years as well as climate and sea-level projections for the twenty-first century. The focus on this 250-year window, however, obscures some of the most profound problems associated with climate change. Here, we argue that the twentieth and twenty-first centuries, a period during which the overwhelming majority of human-caused carbon emissions are likely to occur, need to be placed into a long-term context that includes the past 20 millennia, when the last Ice Age ended and human civilization developed, and the next ten millennia, over which time the projected impacts of anthropogenic climate change will grow and persist. *This long-term perspective illustrates that policy decisions made in the next few years to decades will have profound impacts on global climate, ecosystems and human societies — not just for this century, but for the next ten millennia and beyond*” (emphasis added). (Clark, et al., 2016).

[end extract]

Raise the amount of carbon dioxide, methane, and other heat-retaining gases in the atmosphere, and temperatures eventually rise, melting ice, and raising sea levels. Human beings have an affinity for the oceans, and a large proportion of us live on or near coastlines. Glance at a map of the world and point out the large cities that will be in peril as sea levels rise a few feet – Shanghai, Kolkata, London, New York City, Miami, and many others. Increase the proportion of greenhouse gases in the atmosphere and change its circulation patterns, expanding convection patterns that meteorologists call “Hadley Cells,” which causes declines in rainfall over some areas, expanding deserts. Harvests fail, and people go hungry. We are adapted to the climate, as are all of Earth’s flora and fauna. When the climate changes, everything changes.

A change the balance of trace gases in the atmosphere requires a fundamental change in the ways that energy is obtained and used by everyone on Earth – the ways in which we transport ourselves, heat and cool our homes, and manufacture nearly everything we use in daily life. Such a change creates debate and dissension as scientists’ warnings become more ominous, as the Intergovernmental Panel on Climate Change (IPCC) warns that burning even a fraction of proven fossil-fuel reserves will damage the ecosystem beyond repair. Scientists now anticipate that three-quarters of

known fossil-fuel reserves must remain in the ground if warming is to be kept at a tolerable level – requiring companies that exploit these reserves to eventually write down their asset values to zero. The mother-lode model is failing in the marketplace as Peabody Coal, the biggest miner of that dirty fuel on Earth, goes bankrupt as wind power flourishes – because it costs less!

Even as wind and solar advance, however, politicians flush with oil-company cash deny that global warming exists. Many other people have come to realize that building a sustainable future is not a luxury. The mother-lode mentality does not anticipate conditions seven generations hence, as many Native paradigms instruct. The Native paradigm is more in line with science's understanding of thermal inertia, by which the atmosphere reacts to today's greenhouse-gas emissions a half-century from now on land, and more than that in the oceans. The behavior of thermal inertia requires that we anticipate the future, and not merely react to present conditions.

More people are realizing geophysical limits. Today we are witnessing an energy-system paradigm shift. For example (one of many), in 2016, Iowa's electrical generation passed half wind. At the same time, technological change, as always, generates fear of unemployment. Paradoxically, such changes also always generate economic activity. A change in our basic energy paradigm during the twenty-first century will not cause the ruination of our economic base, as some deniers of climate change believe. Appreciation of sustainable models will enhance the economy.

The proportion of carbon dioxide in the atmosphere continues to rise worldwide, however, a trend that has not changed since the beginning of the industrial revolution. That level reached 400 parts per million in 2015, as high as it was in the Pliocene, 2 to 4 million years ago, when sea levels were 100 feet higher and temperatures 4 to 6 degrees F. warmer. This is a key figure, and one that indicates how much change has yet to be experienced because of thermal inertia, within the next few centuries. This cake is already being baked. In terms of geologic time, the change is coming about remarkably quickly. Carbon dioxide is a trace gas, a tiny proportion of the atmosphere; at 400 p.p.m., it comprises only one-tenth of one third of one per cent of the air. It is, however, a remarkably efficient retainer of heat, and it is now increasing at a rate more quickly than at any time in the geophysical record, hundreds of millions of years.

The price of loading the air with carbon dioxide and methane continues to rise. The IPCC in 2014 projected that by 2100 rising sea levels and storm surges probably will swamp some of Asia's largest cities, among them Mumbai, Bangkok, Kolkata, Dhaka, Shanghai, Ho Chi Minh City and Rangoon; In Europe, London will be at risk, and New York City, New Orleans, Miami, and others will succumb to seas that rise in storm surges. The IPCC also projects that a rise in atmospheric carbon dioxide level to 430-480 parts per million will raise acidity levels in the world's oceans to a level by 2100 that will imperil nearly everything that grows in a shell, from phytoplankton (the basis of the maritime food web) to corals, many of which are also in trouble due to rising water temperatures. Carbon dioxide is being injected into the oceans far faster than nature can neutralize it. Seawater is usually slightly alkaline, at about pH 8.2. The pH of the oceans has fallen 0.1 during industrial times. The scale is logarithmic, so a 0.1 change means a 30 per cent increase in the concentration of hydrogen ions. Under a business-as-usual scenario, the pH may fall by roughly 0.5 by the year 2100.

Conclusion: For the Seventh Generation

Even as surviving indigenous peoples and their cultures are pulverized by the industrial machine – and even as the ecologically unsustainable nature of this ferocious juggernaut becomes more obvious – the colonizers (who flatter themselves with the descriptor “first world”) continue to learn, absorb, and change, even in the act of conquest. The important question eventually may become whether these dominant forces can change fundamentally enough, and quickly enough, to avoid a climatic apocalypse.

