

# Front Row Centre at The End of the World Show

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*by Bruce Mason*

## The Warning

*“We must recognize, in our day-to-day lives and in our governing institutions, that Earth with all its life is our only home.”*

**L**ate in 2017, I found an article entitled *World Scientists’ Warning to Humanity: A Second Notice*, published 25 years after the first warning from the *Union of Concerned Scientists* in 1992. The *Second Notice* came bearing 15,364 scientist signatories from 184 countries.<sup>1</sup>

While I have been following the state of our environment for many years, it was refreshing to see our dire situation expressed so neatly and succinctly in three pages. Professor William Ripple and his fellow authors summarize the salient issues of the environmental state of the world, and offer the world a short to-do list providing a simple and sane plan for what is desperately needed.

The *1992 Warning* stated that “Human beings and the natural world are on a collision course” and cautioned us that we might “so alter the living world that it will be unable to sustain life in the manner that we know.” We were warned about air pollution, depletion of groundwater, signs of fisheries collapse, loss of soil productivity, destruction of forests, the irreversible loss of species and more. We were given a list of things to do, including managing our resources and stabilizing population, which was 5.4 billion in 1992.

*Flash forward.* If things had gone well, we would not have needed a second notice.

The *2017 Warning* article introduces the *Sixth Extinction*: “Moreover, we have unleashed a mass extinction event, the sixth in roughly 540 million years, wherein many

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<sup>1</sup> I am not a scientist, and this is a casual, not an academic essay. I am grateful for the excellent work of many scientists and other professionals. I endorsed the *Warning* article as a (non-scientist) individual. <http://www.scientistswarning.org/individual-endorsement-form/>

current life forms could be annihilated or at least committed to extinction by the end of this century.”

This *Second Notice*, issued by the *Alliance of World Scientists*, finds few areas of progress and disturbing 25-year trends such as significant increases in global carbon emissions and average temperatures, the loss of millions of acres of forestland (e.g., for agricultural use), a reduction in the amount of freshwater available per capita, large reductions in the numbers of mammals, birds, fish, and flying insects, reduced harvests of fish, more ocean dead zones, and more.

And world population in 2017 was up about 35% to 7.5 billion.

The *Second Notice* also includes a list of 13 practical steps humanity can take to achieve sustainability, such as creating habitat reserves, restoring habitats, reducing food waste, shifting to plant-based diets, improving education, improving green technology and decreasing fossil fuels, reducing fertility rates and working toward a sustainable human population.

These are not easy steps to take, and would likely be met with considerable resistance from many quarters, but what is the alternative? Should we just give up, accepting the Sixth Extinction as inevitable? The cause is human action and the remedy is human action of a different kind. But are we too late?

“Soon it will be too late to shift course away from our failing trajectory, and time is running out.” We do not have another 25 years to shift to a sustainable course.

What is driving this failing trajectory?

“We are jeopardizing our future by not reining in our intense but geographically and demographically uneven material consumption and by not perceiving continued rapid population growth as a primary driver behind many ecological and even societal threats.”

The primary drivers, the proximal causes of virtually all of our environmental problems, are clearly overpopulation and overconsumption.

To properly manage our environment, repair the damage, and build a sustainable world, we need to address these causes. Appreciating that this is perhaps the most difficult challenge facing our leaders, I began to refer to this as *the hard problem*.

I concluded that the following three statements are now indisputable:

**I     The science is solid – the *Sixth Extinction* is real and is happening now.**

We are clearly beginning to see the effects of climate change, biodiversity loss and many other environmental and economic catastrophes, harbingers of the end of our modern world and the loss of much or most of life on Earth.

## **II The proximal causes are human overpopulation and overconsumption.**

Unless we can deal with *the hard problem* (the causes that are driving the Sixth Extinction) with a prompt and effective strategy, our feeble efforts to remedy ancillary difficulties will be of as little value as swabbing the decks as the Titanic goes down.

## **III Nature does not care how difficult our human problems are.**

Nature mercilessly and inexorably obeys its own natural laws of physics, chemistry, and biology, and is oblivious to our political and economic problems. To refuse to take the necessary swift and effective action because it is “too hard” is simply giving up.

It is easy to find lots of reasons why we *cannot* do something.

Let's focus on what we *can* do to prevent the Sixth Extinction.

Who is the most likely person in Canada to be actually doing something about the hard problem and the Sixth Extinction?

*On January 15, 2018, I wrote to Canada's Minister of Environment and Climate Change to ask about the hard problem, and to pose **the hard question**:*

**Does Canada have, or intend to have, a strategy to directly address the broad issues of overpopulation and overconsumption?**

# Population

*“You don’t need a scientist to know what’s causing the sixth mass extinction”*

– Paul R. Ehrlich, *The Guardian*, 2017

**W**hen I was born, in 1947, I was the “2,453,293,575<sup>th</sup> person alive on Earth, the 75,385,982,213<sup>th</sup> person to have lived since history began,” or so a BBC website informed me in 2011. Let’s say, in 1947, there were less than 2.5 billion people. As I write this in the fall of 2018, *Population Matters* estimates humanity to number about 7.6 billion.<sup>2</sup> So our global population has ***more than tripled in one lifetime***. If the egregious burgeoning of world population and rapacious gobbling of the Earth’s resources continues at a rate that is impossible to sustain, this could be the end of the world as we know it.

That’s why I call it the End of the World Show. *What a show it has been and continues to be!* I am grateful to have had a ***Front Row Centre*** seat at ***The End of the World Show***. Those who arrived recently may want to call it ***Standing Room Only at the End of the World Show***.

Isaac Asimov wrote some excellent essays on the overpopulation issue, including ***The Power of Progression***, 1969. Using the data and growth rate of the time, he calculated that by the year 2554 the entire Earth’s surface, 200,000,000 square miles of oceans, deserts, mountains, polar regions, forests, and farms – everywhere – would be as densely populated as the island of Manhattan at lunch hour. This and similar arguments provide an airtight case for concluding there must be an absolute limit to the human population on Earth. Like bacteria multiplying in a Petrie dish, our natural tendency is to reproduce until something stops us, like a lack of food or water. Asimov spells it out:

