Accelerating Global Climate Change

by Clark M. Thomas

Most people think of today's human-caused climate change as a *linear* process, when in fact it is a complex *exponential* process of accelerating change.

After two years of devastating hurricanes in the southeast, horrible wildfires in California, and a burst of intense Polar Vortex cold this winter in the upper midwest, the majority of Americans have suddenly gotten the "climate change religion."

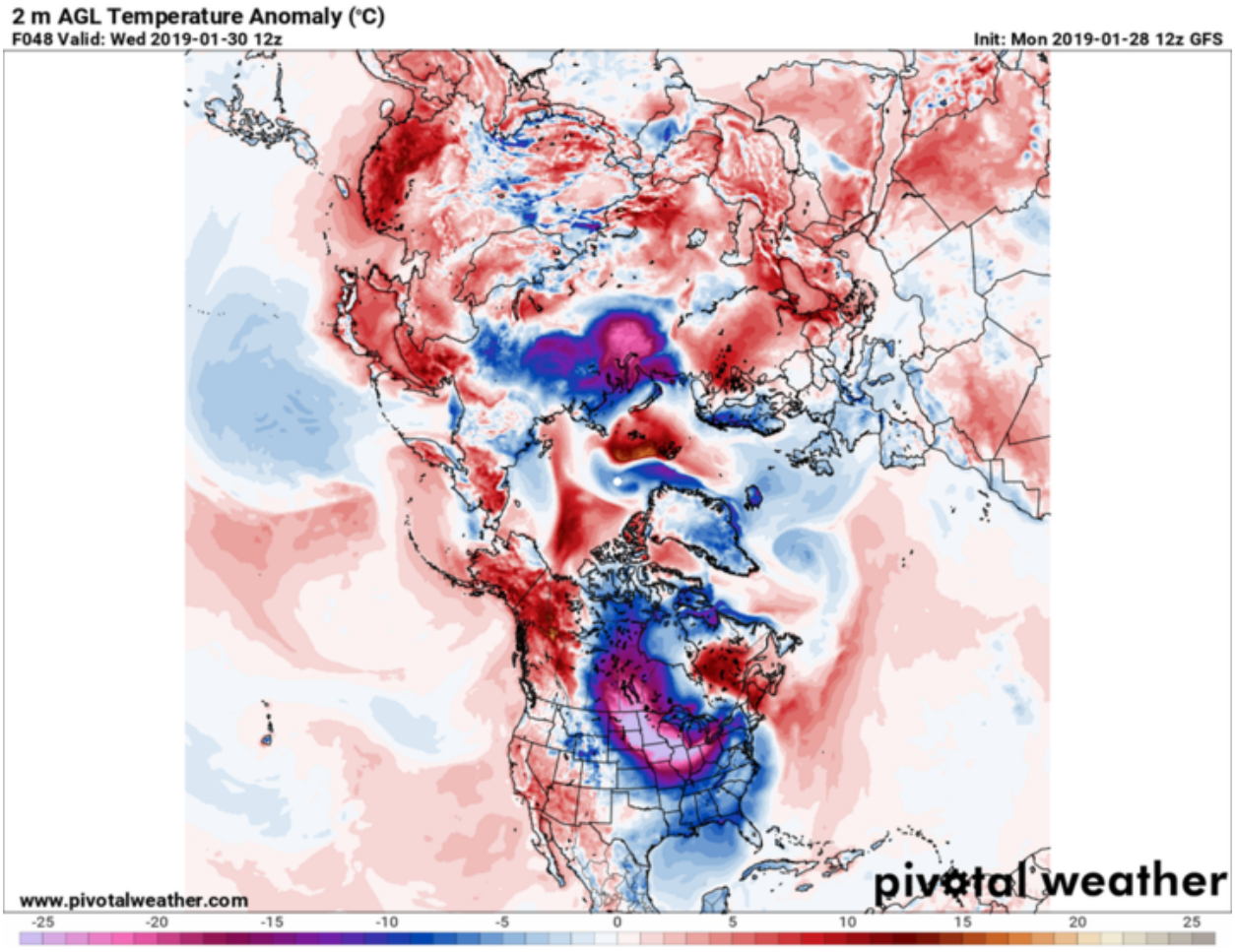
There are many research studies showing how the ecosystem is slipping toward catastrophic climate change…but how fast? There are also serious, but ignored, articles and research theses explaining how we humans can actually slow the pace of change, if the will and urgency are there. Climate change consciousness can seem more like video games than true religion – except for those who fatalistically believe a loving, anthropocentric God will always bail us out.

