

## Near-Term Loss of Habitat for *Homo sapiens*

Guy R. McPherson

Professor Emeritus, University of Arizona

### \*Corresponding author

Guy R. McPherson, Professor Emeritus, University of Arizona.

Submitted: 25 Nov 2020; Accepted: 07 Dec 2020; Published: 08 Dec 2020

### Abstract

Earth is in the midst of abrupt, irreversible climate change. The current global-average temperature of Earth is the highest ever with *Homo sapiens* present, and there is no demonstrated way to stabilize or reduce the planetary temperature. This paper describes a few means by which habitat for humans could be lost in the near future.

**Keywords:** Abrupt, Irreversible Climate Change, Aerosol Masking Effect, Functional Extinction, Habitat, Mass Extinction Event, Near-Term Human Extinction

### Introduction

Earth is in the midst of abrupt, irreversible climate change [1]. The ongoing rate of temperature rise indicates that the climate of Earth will resemble that of the Pliocene Epoch as early as 2030 [2]. The mid-Pliocene was more than 2 C warmer than contemporary Earth, and the rate of change anticipated by Burke et al. (2018) is occurring rapidly enough to assure the inability of vertebrates and mammals to keep up [2].

We currently occupy the warmest Earth with *Homo sapiens* present beyond the much-vaunted 2 C “guardrail” above the 1750 baseline (McPherson 2020a) [1, 3]. There is no known way to stabilize or reduce the global-average temperature of Earth.

The projected rate of climate change in the future, based on the gradualism assumed by the Intergovernmental Panel on Climate Change (IPCC), outstrips the adaptive response of vertebrates by a factor of 10,000 times [4]. Similarly, mammals cannot evolve rapidly enough to escape the current extinction crisis [5]. Humans are classified as vertebrate mammals, indicating that we will experience a fate similar to the one faced by an estimated 150-200 species of plants, insects, birds, and mammals each day [6]. Human extinction draws near.

The pivotal paper by Burke et al. (2018) [2] indicating a rapid rise in global-average temperature in the near future relies upon the Representative Concentration Pathways of the Intergovernmental Panel on Climate Change (IPCC), thereby ignoring many self-reinforcing feedback loops and also the aerosol masking effect. The observed and projected rates of rapid global-average temperature rise are unprecedented in planetary history [7]. In other words, Earth is already in the midst of abrupt, irreversible climate change, and the pace of global-average temperature rise is expected to accelerate in the near future. There is little question that human ani-

mals face an existential threat.

Not only are humans classified as animals, but we depend upon other species for our own continued survival. As indicated by Strona and Bradshaw (2018), “in a simplified view, the idea of co-extinction reduces to the obvious conclusion that a consumer cannot survive without its resources.” Abundant evidence indicates humans will join the annihilation of “all life on earth,” as reported by Strona and Bradshaw (2018) and affirmed by McPherson [1, 8]. The only question is when, not whether, we will lose habitat and then go extinct.

In addition to abrupt, irreversible climate change, Earth is also in the midst of a Mass Extinction Event [9, 10]. This event does not lie in the distant future, nor has it begun recently. Rather, it has been under way for at least a decade [6]. Consider, for example, the “Significance” section of the paper by Ceballos et al. (2017) [9]. “The strong focus on species extinctions, a critical aspect of the contemporary pulse of biological extinction, leads to a common misimpression that Earth’s biota is not immediately threatened, just slowly entering an episode of major biodiversity loss. This view overlooks the current trends of population declines and extinctions. Using a sample of 27,600 terrestrial vertebrate species, and a more detailed analysis of 177 mammal species, we show the extremely high degree of population decay in vertebrates, even in common ‘species of low concern.’ Dwindling population sizes and range shrinkages amount to a massive anthropogenic erosion of biodiversity and of the ecosystem services essential to civilization. This ‘biological annihilation’ underlines the seriousness for humanity of Earth’s ongoing sixth mass extinction event.”

Our membership in the animal kingdom comes with the ability to predict that loss of habitat will cause the functional extinction of our species, as with other animals. Such a loss of habitat will

---

make us functionally extinct. Shortly thereafter, our species will disappear from Earth.

This current paper describes a few means by which Earth could lose all habitat for *Homo sapiens*, a process that is already under way. Human extinction likely was triggered when Earth exceeded 2 C above the 1750 baseline. After all, an “increase of 1.5 degrees is the maximum the planet can tolerate; ... at worst, [such a rise in temperature above the 1750 baseline will cause] the extinction of humankind altogether” [11]. In other words, human extinction likely was guaranteed with no further degradation of planetary habitat before Earth crossed 2 C above the 1750 baseline in March, 2020 [1]. Lethal wet-bulb temperatures, which cause organ failure and therefore death, are occurring now, contrary to models indicating that they lie decades in the future [12].