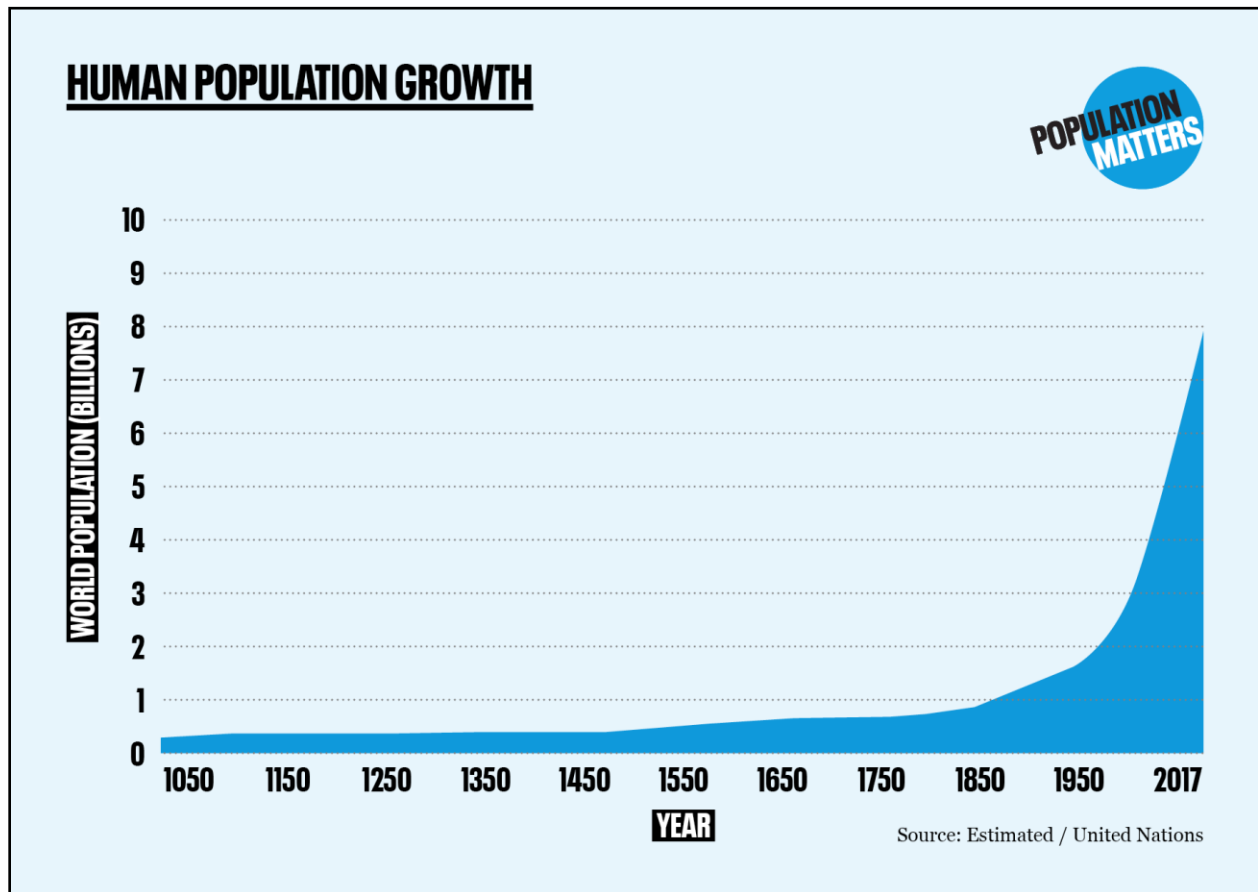
If we do nothing but what comes naturally, the population increase will be brought to a halt by an inevitable rise in the death rate through the wars and civil rioting that worsening human friction and desperation will bring; through the epidemics that crowding and technological breakdown will bring; and through the famines that food shortage will bring.

His argument is still sound, five decades later, except the global population has doubled.

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<sup>2</sup> More precisely, at 1:02 PM, EST, Dec 17, 2018, the counter read: 7,667,416,000.

Below is a snapshot of the population of the world over a 1000 year period, a *Hockey-Stick* graph. (Infographics courtesy of *PopulationMatters.org*.)



Does this graph disturb or even alarm you? From a population of a few hundred million a thousand years ago, turning dramatically upward with the Industrial Revolution, we may reach nine point something billion of us (or more by other estimates) by 2050. How can the world possibly sustain such a gigantic increase on the same-size planet?

It's not as if a concern about too many people is new. In 1798 Thomas Malthus wrote *An Essay on the Principle of Population*, clearly dated, but on the right track, e.g.: "It is an obvious truth, which has been taken notice of by many writers, that population must always be kept down to the level of the means of subsistence." (p. vii)

In the 1960s, when there were about three point something billion of us, Paul Ehrlich laid out the basic argument clearly in *The Population Bomb*, 1968. An example: "The causal chain of [environmental] deterioration is easily followed to its source. Too many cars, too

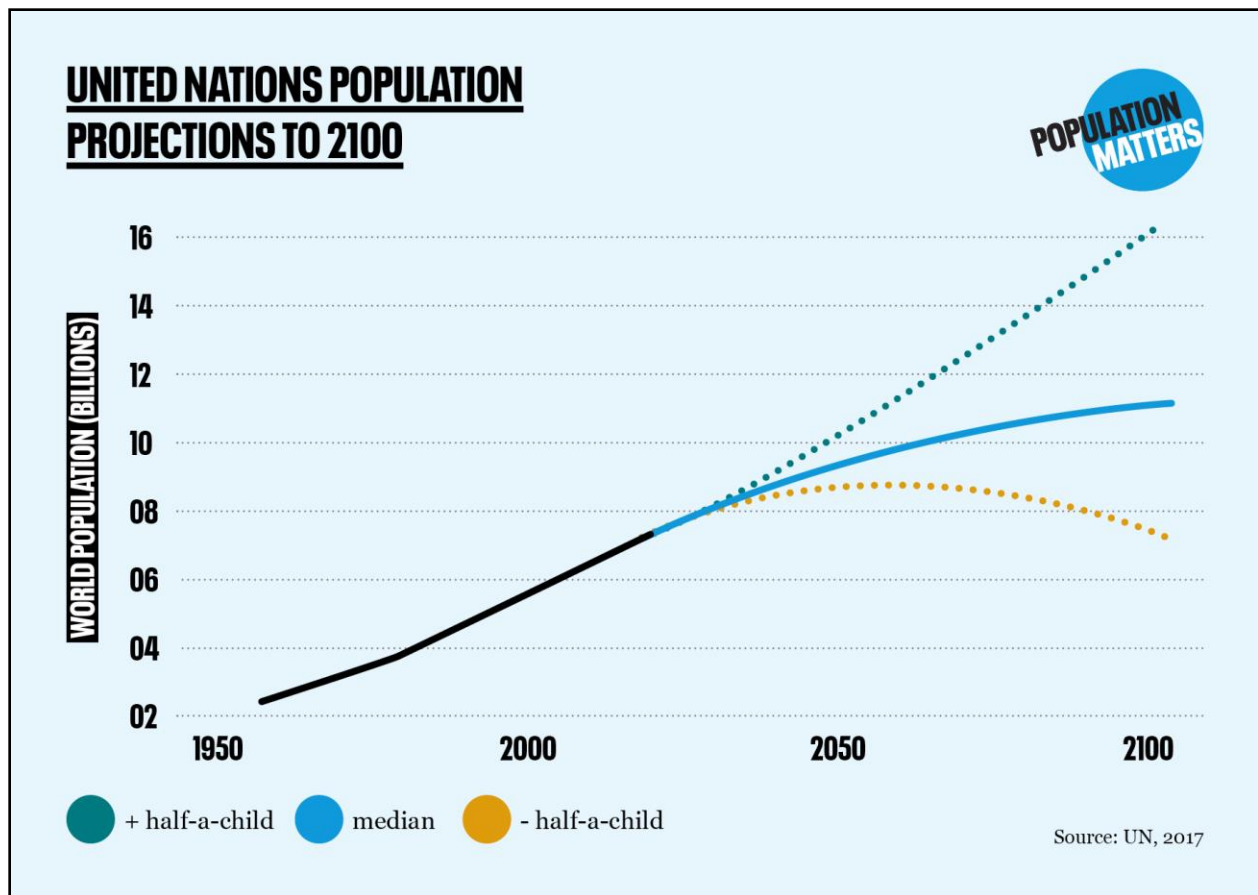
many factories, too much detergent, too much pesticide, ... too much carbon dioxide – all can be traced easily to *too many people*.” (p. 66-67)

Dennis Meadows *et al* used computer modelling to estimate *The Limits to Growth*, 1972, looking at population growth, resource depletion, food production, and many other variables. How well did their results stand up? A study from the University of Melbourne, 2014, states, “The Limits to Growth ‘standard run’ (or business-as-usual, BAU) scenario produced about forty years ago aligns well with historical data that has been updated in this paper.” The authors aim “to forewarn of potential global collapse – perhaps more imminent than generally recognised – in the hope that this may spur on change, or at least to prepare readers for a worst case outcome.” (p. 3, 5) A similar study, *Limits Revisited: A review of the limits to growth debate* by Jackson and Webster, 2016, stated that “There is unsettling evidence that society is tracking the ‘standard run’ of the original study – which leads ultimately to collapse.” (p. 17) For a good summary, read *The Guardian* article, *Limits to Growth Was Right*.