This essay will focus on the real dangers of exponential climate change for human civilization. It will explain why much is said, but little is done, to correct our self-inflicted miseries. It will also point to what can be done soon to help slow the rate of change, if not yet to stop and correct the emerging crisis.

(1) EXPONENTIAL AND LINEAR SYSTEMS

It is natural for people to think of change in terms of here-and-now events; or even of change as cyclical seasons that end up not being change at all. It is easier to look back than to honestly look forward. The past is gone and mentally easy. The climate future is a human-made holocaust only hinted at in its full force these last two years. Most societies haven't a clue how to move fast enough to intersect accelerating global disaster.

Here is what the heat map of the northern hemisphere looked like during the 2019 Polar Vortex.[1] Concurrently, Australia and other areas of the southern globe suffered severe heat waves:



[1] https://www.huffingtonpost.com/entry/polar-vortex-climate-change-warming_us_5c507e4ee4b07818afbea4d6

Ordinary climate change typically has taken several thousand years between changing cycles. After extreme changes have occurred it has taken as much as several million years for full biodiversity to reappear.[2] None of these eras involved "thinking" apes in whose world ten years seems a long time. These apes are now uniquely able to radically transform their biosphere for their needs, while ignoring negative consequences of "progress."

Like locusts, this species has the Malthusian power to expand its population geometrically when resources are plentiful, until there is a rapid population crash after critical resources vanish.

We are increasingly likely to create and deploy our own virtual Chicxulub asteroid. It could be the summation of exponential climate change, and/or global thermonuclear destruction, any of which would radically slash the number of self-centered humans, thus reducing our Malthusian footprint. The "collateral damage" resulting from any of these scenarios will be the extinction of hundreds of thousands of beautiful and innocent "lower" species, and the survival of tough and less beautiful species for millions of years following our very brief and selfish Anthropocene period.

Stalin is reputed to have said that the death of one person is a tragedy, but the death of a million people is a statistic. A recent essay in *Psychology Today* explains this weirdness as follows:[3]

> "The collapse of compassion happens because when people see multiple victims, it is a signal that they ought to rein in their emotions. The alternative might seem too difficult. It also suggests a way that the collapse of compassion might be prevented. Anything that encourages people to accept their emotions, rather than suppressing them, might reduce the collapse. Scads of studies show that a non-judgmental acceptance of our own emotions can be good for our health. This new research suggests that it might also be good for the health of thousands of victims in Haiti, Chile, Darfur, and beyond."