### Habitat Loss

The first means by which humans could lose habitat was reported by Shakhova et al. (2008) [13]: a burst of methane from beneath the Arctic Ocean. They reported that “up to 50 Gt . . . hydrate storage as highly possible for abrupt release at any time.” Such a rapid burst of methane into the atmosphere would cause an abrupt rise in global-average temperature far too rapid for organisms to adapt. Methane is more than 100 times more powerful than carbon dioxide as a greenhouse gas, and the abrupt release of even half the 50 Gt concluded by Shakhova and colleagues would cause loss of habitat for humans within a matter of months. Shakhova et al. (2008) did not indicate that an ice-free Arctic was required for such a release of methane [13].

The relatively shallow seabed of the Arctic Ocean is not the only source of atmospheric methane on Earth. This potent greenhouse gas is also being released at exceptionally high levels from terrestrial permafrost in the Arctic region [14]. Industrial activity will continue to drive up temperatures as a result of increased greenhouse gases in the atmosphere. The current levels of atmospheric carbon dioxide (more than 415 ppm) and methane (more than 1,500 ppb) assure planetary disaster awaits in the relatively near future. Carbon dioxide and methane are two of more than 40 greenhouse gases.

Paradoxically, human habitat can be lost not only via increased industrial activity, but also via decreased industrial activity. The aerosol masking effect, or global dimming, has been described in the peer-reviewed literature for at least 90 years [15]. Coincident with industrial activity adding to greenhouse gases that warm the planet, industrial activity simultaneously cools the planet by adding aerosols to the atmosphere.

Atmospheric aerosols block incoming sunlight, thereby keeping cool our pale blue dot. Reducing industrial activity by as little as 20 percent is expected to cause a global-average temperature rise of 1 C within a few weeks [8]. One means by which aerosol masking could decline is via a reduction of industrial activity resulting from SARS-CoV-2. Initial measurements from the SARS-CoV-2 pandemic indicate a 17 percent reduction in daily global carbon dioxide emissions [16]. Whether this reduction in carbon dioxide emissions corresponds directly to a reduction in industrial activity is unknown.

The ability to grow, store, and distribute grains at scale is a defining element of industrial civilization, as with all civilizations. A significant decline in grain harvest will surely cause a collapse of this version of civilization. The 83.3 percent decline of earthworms in agrichemical fields relative to other areas thus poses a threat to industrial civilization [17]. The resulting loss of aerosol masking would cause loss of habitat for humans on Earth, as described above.

The looming ice-free Arctic Ocean, incorrectly projected to occur in 2016 + 3 years [18], will represent the first such event in history. The profoundly negative scientific impacts of this eventuality were summarized by the President of Finland during a press conference with President Donald Trump in August of 2017, and several times since then [19]: “If we lose the Arctic, we lose the globe. That is reality.”

The vortices created by aircraft have been transformed into patterns of semi-permanent atmospheric circulation [20]. These vortices “have widespread effects on how the atmosphere traps and releases heat. It is also possible that these changes alter the loss of water from the atmosphere. This would endanger all life on earth, not just the human population.” Continuation of commercial air traffic thus joins the factors contributing to a loss of all life on Earth.

Finally, a future El Niño-Southern Oscillation (ENSO) will release heat from the ocean to the terrestrial biosphere, as is typical for ENSO events. An ENSO was incorrectly forecast to occur in the northern hemisphere autumn of 2020 [21], and it surely lies in the near future. The ocean acts as a “battery” that stores carbon dioxide and heat. The release of heat from the ocean during an ENSO event likely will be sufficient to exacerbate ongoing heat waves and failing production of grain crops. It seems likely that these negative consequences will result in loss of habitat for humans, with extinction soon to follow.

Any series of events that causes the demise of industrial civilization leads, shortly thereafter, to human extinction by two independent means. Firstly, the rapid reduction in aerosol masking associated with a reduction in industrial activity leads directly to loss of habitat for humans and most other organisms on Earth. Secondly, the catastrophic meltdown of the world’s nuclear power facilities as essential workers stop working voluntarily – or disappear as a result of human extinction – will lead to lethal mutations resulting from widespread ionizing radiation, thereby threatening all plant life on Earth with extinction [22].

### Now What?

Although we all know we will die, accepting one’s own personal death is difficult for most people. Accepting one’s own personal death within a few months or years poses an even greater emotional challenge than accepting death on the distant horizon. Similarly, although we know all species go extinct, accepting human extinction is difficult for most people. Accepting human extinction within a few years is very difficult.

Many contemporary climate scientists, heads of corporations, and politicians have access to the information I have presented in this

paper. Yet many of these individuals seem reluctant to share the information, as I have discussed [23]. I suspect the potential loss of privilege associated with sharing existentially dire information contributes to their reticence [24].

In response to the information I have been promulgating for many years, I regularly recommend living where you feel most alive and, simultaneously, where you feel most useful. I recommend living fully. I recommend living with intention. I recommend living urgently, with death in mind. I recommend the pursuit of excellence. I recommend the pursuit of love.