When will the proverbial feces start to hit the fan in a big way? No one knows for sure, but here is a good estimate. In 2009, Sir John Beddington, Chief Scientific Adviser to the U.K. government, warned that the world faces “**a perfect storm**” by 2030. Referring to a growing population and rising consumption, he states: “It is predicted that by 2030 the world will need to produce 50 per cent more food and energy, together with 30 per cent more available fresh water, whilst mitigating and adapting to climate change. This threatens to create a ‘perfect storm’ of global events.” (This is consistent with the recent IPCC report, warning us that we may only have 12 years to avoid a major catastrophe. [2018 – 2030] See the *Climate Change* section, below.)

With global population predicted to pass the 8 billion threshold in the early 2020s, and increasing food, water and energy demands, the perfect storm may indeed strike by 2030.

Are we too late? If we do virtually nothing, the answer is clearly yes. There *are* solutions if implemented on a massive scale. *Population Matters*, whose patrons include Jane Goodall and Sir David Attenborough, has a strategy to deal with population growth, (similar to the *Warning* article) including making family planning widely available, educating women and girls, and women’s empowerment. It may take some time to change people’s attitudes on some of their fundamental beliefs. But even small changes can make a huge difference, such as an average decrease in family size of half a child. Unfortunately an increase of half a child per family can make things much worse. (See the graph below.)



You might well ask, just how many people *can* we have on Earth, an *optimum population size*, without getting into some kind of environmental trouble?

An excellent question, but there may be no single, exact answer. It depends on how much each of those optimal people consume.



# Consumption

*“Buy land, they’re not making it anymore.”*

– Mark Twain

**M**y letter to the Minister referred to the closely related issues of Population and Consumption as the conjoined twin elephants in the room. I proposed a simple equation that expressed their relationship as:

**Total Consumption = Consumption per capita X Total population.**

Total consumption is inseparable from total population, as the total of what we consume of fossil fuels, fast food, and fast fashion depends on both individual consumption and total number of people consuming it.

On the population issue, some claim it is not a problem, since people will naturally have smaller families as their income rises. Probably most of the increase in income will be spent consuming more stuff.

A similar point is made with considerable more data, detail and rigour in the paper *A good life for all within planetary boundaries*, in which the authors state, “We find that no country meets basic needs for its citizens at a globally sustainable level of resource use.” Poorer countries fail to meet basic needs, and richer countries exceed sustainable level of resource use.

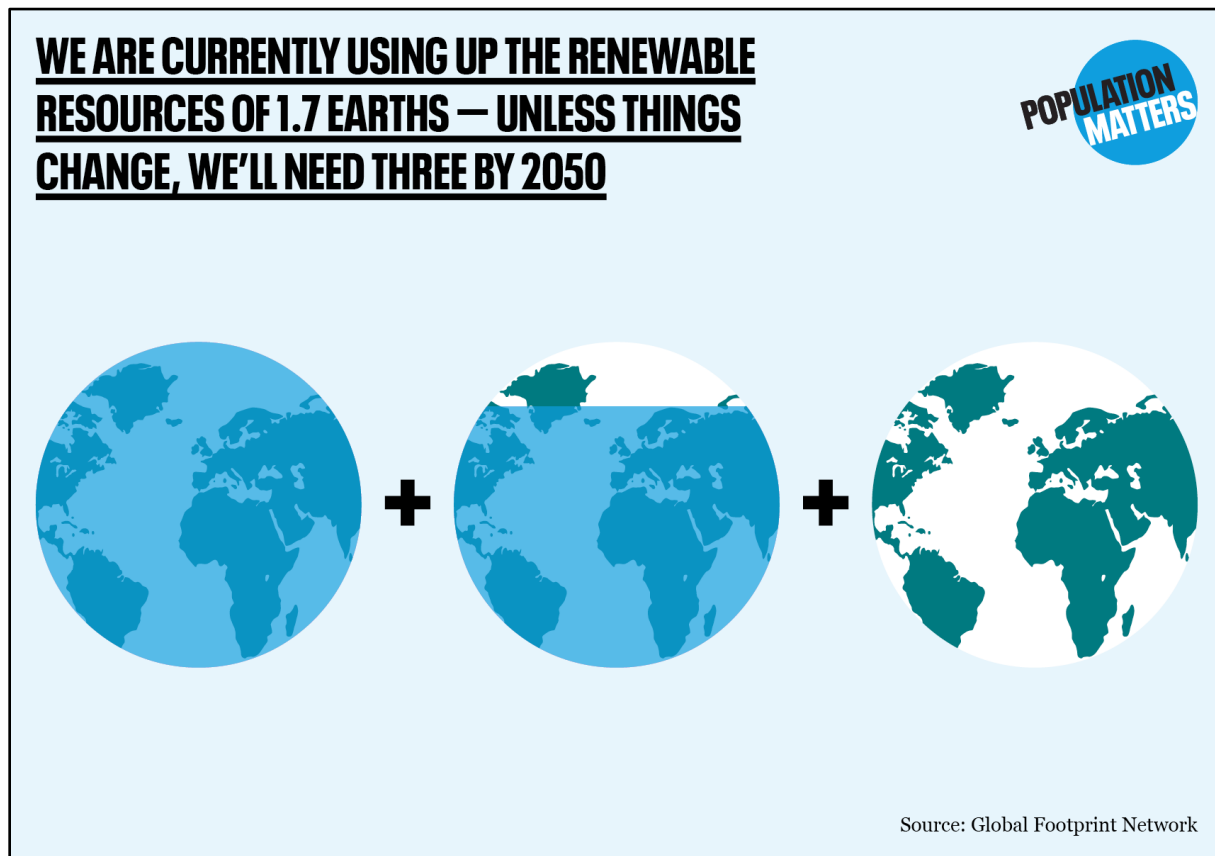
Paul Ehrlich makes the point abundantly clear in his article *You don’t need a scientist to know what’s causing the sixth mass extinction*. I quoted the following for the Minister: “The more people there are, the more products of nature they demand to meet their needs and wants: timber, seafood, meat, gas, oil, metal ores, rare earths and rare animals to eat or to use for medicinal purposes.”

In search of something quantitative and specific, I turned to the *Global Footprint Network*, which tracks our use of natural resources against the maximum the Earth can provide. “*The Ecological Footprint* measures the amount of biologically productive land and sea area an individual, a region, all of humanity, or a human activity that compete for biologically productive space. This includes producing renewable resources, accommodating urban infrastructure and roads, and breaking down or absorbing waste products, particularly carbon dioxide emissions from fossil fuel. The Footprint then can be compared to how much land and sea area is available.”