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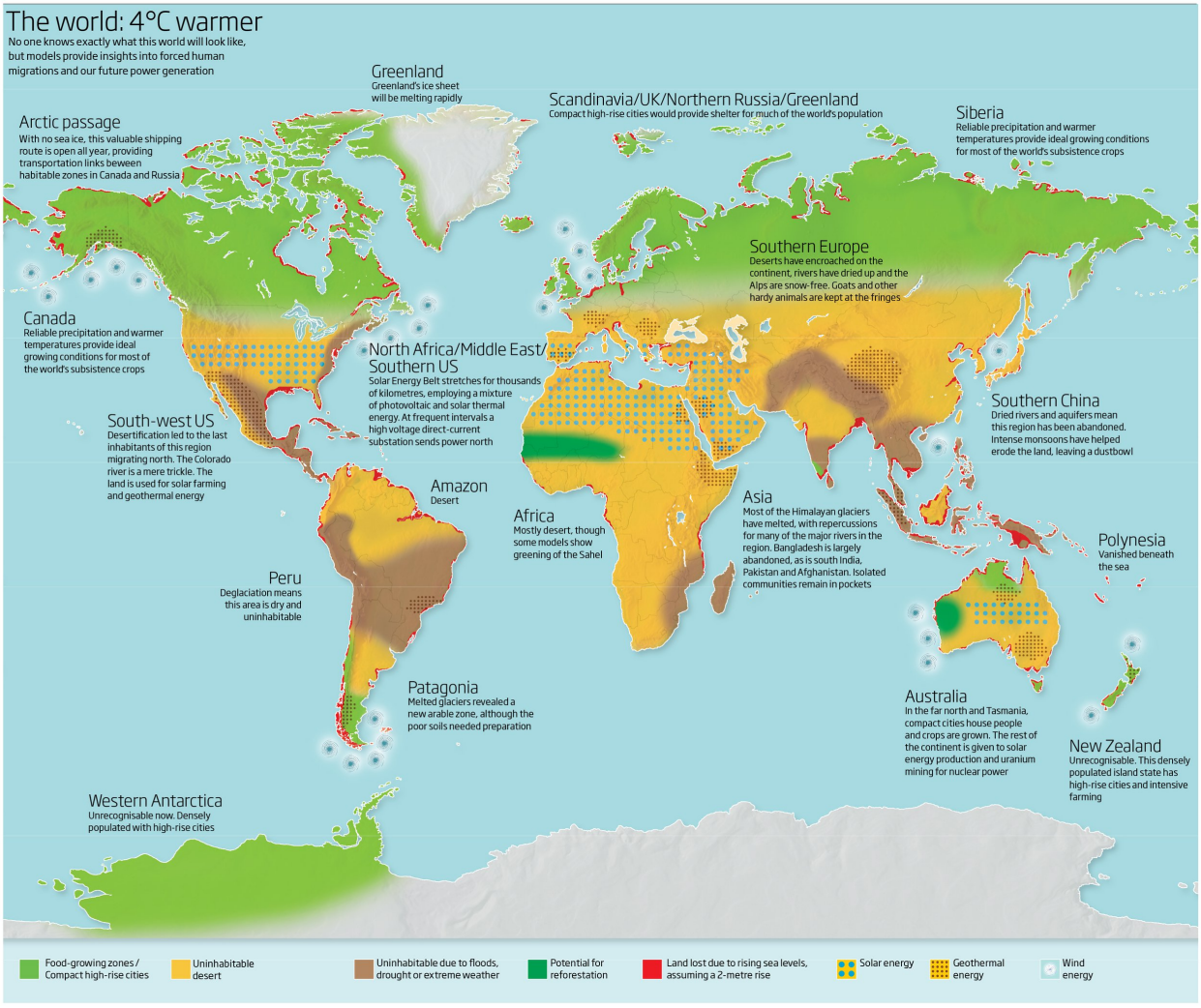
[2] https://www.pnas.org/content/115/44/11262

[3] https://www.psychologytoday.com/us/blog/life-autopilot/201003/why-is-the-death-one-million-statistic

The hot climate apocalypse is rushing toward us in two major ways: oceanic flooding, and unprecedented heat waves. Rising salt water will soon push away many millions of people from their coastal cities. Desertification in the interior will drive away more millions to northern sanctuaries. There will be *many millions* of poor families without the means to safely relocate.

Below is a suggested map of the warmer world after average global temperatures rise about 4 degrees Centigrade over recent averages. The map below ONLY presents the world of a century or two hence. Four degrees of heating is just an intermediate step toward a system equilibrium at even higher temperatures:[4]



[4] http://astronomy-links.net/Boiling.Frogs.pdf

(2) SOLUTIONS THAT ARE NOT SOLUTIONS

There was a mythical man who jumped off a vertical fifty-story building. Halfway down he was heard yelling, "So far, so good!" An inflating balloon is most magnificent just before it bursts. A rubber band stretches and returns to its original shape, except when it is stretched too far and snaps.

We imagine our tidy modern world is like a loose rubber band, but it is more like the jumper or the inflating balloon. There will be a splattered human carcass to retrieve, and a burst balloon, and a snapped rubber band. These remnants are all similar to the appearance in physics of chaotic entropy after a period of orderly negentropy. Whereas there is always a biospheric ecosystem, how it reaches a new homeostasis is everything.