In light of the short time remaining in your life, and my own, I recommend all of the above, louder than before. More fully than you can imagine. To the limits of this restrictive culture, and beyond.

For you. For me. For us. For here. For now.

Live large. Be you, and bolder than you have ever been. Live as though you're dying. The day draws near.

### Acknowledgements

Mimi German and Pauline Panagiotou Schneider thoughtfully and effectively commented on an earlier draft of this manuscript.

### References

1. McPherson G R (2020a) Earth is in the midst of abrupt, irreversible climate change. *Journal of Earth and Environmental Sciences Research* 2: 1-2.
2. Burke KD, Williams J W, Chandler M A, Haywood AM, Lunt DJ, et al. (2018) Pliocene and Eocene provide best analogs for near-future climates, *Proceedings of the National Academy of Sciences* 115: 13288-13293.
3. Hansen J, Satato M, Kharecha P, von Schuckmann K, Beerling D J, et al. (2017) Young people's burden: requirement of negative CO<sub>2</sub> emissions. *Earth Systems Dynamics* 8: 577-616.
4. Quintero I, Wiens J J (2013) Rates of projected climate change dramatically exceed past rates of climatic niche evolution among vertebrate species. *Ecology Letters* 16: 1095-1103.
5. Davis M, Faurby S, Svenning J-C (2018) Mammal diversity will take millions of years to recover from the current biodiversity crisis, *Proceedings of the National Academy of Sciences* 115: 11262-11267.
6. United Nations Environment Programme (2010) Quoted in Vidal J. "Protect nature for world economic security, warns UN biodiversity chief," *The Guardian*, 16 August 2010.
7. Zhao A, Bollasina M A, Stevenson D S (2019) Strong influence of aerosol reductions on future heatwaves. *Geophysical Research Letters* 46: 4913-4923.
8. McPherson G R (2020b) Will COVID-19 trigger extinction of all life on Earth? *Earth & Environmental Science Research & Reviews* 3: 73-74.
9. Ceballos G, Ehrlich P R, Dirzo R (2017) Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines. *Proceedings of the National Academy of Sciences* 114: E6089-E6096.
10. Ceballos, Ehrlich, P R, Raven P H (2020) Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction, *Proceedings of the National Academy of Sciences* 117: 13596-13602.
11. Gaub F (2019) "Global Trends to 2030: Challenges and Choices for Europe," *European Strategy and Policy Analysis System*.
12. Raymond C, Matthews T, Horton R M (2020) The emergence of heat and humidity too severe for human tolerance. *Science Advances* 6: eaaw1838.
13. Shakhova N, Semiletov I, Salyuk A, Kosmach D (2008) Anomalies of methane in the atmosphere over the East Siberian shelf: Is there any sign of methane leakage from shallow shelf hydrates? *Geophysical Research Abstracts* 10.
14. Streletskaia I D, Vasiliev A A, Oblogov G E, Streletskiy DA (2018) Methane content in ground ice and sediments of the Kara Sea Coast. *Geosciences* 8: 434.
15. Ångström A (1929) On the atmospheric transmission of sun radiation and on dust in the air. *Geografiska Annaler* 11:156-166.
16. Le Quére C, Jackson R B, Jones M W, Smith A J P, Abernethy S, et al. (2020) Temporary reduction in daily global CO<sub>2</sub> emissions during the COVID-19 forced confinement. *Nature Climate Change*.
17. Blakemore R J (2018) Critical decline of earthworms from organic origins under intensive, humic SOM-depleting agriculture. *Soil Systems* 2, 33. <https://doi.org/10.3390/soilsystems2020033>.
18. Maslowski W, Kinney J C, Higgins M, Roberts A (2012) The future of Arctic sea ice. *Annual Review of Earth and Planetary Sciences* 40: 625-654.
19. Niinistö S (2017) Remarks by President Trump and President Niinistö of Finland in Joint Press Conference, 28 August 2017.
20. Schouw W J, Pauli G (2019) Jetwash-induced vortices and climate change. *Earth and Space Science Open Archive*.
21. Ludescher J, Gozolchiani A, Mikhail I Bogachev, MI, Bunde, A Havlin S, et al. (2013) Improved El Niño forecasting by cooperativity detection. *Proceedings of the National Academy of Sciences* 110: 11742-11745.
22. Mousseau T A, Møller A P (2020) Plants in the light of ionizing radiation: What have we learned from Chernobyl, Fukushima, and other "hot" places? *Frontiers in Plant Science*.
23. McPherson G R (2019a) Becoming hope-free: Parallels between death of individuals and extinction of *Homo sapiens*. *Clinical Psychology Forum* 317: 8-11.
24. McPherson G R (2019b) Going halfway: Climate reports ignore the full evidence, and therapists ignore grief recovery. *Clinical Psychology Forum* 321: 28-31.

**Copyright:** ©2020 Guy R. McPherson., This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.