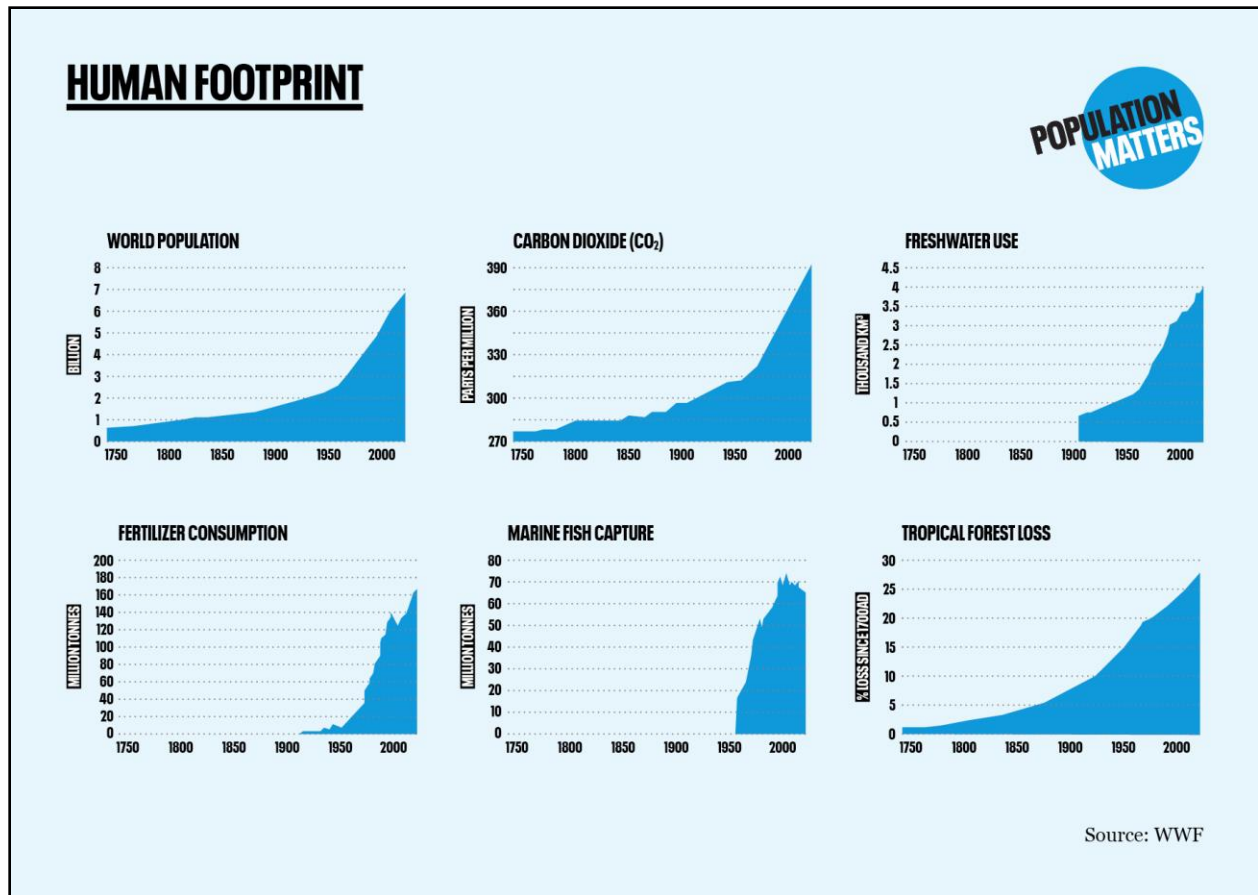


(To grossly oversimplify, it compares our demand versus nature's supply.)

In its simplest expression, they refer to *Earth Overshoot Day*, when humanity's demand on nature exceeds the Earth's supply for one year. For 2018, that day was August 1. If this were a financial budget, we would have run out of money by August 1, and would be deeply in debt for the rest of the year. So now we are deeply in ecological debt, because *we are using 1.7 times the maximum resources the Earth can provide.*



See the illustration below for examples of how, as human population increases, so do carbon dioxide levels, freshwater use, fertilizer consumption, marine fish capture, and tropical forest loss. (See also *Warning* article graphs.)



Mark Twain was right about land, and they're *still* not making it anymore. So the carrying capacity of the Earth stays the same, or declines with overuse and abuse, but population and GDP keep growing and we just want more and more.

What madness drives us to consume more than we can possibly use or need and at the expense of despoiling the planet that is the source of our life?

When I was an engineering student in the 1960s, a mantra for our management courses was this: *The purpose of the corporation is to maximize profit in the long run.* (Ditto partnerships or other forms of business organization.) That's what it's all about? Nothing to do with providing truly necessary goods and services of best quality, nothing about providing a human workplace that benefits the community, nothing about working with the natural world toward sustainability? Just make as much money as you can for the shareholders, and all will be well. What about the human use of human beings?

It felt like this kind of thinking was taking over the world, and creating a *Golem*, an artificial excuse for a human that has only one response for any query: *MORE MONEY.*

Without limit and without end. I think I was hoping for some kind of fantasy economics, a means to noble ends, where people mattered more than money.

Years later, I discovered just that, in a collection of essays by E.F. Schumacher called *Small Is Beautiful: A Study of Economics as if People Mattered*. His essay *Buddhist Economics* is one of the best ever. Here he explains that work is not merely a means to profit, but an avenue to self-development for the worker, joining with other people in a common task, and producing goods and services for a “becoming existence.” In other words, “Right livelihood.” Somehow we have mistaken **maximum** production and consumption, the highest possible amount, for **optimal** production and consumption, the best or most appropriate. Today some economists, like York University’s Peter Victor, argue that “our global economy must operate within planetary limits to promote stability, resilience and wellbeing, not rising GDP.”

Speaking of GDP, would it be such a horror to learn to live with less if it would help save the living planet? What’s so awful about decreasing our consumption? A quick reality check: measured in constant, year 2000 US dollars, Canada’s Real GDP per capita was \$50,262 in 2016, \$17,664 in 1960. We got along quite nicely in 1960.

If we can think of optimum production and consumption, we can also consider what would be an optimum population for a world with a healthy, sustainable environment, not simply the maximum number that can be kept alive long enough to make more people.

By February 10 I had received no response from the Minister of the Environment and Climate Change. I seized an opportunity to buttonhole my Member of Parliament, explained the situation, gave him another copy of the letter, and described past frustrations of getting no response or meaningless boilerplate from an underling who appeared not to have read the letter. He assured me that he would place this copy into the Minister’s hands and “encourage her to review your comments carefully.”

# Climate Change

*Thirty years ago we could have saved the planet.*

– Losing Earth: The Decade We Almost Stopped Climate Change,  
New York Times Magazine, 2018

**C**limate change gets most of the environmental attention these days, perhaps because it is the most imminent threat and/or because we all understand, in a general sense, the basic terms, like temperature, heat, fuels and carbon. We can only touch on this gigantic topic, so let's start with the latest big news.

On October 8, 2018, the *Intergovernmental Panel on Climate Change (IPCC)* issued a special report, *Global Warming of 1.5°C*, [above pre-industrial levels] which the BBC called a “Final call to save the world from ‘climate catastrophe’.” Compared to the limit of 2.0°C agreed to in Paris, 2015, the good news is that global sea levels, extreme heat waves, Arctic sea-ice loss, and coral reef declines would be much less severe. The bad news is that the steps required to meet the limit of 1.5°C include: reduce CO<sub>2</sub> emissions 45% from 2010 levels by 2030, to zero by 2050, 85% global electricity to be provided by renewables, coal use near zero, a chunk of land the size of Australia is needed for energy crops, and global net zero emissions by 2050. The very bad news is that this is estimated to cost about \$2.4 trillion annually, and requires our leaders to accept the reality and move immediately to implement the recommendations.

This is going to require all of us to give up some things. If we increase our per capita consumption of some of our favourite things, like cars and roast beef, things will just keep getting worse. If you or I consume more beef, if you or I use more fossil fuels for our cars or jet planes, the level of CO<sub>2</sub> goes up. If we both do, it goes up twice as much.

Would this whole problem be less severe and easier to manage if there were fewer people consuming less stuff? *Yes!* Is there a real solution that does *not* address the number of humans and how much we each consume? *No!*

Things would be bad enough if the CO<sub>2</sub> level stopped rising now, putting the brakes on climate change. What did one of the smartest people of all time say about that?

*“A more immediate danger is runaway climate change.*

*A rise in ocean temperature would melt the ice caps and cause the release of large amounts of carbon dioxide. Both effects could make our climate like that of Venus with a temperature of 250 degrees centigrade (482 degrees Fahrenheit.)”*

– Stephen Hawking, *Brief Answers to the Big Questions*, 2018, p. 159.



My travel photo shows a building in Amsterdam, 1973, propped up by large poles and braces, yet still functioning, with people shopping and working inside. It looks like it is still possible to save the building with proper new supports – steel I-beams and such – if the work is done swiftly and carefully.

The building's "tipping point" may occur if it suddenly collapses, which would transform a fine old building into a pile of rubble. No one knows precisely when the tipping point will occur until it has tipped. While it is still standing there may be enough time. But time is running out.