(2a) Population Growth Control

In the short run, human population growth is a great concern. People historically have wanted at least four children per couple, giving on the average one male heir and a spare. Problem is, that doubles the population every generation, with no childhood mortality. Even with some mortality, that means the population could double every thirty or so years, rather than twenty.

Our Earth is packed with 7.5 billion resource-hungry and energy-demanding humans. Already we are way too populated to sustain safe biospheric equilibrium. Double 7.5 makes 15 billion. That's absurd, short of living extremely basic lives. However, even in the best of circumstances (which are politically impossible in this half century) accelerating changes in produced greenhouse gases, melting land ice, heating oceans, and rapid desertification could doom any wise, but too late, population control actions.

The best we can do to help minimize Malthusian population crashes is to move toward negative population growth (NPG), where natural deaths outnumber births, and ensure that childless

people are given care in their old ages. The Japanese are already there with NPG, supported by affluence and friendly robotics.

Elsewhere, the advanced world can at least start to reduce the summation of human footprints. Modern population growth and the "revolution of rising expectations" have been the main source of the problem. I am not too optimistic, as I wrote in 1974 the first book manuscript promoting negative population growth.[5] Every pre-Internet book publisher I approached thought there was no real population or resources problem, not to mention the problem of global climate heating.

Ironically, there was still enough time in 1974 to make a wise improvement on the telescoped crisis we have today. However, in 1974 everybody was seemingly happy falling half-way down outside that mythical tall building. We are still in the so-far-so-good zone, but much closer to the end of our as-if gravitationally accelerating fall. There is no such thing as an infinitely receding hard ground.

(2b) Electrical Vehicles

It is trendy to disparage smelly internal combustion engines. Buyers are demanding affordable Tesla-like vehicles. Companies such as Volkswagen, Volvo, GM and others are rushing to convert to lithium-battery-powered motors. Ideally, their local charging stations would be energized by solar cells, windmills, or even geothermal energy. So far, so good. Surely trying to switch from carbon pollution is a good thing, but is this a realistic quick fix?

There are two issues of concern. One is short-term, and the other is long-term. The short-term issue is that much of the electrical energy transferred to electric cars and subways comes from coal powered plants. Renewable energy sources are coming online, but not massively within our critical rescue window. This leads to the second and ultimately more important issue:

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[5] http://astronomy-links.net/TheAmericanEutopia.pdf

Just as a steel chain is only as strong as its weakest link, all eco-friendly electric vehicle strategies have a very weak link beyond the issue of coal-produced electricity. The big problem is that *renewable energy systems can fail if a critical component is not renewable*.

The world's supplies of lithium are finite and non-renewable, but some of it can be recycled. It is estimated that by 2070 we will have exhausted proven affordable supplies of lithium. Not only will that loss critically impact electric vehicle batteries – removing large lithium storage batteries from the global energy management equation will make much more challenging the strategies needed to store energy from solar cells after dark.[6]

(2c) Blocking Sunlight

Conceptually, the easiest way to reduce global air temperatures is to reduce solar energy reaching the ground. We have historical experience with temporarily lowered global air temperatures following major volcanic eruptions, such as Krakatoa in 1883.

There are few purely good or truly evil climate technologies. The good effects of lowering received solar energy come with some nasty side effects:

We can't conjure up a giant sulfur-dioxide-belching volcano, nor would we want to trade a few years of slightly lower air temperatures for massive destruction from any such explosion. Aviation technology now can inject particles into the stratosphere, which will immediately help reduce the sun's rays.

A fleet of special planes could deliver sulfur dioxide (SO_2) molecules. That marginally would work, until the particles fall and combine with moisture, accelerating the creation of acid rain. Sulfuric acid is the same acid found in your car battery.

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[6] https://singularityhub.com/2019/01/18/the-catch-no-ones-talking-about-renewable-energy-relies-on-non-renewable-resources/#sm.00degc1213ood2o11as1thzxhdu4v

In addition, none of this activity eliminates the rapid increase at ground level of carbon dioxide (CO_2). The oceans will take up much of that carbon dioxide, which then will interfere with the ocean's pH, killing off the critical fish nurseries we call coral reefs. This process is underway, with large areas of the living Great Barrier Reef off Australia already dying.