James E. Hansen, long-time director of NASA's Goddard Institute for Space Studies, and the first person to discuss global warming in a scientific context (Hansen, *et al.*, 1981,957-966) observed natural limits as early as 1981. “The bottom line is this: business-as-usual, if it continues for even another decade will be disastrous for the planet. We can have a stable climate, clean air, and an unpolluted ocean. And clean energies yield good jobs. It is up to the public to make sure that we get onto a path that stabilizes climate and allows all the creatures of Creation to continue to thrive on this planet” (Johansen, 2007, 7). The effects of climate change are not theoretical, and they are not speculative problems that can be handed off to future generations. Economic activity around the world, as well as the lives of animals and plants, are being affected today by rising temperatures. This is not merely a matter of a few degrees on the thermometer, but of alterations in an environment that sustains all of us.

Greenhouse gases have no morals, loyalty, nor party affiliation. Carbon dioxide is not having a debate with us. It merely retains heat. Thus, in 50 years, when our children are grandparents, the planetary emergency in which we are now tasting the first course will be a dominant theme in everyone's life, unless we act now. Within a decade or two, thermal inertia will take off on its own, portending a hot, miserable future for coming generations.

Can a system predicated on growth adapt to a sustainable world in which having less “stuff” will be preferable? How can we adjust our desires to fit a new world in which more is not always better? Will our basic values change along with our energy sources?

A major – perhaps *the* major question facing an Earth and its human denizens in a time of worldwide environmental crisis is: can capitalism change its character? A sustainable environment can make good business. Witness the growth of alternative forms of energy. Can capitalism factor respect for the Earth that sustains us all into its calculus of development? If so, it may be a positive force in a new, sustainable world. If not – if it retains attributes of the cancer cell – then ultimately, our progeny will inherit an exhausted, poisoned world.

Can capitalism, with its appetite for pell-mell (and often environmentally destructive) growth, survive in a new world in which geophysical reality demands that we restrain our demands upon the Earth? Are we ready to operate with an accounting system that brings us all to account for the toll that our activities exact on the Earth and its atmosphere? Can we fashion a system in which polluting the atmospheric commons is defined as a criminal act for which sizable fines are levied and people serve time in prison? Such a system would re-define some present-day free choices (e.g. to trash the commons) as illegal acts. At that point, with indigenous advice, we will be truly respecting mother Earth.

Because thermal inertia serves us with the impact of today's carbon-dioxide emissions 50 to 150 years in the future, the geophysical system *requires* that we heed traditional ecological knowledge to anticipate the effects of our actions on the seventh generation. To do otherwise virtually guarantees that future generations will inherit a scorched, desolate world. The survival of human peoples, as well as the plants and animals upon which we depend, *requires* planning seven generations hence. This is *not* an optional luxury. This is basic survival behavior for a sustainable world – and, it goes without saying, one very important example of how indigenous ideas inform the thoughts and actions of everyone. Chief Sitting Bull of the Hunkpapa Lakota said a century and a half ago: “Let us put our minds together and see what life we can make for our children” (Archambault, 2016).

Let us ask the tough questions. When it comes to sustainability, what *really* works? What *really* matters? In the long run, can a capitalistic system change its character to embrace standards of performance not predicated on growth; ones that improve the quality of life rather than sheer production?

Let us explore the ideas that will make tomorrow work.

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Brief Biography

Bruce E. Johansen is Frederick Kayser Professor of Communication and Native American Studies at the University of Nebraska at Omaha, where he has been teaching and writing since 1982. He has authored 44 published books, the most recent *Up from the Ashes: Nation-building at Muckleshoot* (2014) and *Eco-Hustle! Global Warming, Greenwashing, and Sustainability* (2015). He holds the University of Nebraska Award for Outstanding Research and Creative Activity (2016), the highest honor awarded by the university.

Johansen writes frequently about environmental subjects, including *The Encyclopedia of Global Warming Science and Technology* (2 vols., 2009), *Global Warming in the 21st century* (3 vols., 2006), *The Global Warming Desk Reference*

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Johansen's first academic specialty was the influence of Native American political systems on United States political and legal institutions; his best-known books in this area are *Forgotten Founders* (1982) and *Exemplar of Liberty* (with Donald A. Grinde, Jr.), published in 1991. Johansen has described the present-day debate over this issue in *Debating Democracy* (1998), and *Native American Political Systems and the Evolution of Democracy: An Annotated Bibliography* (Greenwood, 1996; volume 2, 1999).

He also writes as journalist in several national forums, including the *Washington Post* and *The Progressive*, with letters to the editor in *The Atlantic*, *New York Times*, *National Geographic*, *Wall Street Journal*, et al. He was co-editor of the *Encyclopedia of American Indian History*, a 4-volume set (ABC-CLIO, 2007), as well as a 2-volume Praeger *Handbook of Contemporary Native American Issues* (2007). He recently also wrote *The Global Warming Combat Manual: Serious Solutions for a Sustainable World* (Praeger, 2008). His *Eco-Hustle! Global Warming, Greenwashing, and Sustainability* will be published in 2015.

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