How much CO<sub>2</sub> can be added to the atmosphere from burning fossil fuels or deforestation, how much methane (a very potent greenhouse gas) can be released from the melting permafrost, how many fractions of a degree can global temperatures rise before we are into the runaway climate change scenario that Hawking describes above? That is a big unknown, and the only way to know when a tipping point will tip is to keep pushing it until it tips. We definitely do not want to do that.

The article, *Trajectories of the Earth System in the Anthropocene*, often referred to as the *Hothouse Earth* article, described the risk that "a 2°C warming could activate important tipping elements ... raising the temperature further to activate other tipping elements in a domino-like cascade that could take the Earth System to even higher temperatures (Tipping Cascades)." Some dominoes that could cascade include "permafrost degradation, loss of Arctic sea-ice, and boreal forest dieback." (p. 3, 4)

Deforestation is a major contributor to climate change. "Where might the tipping point be for deforestation-generated degradation of the hydrological cycle?" ask the authors of *Amazon Tipping Point*. "We believe that the sensible course is not only to strictly curb further deforestation, but also to build back a margin of safety against the Amazon tipping point, by reducing the deforested area to less than 20%, for the common sense reason that there is no point in discovering the precise tipping point by tipping it."

We are already at a global temperature of about +1°C above pre-industrial levels, and the effects are clear and measureable. Who, in their right minds, would want to push our luck to a limit of +1.5°C or even +2.0°C?

Runaway climate change has likely happened before on Earth. The greatest catastrophe the Earth has endured in its entire history, the Permian-Triassic extinction event, AKA “the Great Dying,” occurred 251 million years ago, with 96% of all species lost due to enormous volcanic eruption. See the articles, *Burning Fossil Fuels Almost Ended All Life on Earth*, and *Timeline Of Mass Extinction Events On Earth*.

“The Great Dying” was the third major extinction. We are now beginning the sixth.

On April 30, I wrote to the Minister a second time, via registered mail. I reiterated the hard question, summarized the main points, and offered my assistance:

**Are there obstacles to responding that I am unaware of?  
Would it be helpful if I were to talk with you or a staff  
member directly, in person or by phone? Is there any  
other way in which I can help?**

*There's a reason it's not called answer period.*

An old joke, referring to the House of Commons' *Question Period*



# Biodiversity

*The world is mad and we're all going to die.*

– Lou Gubrious anticipates the Sixth Extinction, *The Telomere Conspiracy*, 2011

**J**ust to be sure we are on the same page, when we use the term “extinction” we mean “dying out or termination of a species” and the term “species” includes “*Homo sapiens*, (Latin: “wise man”) the species to which all modern human beings belong.”<sup>3</sup> That means you and I and 7.6 billion other *Homo sapiens* and our descendants could all die.

Elizabeth Kolbert’s landmark book, *The Sixth Extinction: An Unnatural History*, landed the number one spot on *The Guardian*’s list, *The 100 best nonfiction books*. As has happened five times previously in Earth’s history, a majority of life on Earth may become extinct. The most famous extinction happened about 65 million years ago. She states: “...scientists around the world are now monitoring the next mass extinction, possibly the biggest devastation since an asteroid wiped out the dinosaurs. With this difference: the impending cataclysm is... us.”

Biodiversity includes all of life on Earth, from the abundant and obvious life in the forests and oceans to the legions of unsung biological heroes, including those in the human gut, and all the microbes, fungi, insects and worms that keep the soil healthy, enabling healthy food crops for healthy humans.

What is putting all of us at risk of going extinct in the *Sixth Extinction*? (*Emphases added in the following.*)

The scientist authors of the *1992 Warning* referred to “The irreversible loss of species” and the benefits we would lose with them. The *2017 Warning* article provides updated data on species loss, and states: “By failing to adequately limit **population growth**, reassess the role of **an economy rooted in growth**, reduce greenhouse gases, incentivize renewable energy, protect habitat, restore ecosystems, curb pollution, halt defaunation, and constrain invasive alien species, humanity is not taking the urgent steps needed to safeguard our imperilled biosphere.”

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<sup>3</sup> <https://www.britannica.com/science/extinction-biology>  
<https://www.britannica.com/topic/Homo-sapiens>



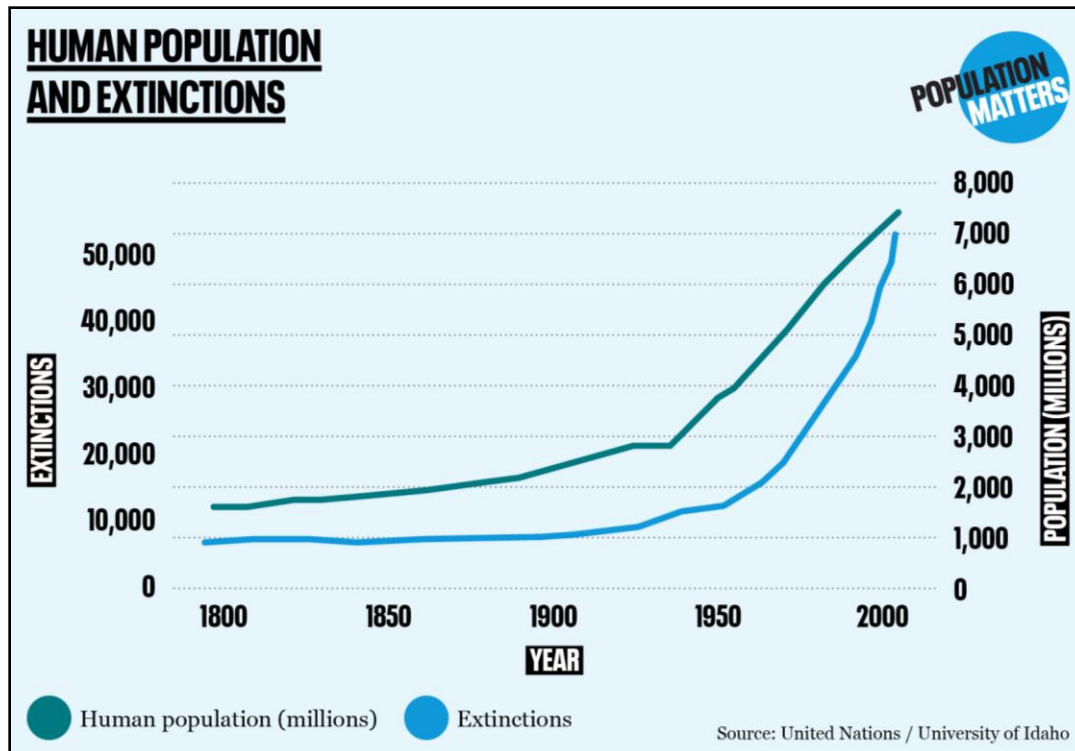
The *WWF Living Planet Report 2018 (Summary)* states, “We are living through the Great Acceleration – a unique event in the 4.5 billion-year history of our planet – with **exploding human population and economic growth driving unprecedented planetary change through the increased demand for energy, land and water**... This is so great that many scientists believe we are entering a new geological epoch, the *Anthropocene*.” This extinction is happening right now. The **WWF (2018 full report) *Global Living Planet Index, 1970 to 2014***, shows: “Average abundance of 16,704 populations representing 4,005 species monitored across the globe declined by 60%.”

A UN-backed report (**IPBES**, below) notes that the risks posed by biodiversity loss should be considered on the same scale as those of climate change.