It might be better to disperse reflecting Mylar plastic particles, the same material used in the two "Echo 1" satellite balloons. That dispersal option would require much higher flights, and does nothing to stop the effects of carbon poisoned seas.

When we opt for any aerosol injection warming "solution," that fix only encourages carbon polluters to continue. More CO_2 helps plants grow, and dying coral reefs are "out of sight and out of mind." Greed always finds a way to justify itself.

There could come a time (following a nuclear war?) when nobody has the capacity or will to launch replenishing payloads of reflecting particles. Our biosphere temperatures would soon jerk back to where we are heading today, facing the full force of solar energy and greenhouse gases.

(3) SOLUTIONS THAT ARE PARTIAL SOLUTIONS

There is no quick panacea for our accelerating global crisis. However, there are some things we can affordably do starting now that will make the climate transformation happen not so rudely.

Any warming delay will give us some more time to develop new technologies, and to engineer a humanistic reduction in human population. The slope down to desolation will be less steep.

This brief essay cannot list every option, just examples, but the combined effect of several options can lead to some amelioration.

(3a) Green Engineering

Green engineering can be in the form of producing and eating foods more wisely. It can also be in the form of reforestation and helping heal the planet's waters, even green types of insulation.

Much of the world does not feast on beef. Americans and others emulating our bovine diet consume too many inefficiently fed, methane-producing cows. Alternative sources of good protein abound. Not producing beef could free millions of acres of land for different foods. Note however that the vast American breadbasket will become mostly desert anyway. Organic farming involves wise husbandry of the land. Only some lessons were applied after the great dust bowl years. Now is the time for advanced science to help produce affordable quality food.

It could be said that agriculture will simply move northward into Canada, Alaska, Siberia, and a small part of Antarctica. Cutting down vast forests in the great north hardly helps with the reforestation goal. Available space for humans on this planet is already limited, so having most of us cram into newly temperate zones will provide little space for traditional cattle ranching. However, chickens evolved from the T-Rex dinosaur family could adapt with us.

As the oceans become depleted of historically desirable fish, job opportunities will expand for fish farming in ponds and in estuaries. Fish protein is high quality food, in some ways superior to beef and pork. We will farm tropical fish that can tolerate higher water temperatures with less dissolved oxygen.

(3b) Insulation and Energy Efficiency

Money not spent on purchased energy can be applied to additional insulation and shielding from the sun's rays. We do this on the ground, not from high altitudes. Proven technologies are common, and need to be applied even more in our future daily lives. Energy efficiency speaks for itself.

(3c) New Technologies

The more time for amelioration we can generate, the longer it will take for the metaphorical falling man to hit, for the balloon to burst, and for the rubber band to snap. We humans are only for the next few decades collectively at our social peak, and this is largely because of the flowering of new technologies.

I doubt that much new pure science can swiftly transform into rescue technology in sufficient time. Nevertheless, we hope that our own species makes it beyond the next century, at which time some of the emerging technologies will help us all.

Artificial Intelligence has been predicted to merge with human consciousness into what is known as the singularity. This already is happening with the Internet. When primate human bodies are bioengineered with bionic AI capabilities we will be on the way to a new species of our own creation. Over at least two centuries pure ethical androids could appear, if we don't self-destruct before then.

There will be many survival benefits to having a human mind inside a climate-change-resistant android. When computers develop an ethical philosophical consciousness we will have created comphumans. Combine that wisdom with an android body that can surf extreme climate changes, and we have one formula for future success. If we ever visit extrasolar planets it will be as gamma-ray-resistant androids, not fleshy apes.

Literally, there could be thousands of new helpful technologies emerging from a stressed future. The key again is for there to be enough time and space for these science seeds to bear fruit. Our audacious and fragile species first must avoid mutually suicidal resource wars.

The dark side of successful singularities is the possible creation of a superior humanlike species lording over the ordinary human apes. Will the future super species exploit the originals?