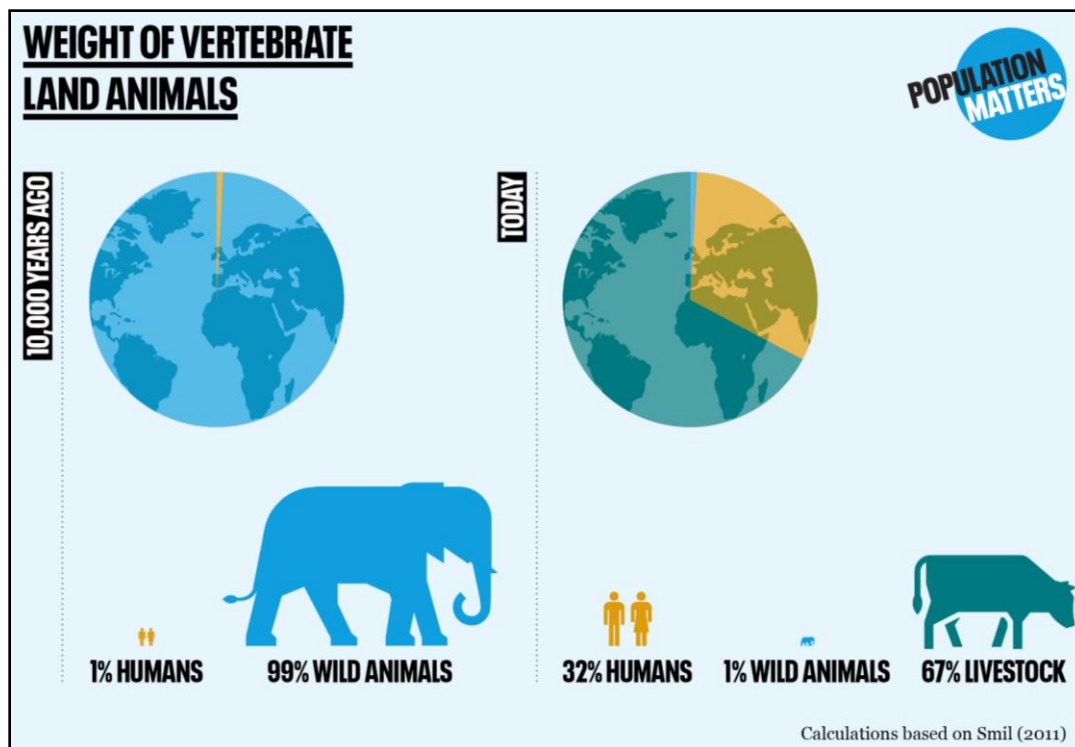
*The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)* highlights the role of land degradation. “Worsening land degradation caused by **human activities** is undermining the well-being of two fifths of humanity, driving species extinctions and intensifying climate change. It is also a major contributor to mass human migration and increased conflict,...

Human activities? What could these be? “**High and rising per capita consumption**, amplified by **continued population growth** in many parts of the world, can drive unsustainable levels of agricultural expansion, natural resource and mineral extraction, and urbanization – typically leading to greater levels of land degradation.” (p. 1, 3)

Do we need any more evidence that overpopulation and overconsumption are the primary drivers, the proximal causes of the *Sixth Extinction*? How many thousands of scientists does it take to convince the naysayers?



As human population rises, so do extinctions.



10,000 years ago, humans were 1% of land animals, by weight.  
 Today, humans and their livestock are 99%, wild animals 1%, by weight.

One solution in particular stands out.

A brilliant and challenging proposal by the eminent scientist E. O. Wilson in his book, *Half Earth: Our Planet's Fight for Life*, would require enormous change and superlative international cooperation. He says, “to save biodiversity, we need to set aside about half the Earth’s surface as a natural reserve.” He includes land, oceans – the whole surface – half of which would be carefully selected as a permanent reserve.

This idea is supported by Cristiana Paşca Palmer (UN biodiversity chief,) who told *The Guardian*, “This is mega-urgent.... We’re losing species at a rate never seen before. This is eroding the systems that sustain life on Earth, including human life. It’s less visible than extreme weather but it’s killing us for sure.” “We have to turn the Titanic from hitting the iceberg and we only have two years,... We need to inject a sense of urgency into political decision-making.”

On July 16, I wrote to the Governor General, with the faint hope that someone of her accomplishments and intellect might be interested in the fate of the Earth.

**As an engineer, you have to have a clear understanding of the gravity of the situation.**

**As a mother, you have a priceless stake in our collective future.**

**As Governor-General, you have a better chance than I of getting a “clear, strong and affirmative response” from our government.**

I actually did get a response about a month later, presumably from a staffer who was directed to reply in a certain manner, and he did thank me for sending the G.G. the *Warning* article. I wrote back, asking if the Governor General had actually read the letter, and if I should abandon all hope of getting a reply that answers the question.

Months later, still nothing.

***“We were just following orders.”***

– a feeble defence that has fallen out of favour since the Nuremberg Trials

## In Brief

***“Insanity runs in my family. It practically gallops.”***

– *Arsenic and Old Lace*, Joseph Kesselring, 1941

**I***ndulge me for a moment*, please, while we cover a lot of ground quickly. Many serious environmental concerns could be discussed at length and their causes found in the same elephants in the same room, plus a cornucopia of everyday human folly.

- Water has been called “the key environment issue of the century,” and as glaciers melt and wells must be drilled deeper to suck up what’s left of the aquifers, global water shortages loom large. “With more than 7.5 billion people on the planet, and the population projected to top 10 billion by 2050, the situation is set to grow more urgent.” Referring to California’s Central Valley, water expert Jay Famiglietti states “...declining groundwater quality and subsiding land are signals that the aquifers are being pushed past their tipping point, losing more water than can be replenished in a year.”
- Ocean acidification is sometimes called “climate change’s equally evil twin,” and for good reason: “it’s a significant and harmful consequence of excess carbon dioxide in the atmosphere...” affecting marine life, notably coral reefs; compare this to a small drop in your blood’s pH, which could mean anything from a panic attack to death.
- As climate, economies, and other stressors worsen, some countries have already adopted extreme measures to discourage illegal immigration. The policy of India on its border with Bangladesh is *shoot to kill*.
- *New Scientist*, 2015, reports we have about 60 years of harvests left due to soil degradation. So now in 2018 there are now about 57 years left.
- My motivation to recycle every scrap of paper and to continually turn off light bulbs wanes when I hear stories of completely bonkers, self-indulgent waste, such as “***The house with one MILLION Christmas lights.***”
- One of the most unsettling sentences I have ever read: “... I can’t help reflect on a simple fact: during my lifetime, and that of my cohort, about half of the non renewable resources of the planet will have been used. Gone, forever.” (Richard Heinberg, 2007, ***Peak Everything***, p. 159.) A broad statement, but I am not aware of any general contradictory evidence.

- What may be the most frequent cause of death due to climate change gets little attention: heat- and humidity-related heat stroke or other heat-related death.
- Could we actually feed the current 7.6 billion a “good diet”? The “global agricultural system currently overproduces grains, fats, and sugars while production of fruits and vegetables and protein is not sufficient to meet the nutritional needs of the current population.”
- “Industrial agriculture is heavily reliant on fossil fuels, for fertiliser and pesticides, as well as for cultivating, processing and transportation. ...it takes 10 calories of fossil-fuel energy to produce one calorie of food energy,” which is unsustainable without Gargantuan fossil-fuel use. (“10 calories” is an average, and the ratio varies considerably with the type of food.)
- You may have heard this one already: “By 2050, there will be more plastic than fish in the world’s oceans,” as measured in pounds. A linear comparison is “Five bags filled with plastic for every foot of coastline in the world.” In a related story, “Microplastic contamination has been found in tap water in countries around the world” How much of *you* is plastic?
- Our incredibly “successful” global transportation system is a major contributor to the likelihood of a deadly global pandemic, such as another Ebola outbreak. “On any given day, millions of people around the world are moving around on planes, trains, boats, trucks and automobiles, some from places where undiscovered viruses are festering in the bloodstreams of wild beasts and fowls. An average of 10 million people a day take to the skies; 3.5 billion passenger flights a year.”
- It’s not just the mountains of smelly garbage fouling our planet, the documentary ***Trashed*** warns us of the accompanying toxins, and “the poisonous consequences of littering the planet with substances that, like bedbugs and French mimes, are almost impossible to get rid of.”
- Where have all the insects gone, the little critters that really run the world, including the honey bees and other pollinators that fertilize so many of our crops? Can you still recall the many bugs you had to clean off your windshield after a drive in the country? Whatever happened to all those little guys?
- “Fast fashion has become more prevalent; clothing is produced on shorter timeframes with new designs appearing every few weeks to satisfy demand for the latest trends, but with this comes increased consumption and more waste. It has been estimated

that there are 20 new garments manufactured per person each year and we are buying 60% more than we were in 2000. Each garment is worn less before being disposed of and this shorter lifespan means higher relative manufacturing emissions.”

*Then there are the brilliant ideas that are offered as solutions, but suggest there are those who would go to any lengths to avoid even mentioning the P-word or the C-word.*

- If we were to repopulate the wilds of Siberia with herds of woolly mammoth, they might trample the earth enough to slow the release of methane and prevent the carbon time bomb from going boom.
- China’s South-North Water Diversion Project is the most expensive infrastructure enterprise in the world, and which *The Economist* describes as doing “more harm than good,” and diverting “attention from China’s real water problem: waste and pollution.” Are they transferring water or sewage?
- (Re California wildfires, 2018) “Don’t blame wildfires on climate change – it’s environmentalists’ fault... US interior secretary Ryan Zinke blames environmentalists for the devastation in California and calls for an increase in logging.”
- “Build Earth Some Sunglasses” – the strategy is to put “a ring of sunlight-scattering particles or micro-spacecraft in orbit around the equator. The idea is that the ring would reduce the amount of solar radiation hitting the planet and counteract some of the warming induced by greenhouse gases.” The cost could be in the trillion\$ – could anything go wrong with these geo-engineering ideas?
- “Fill the Air With Sulfur” – we could “mimic nature and inject a bunch of sulfur into the atmosphere to counteract global warming. One problem with this plan is the increased amount of acid rain this would generate. Another is that sulfur would have to be regularly injected into the atmosphere to keep up the cooling, or global warming would pick up right where it left off.”
- “Plant Fake Trees” – “Engineers have proposed building a forest of 100,000 fake trees to soak up carbon emissions and combat global warming. The trees – machines really – would suck carbon from the air through filters and then store it.” Presumably there is more profit to be had with fake trees than natural trees.
- *And my personal Canadian favourite:* “Federal carbon tax rebates will exceed the cost for most people affected.” Does anyone truly expect this to reduce our carbon

consumption? I, for one, expect to make a nice little profit from the tax rebate, which I plan to squander on postage.

*Does anyone notice the conjoined twin elephants in the room?*

*Or should that be the conjoined twin woolly mammoths?*

On October 19, I wrote to Canada's Prime Minister, c.c. the Minister and my M.P., to enquire if he or his staff could assist me in getting a response from the Minister, or whoever could address the hard question, adding that "While I would prefer a 'clear, strong, and affirmative response' I would appreciate even a murky, feeble, and negative response rather than simply being ignored."

On November 15, I did get a letter from my M.P, a good fellow who actually responded, but I could not expect him to speak on behalf of the Minister. On December 6, a letter arrived from a special assistant in the Prime Minister's Office saying my letter had been forwarded to the office of Minister of Environment and Climate Change.

As of late December 2018, I have had no response from the Minister.



## Why

*“I fear evolution has inbuilt greed and aggression to the human genome.”*

Stephen Hawking, to the BBC News, 2017

**T**he *proximal* causes of our environmental disaster are runaway population growth and consumption, overshooting the Earth’s limits to growth. Why do we behave this way? What are the underlying *distal* causes?

Global warming is not the sort of thing that shouts *DANGER!* to our brain cells. Harvard psychologist Daniel Gilbert explains what we are programmed to respond to. Terrorism fits the model quite nicely, but gradually progressing environmental catastrophe does not.

- We would readily react to a human face as the culprit. “If climate change had been visited on us by a brutal dictator or an evil empire, the war on warming would be this nation’s top priority.”
- We need an outrageous moral issue to respond to, like eating kittens. Then, “...millions of protesters would be massing in the streets.”
- The threat has to be immediate. “The brain is a beautifully engineered get-out-of-the-way machine that constantly scans the environment for things out of whose way it should right now get,” like a fast baseball about to hit our eyes.
- “Environmentalists despair that global warming is happening so fast. In fact, it isn’t happening fast enough” for us to detect and react to it.

At the risk of oversimplifying Professor Gilbert’s explanation, I conclude that we behave as we do because that’s the sort of behaviour that helped us survive in an earlier world. In a word, that’s “**evolution**.”

Much has been written on our inability to respond effectively to climate change, although the *American Psychological Association* notes, “There is, however, significant variability in people’s reactions to climate risks, much of which is mediated by cultural values and beliefs.” Fortunately, some of us do get it.

There is also the **A B C** argument. It is in our nature to focus on the **A** jobs, the easy ones we do routinely, or the **B** jobs, more difficult but relatively easy to manage, and to go into some form of denial about the **C** jobs, the new or rare tasks that we don’t know how to begin to tackle, and leaving us staring into space, hoping for a diversion. Unfortunately, the **C** jobs are often the most urgent and dangerous to ignore for long.

Example: Canada's Federal government seems to be ducking the hard problem, (C) and instead has brought in a carbon tax legislation (A) that will give people like me a refund exceeding any carbon tax I might pay. It may also help them win the 2019 election (B).

This is not likely to encourage many people to decrease their Carbon Footprint. It strikes me as effective a strategy as swabbing the decks on the Titanic as the ship goes down. Hopping from one issue to another is a management style I have heard described as "firefighting." What better way to develop a coherent effective strategy than to start with the causes of the *Sixth Extinction*, the growth of population and consumption.

I know this is difficult. The political and economic problems are gigantic – that's why I call it the hard problem. But that's also why I said to the Minister (January 15 letter):

*"Nature obeys its own laws, oblivious to our daunting political/economic challenges."*

Nature does not care how hard it is for us, and so CO<sub>2</sub> levels continue to rise, numbers of wild animal and entire species continue to dwindle, and water shortages increase. Politicians have evolved to focus on doing what it takes to win elections, which usually means focussing on short-term, popular measures and dodging hard problems.

If appealing to reason is not working, if Stephen Hawking could not convince them, if what passes for political leadership in today's world could be described as a gormless vacuum, is there any reason left for hope?

From the January 15 letter:

**In the absence of a clear, strong, and affirmative response to the question, accompanied by swift and effective implementation, if no nation, not even a world leader like Canada, is prepared to rise to the challenge of addressing the root causes of the *hard problem*, I can only conclude that we can be certain that the 21st century will bring forth a cascading series of environmental and economic catastrophes, ushering in the *Sixth Extinction* of the *Anthropocene*.**

# The End?

*“If we don’t take action, the collapse of our civilisations and the extinction of much of the natural world is on the horizon.”*

Sir David Attenborough, COP24 Conference, 2018

**B**laise Pascal (1623-1662) constructed a clever argument that became known as “Pascal’s wager.” If we were to apply similar reasoning to the hard problem, it might go something like this:

If we are heading toward the *Sixth Extinction*, which is by far the most likely scenario given all of the above, it would be logical to make every possible effort to avert it, including controlling our population and consumption. If we do not try, then surely we are doomed.

If the *Sixth Extinction* is not heading our way, i.e., the very low probability that many thousands of scientists have all goofed somehow, those same efforts would lead to a healthier living planet that is sustainable in the long run. If we do not try, then we still have to contend with population- and consumption-related problems like food and water for the billions.

So, despite the daunting odds against success, the rational strategy would be to strive as hard as possible to stop the madness of out-of-control population growth and consumption far beyond the ability of the Earth to sustain it.

Do you want to know what really gets my goat, makes my blood boil, what pushes my buttons about this? There is no giant asteroid headed our way, impossible to stop. The sun is not about to go into its Red Giant phase, and toast us like marshmallows. There is no pandemic with an incurable, 100% fatal disease and with no remedy we can turn to.