(4) THE GREEN NEW DEAL

Washington is perennially schizophrenic, and no more so than now when it comes to climate change:

On the one hand, voices of the *status quo* proclaim climate change is just weather fluctuations. They may have union jobs in the carbon industries, not wanting non-union and lower-paying green-energy jobs. They may be religious, and envision what's happening as just another Noah-like loyalty test from God. They infest the White House, with carbon polluters controlling all the federal government's climate-related departments.

The other side of Washington's schizophrenia is the emergence of trendy climate progressives. They fully understand what is just over the horizon, and they are building momentum – but not soon enough or strong enough to stop disaster inside a hundred years or less. Most importantly, there is sufficient opposition in both houses of Congress and in the willfully blind White House that will delay any *Green New Deal* agenda for several years.[7]

There is much to like about some elements of this "green deal." If viable elements were implemented very soon, it would help slow down the slide to catastrophe; but how much and how soon?

The major hope is to significantly redirect from where our energy comes. That will be, in the USA alone, unlikely in this century, and nearly impossible in vast areas elsewhere. Some improvements, such as solar cells and other renewables, along with major insulation projects, will help; but again by how much when climate change is already accelerating?

It is ironic that the electrical grid of New York City is mainly supplied by coal-powered plants. Riding the electrical subways is consuming coal power. Gas-powered plants emit greenhouse gas.

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[7] https://www.huffingtonpost.com/entry/ocasio-cortez-green-new-deal_us_5c588e7fe4b09293b20730d7

The greatest error comes not from misunderstanding how much greenhouse gases go indirectly into electrical vehicles. The issue of storing electricity at night is also unsolved outside large lithium batteries which may stop being available by 2070.

The biggest pollution problem is both historical and current: *The United States is now just one of the major greenhouse gas polluters, when formerly we were the worst.* Last year was a bonanza year for increased global emissions.

China is the worst total polluter, and shows no signs of seriously changing, even though China will be one of the most damaged countries by future heat waves and rising seas. Truly poor countries don't individually produce as much greenhouse gases, but they are numerous and constitute a large population-driven component.

(5) THE QUESTION OF MORAL HUMANITY

A viable society is much more than food and guns. It is first and foremost a mutual aid society, and ultimately a vehicle for preserving the viability of one's own species. That is why Earth's relatively affluent and polluting citizens must navigate this global change with humane treatment of the weak who cannot adapt.

As climate generally heats, and as many local regions of the planet lose most of their reliable precipitation, there will erupt massive chaos and fear, leading to climate clashes. In the second half of this century there will be erected a real "Trump wall" along the entire USA/Mexican border. South of this wall will appear desperate people unlike today's refugees from Central American gangsterism. Global warming "illegal aliens" will arrive at the real wall in the thousands, possibly millions, as their lands scorch and dry up. At the same early time vast areas of the American southwest will also dry up, but citizens from those states will be able to migrate toward Canada or Alaska.

I am deeply concerned with entire South American villages fleeing certain climate-driven death. Are we the relatively safe going to become hardened like Stalin, losing all compassion for innocent climate victims? Or are we going to express what we morally can become?

Helping others like us facing death, while we help ourselves, may defuse the potential for global thermonuclear war, as nations don't nuke their friends. There are two elements that need to be synchronized: first, the ethical; second, the management of sharply lowering populations through NPG.

Take, for example, vast areas of South America. Most of today's lush Amazon forests will turn into savannas with very thin soil and extremely hot temperatures. Rural and urban Brazilians will flee either to the south, or to nearest Antarctica; or try to flee to northern America. It is better to manage their refugee status in place, where possible.

Areas with sufficient wealth to help the transition toward smaller populations can offer this *verifiable* deal: "We will pay you some subsistence money while you age, and even some custodial help from family or neighbors when you are very old. In return, you will now and permanently give up producing any more children."

What is said here applies equally to vast areas of South Asia and Africa. This emerging global crisis needs global remediation, with regional help coming from regional resources.

Over several decades Earth's population could peaceably stabilize at sustainable lower levels. That's enough time to preserve and rebuild human civilization with new technologies and new hope.

In the end our saving power will be our caring for each other. Maybe this great climate change challenge is about testing our common humanity and moral wisdom. Will we pass or fail?