***This is not a hopeless problem with no solution.***

Our real problem is not a scientific or technological puzzle to be analyzed and solved. Our real problem is humanity’s inherent fecal incoherence.

We just cannot get it together.

This is a human-made problem that is amenable to human-made solutions. There is nothing beyond our ken in the proposed solutions alluded to above, such as the *Warning* article’s 13 examples of steps to transition to sustainability, E. O. Wilson’s *Half-Earth* proposal to reserve half the Earth for nature, or the sensible measures to manage population size outlined by *Population Matters*.

What is lacking is the collective will to take any and all steps necessary to save the planet from the *Sixth Extinction*. It is going to take billions of us to get *mad as hell* and to push our leaders, elected politicians and others, into real action, with their political future at stake.

Fortunately, this is not *mission impossible* – this is merely *mission difficult*.

In the first section, I offered three indisputable statements:

**I The science is solid – the Sixth Extinction is real and is happening now.**

**II The proximal causes are human overpopulation and overconsumption.**

**III Nature does not care how difficult our human problems are.**

May I now offer a fourth?

**IV Our leaders will not act on the hard problems until it is in their own interest.**

Our responsibility is to convince them it is in their own interest to act on the hard problems.

And I invite the Minister and the Prime Minister to prove me wrong, preferably soon.

After one of my frequent rants on these matters, a good friend asked me, “So what am I supposed to tell my children and grandchildren?” I suggested, “You could encourage them to take it seriously, and start the family discussion with something like, ‘You may expect your lifetime to follow more or less the same trajectory as mine has. But with the *Sixth Extinction* coming, it probably won’t, and no one can accurately predict the future.’”

This essay is, in part, a more complete response to her question.

**First:** I would encourage her family, (*and YOU, too!*) to take the issue seriously, familiarizing themselves with the issues, the fatal worst case scenarios, and what needs to be done. Follow the examples of the *World Scientists Warning* group and many others who are organizing to push our leaders into real action. Circulate the **Warning** article and/or this essay and get your friends and family involved – schoolmates, colleagues, neighbours, seniors – all 7.6 billion of us.

**Second:** Give your local representatives a friendly and courteous nudge to let them know that real, swift, effective action which addresses the real causes of climate change, biodiversity loss, and other environmental problems is what people want and will help them get elected. The *Warning* article puts it nicely.

As most political leaders respond to pressure, scientists, media influencers, and lay citizens must insist that their governments take immediate action as a moral imperative to current and future generations of human and other life. With a groundswell of organized grassroots efforts, dogged opposition can be overcome and political leaders compelled to do the right thing.

Inundate them with letters, phone calls, emails, social media, semaphore, smoke signals, telegrams, singing telegrams, song and dance, farting and tap-dancing, or any other form of messages that will penetrate their political defence mechanisms.

*(But legally and peacefully, please, with manners and courtesy for all. Thank you.)*

**Third:** DO NOT GIVE UP. Denying climate change is unrealistic, but allows the denier the comfort of thinking they do not have to do anything about it. So is leap-frogging to the opposite extreme, proclaiming things like “It’s all over!” “We’re doomed!!” “We’ll all be dead in a few years anyway!!!” which also allows the *Nattering Nabobs of Negativism* the freedom to do nothing, and they can safely hide under the bed in the hope they will die an easy death before things get really bad. As it so often is, I think the truth lies between these extremes, and the best experts on Earth say there is still time to turn things around.

If all or most of us give up, we will all lose. It would be a self-fulfilling prophesy.

If my life follows the pattern of my family, the remainder is likely best expressed in years, not decades, and I may miss the dramatic conclusion of *The End of the World Show*. For younger people, it’s more your future than mine. Do what it takes to save life on Earth.

It takes just a little courage to demand change. Perhaps just a thin sliver of the amount of courage exhibited by Britain in World War II. They stood up in defiance to Hitler, and refused to kowtow to the coming Nazi assault.

Against all odds they won. Never give up on life on Earth.

***“... we shall never surrender, ...”***

Winston Churchill, June 4, 1940, to a very different House of Commons

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# For Further Interest

(All links retrieved December 2018. E&OE)

## The Warning

*World Scientists' Warning to Humanity: A Second Notice*, (2017 version)  
<https://academic.oup.com/bioscience/article/67/12/1026/4605229> (See pdf version)

Also try <https://www.scientistswarning.org/> for a one-page overview and more.

*World Scientists' Warning to Humanity*, (1992 version)  
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## Population

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See also pdf version © 1998, Electronic Scholarly Publishing Project,  
<http://www.esp.org/books/malthus/population/malthus.pdf>

*The Population Bomb*, Paul Ehrlich, 1968

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- ***Limits Revisited: A review of the limits to growth debate***, Tim Jackson and Robin Webster April, 2016 <http://limits2growth.org.uk/wp-content/uploads/2016/04/Jackson-and-Webster-2016-Limits-Revisited.pdf>
- ***Limits to Growth Was Right***, <http://www.theguardian.com/commentisfree/2014/sep/02/limits-to-growth-was-right-new-research-shows-were-nearing-collapse>

Sir John Beddington, *A Perfect Storm*, 2009

- <http://www.guardian.co.uk/science/2009/mar/18/perfect-storm-john-beddington-energy-food-climate>
- <https://webarchive.nationalarchives.gov.uk/20121206120858/http://www.bis.gov.uk/assets/goscience/docs/p/perfect-storm-paper.pdf>

**Population Matters – Solutions** <https://populationmatters.org/solutions>

## Consumption

(Re the equation) See also the well-known **IPAT** equation, by Ehrlich et al, explained in detail in: <https://news.nationalgeographic.com/news/2014/09/140920-population-11billion-demographics-anthropocene/>

Daniel W. O'Neill, et al, *A good life for all within planetary boundaries*, Nature Sustainability, February 2018, <http://www.nature.com/articles/s41893-018-0021-4>

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**Global Footprint Network – re *The Ecological Footprint & Earth Overshoot Day***

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 (Steffen et al; also available in pdf)

**Planetary boundaries**, an important concept for a finite planet; for a general overview see:

- <https://www.stockholmresilience.org/>
- <https://www.stockholmresilience.org/research/research-news/2017-11-20-a-fundamental-misrepresentation-of-the-planetary-boundaries-framework.html>

**Methane** – for more on the “methane time-bomb” see <https://phys.org/news/2018-12-permafrost-climate.html>

**Amazon Tipping Point** <http://advances.sciencemag.org/content/4/2/eaat2340>

**Burning Fossil Fuels Almost Ended All Life on Earth**  
<https://www.theatlantic.com/science/archive/2017/07/a-road-trip-to-the-end-of-the-world/532914/>

**Timeline Of Mass Extinction Events On Earth** <https://www.worldatlas.com/articles/the-timeline-of-the-mass-extinction-events-on-earth.html>

# Biodiversity

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Isabella Tree, ***Wilding: The Return of Nature to a British Farm***, 2018

If you like E. O. Wilson's *Half Earth* idea, you will love this rich and detailed book. The chapter on soil can give the reader a new view on biodiversity. "The story of an astonishingly bold experiment: the rewilding of a West Sussex farm and the triumphant return of nature to the British countryside." (*Flyleaf text.*)

## In Brief

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**Trashed** <https://www.nytimes.com/2012/12/14/movies/trashed-a-global-tour-of-rubbish.html>

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## The End?

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I am very appreciative of the support and ideas from several good friends.

What do you think? I welcome hearing some of your thoughts and feelings regarding *The Sixth Extinction* and *Front Row Centre at The End of the World Show*.

The e-mail address for this project is:

[EndWorldShow@yahoo.com](mailto:EndWorldShow@yahoo.com)

Bruce Mason enjoys his golden years in Toronto. His hobby is fecal perturbation.