

# Introduction: The Boundaries of the Anthropocene

*Jeni Barton, Jay Foster*

## Preview

The Fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) was published in early 2014. In addition to expressing a “high confidence” in anthropogenic climate change, the report introduced a new emphasis on adapting to climate change. The Report’s “Summary for Policymakers” declared, “Adaptation and mitigation are complementary strategies for reducing and managing the risks of climate change.” Just a little later the report advises that, “Adaptation can reduce the risks of climate change impacts, but there are limits to its effectiveness...a longer-term perspective, in the context of sustainable development, increases the likelihood that more immediate adaptation actions will also enhance future options and preparedness.” In other words, adapting to the climate change that is underway is important, but to be effective, adaptation needs to take place in the context of sustainable development strategies. This highlights a recurring motif of the Fifth Assessment Report: adaptation now comes before mitigation. The IPCC still strongly recommends mitigating (i.e., reducing) global emission of greenhouse gases (GHGs). But there is also an urgent need to build what the Report, somewhat euphemistically, calls “adaptive capacity.” The overall message is clear: the effects of climate change are coming and we should try to keep them to a minimum, but people will be better able to cope with the effects if we begin to adapt to a warmer world right away.

## **Introduction: The Boundaries of the Anthropocene**

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The Fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) was published in early 2014. In addition to expressing a “high confidence” in anthropogenic climate change, the report introduced a new emphasis on *adapting* to climate change. The Report’s “Summary for Policymakers” declared, “Adaptation and mitigation are complementary strategies for reducing and managing the risks of climate change.” Just a little later the report advises that, “Adaptation can reduce the risks of climate change impacts, but there are limits to its effectiveness... a longer-term perspective, in the context of sustainable development, increases the likelihood that more immediate adaptation actions will also enhance future options and preparedness.”<sup>1</sup> In other words, adapting to the climate change that is underway is important, but to be effective, adaptation needs to take place in the context of sustainable development strategies. This highlights a recurring motif of the Fifth Assessment Report: adaptation now comes before mitigation. The IPCC still strongly recommends mitigating (i.e., reducing) global emission of greenhouse gases (GHGs). But there is also an urgent need to build what the Report, somewhat euphemistically, calls “adaptive capacity.”<sup>2</sup> The overall message is clear: the effects of climate change are coming and we should try to keep them to a minimum, but people will be better able to cope with the effects if we begin to adapt to a warmer world right away.

The next IPCC Assessment is not due until 2022. Four years is an eternity in climate change science and policy. To fill the gap, in 2018, the IPCC published a special report simply titled, *Global Warming of 1.5°C*. As the report’s title suggests, the IPCC recommends that the global policy aim should be to limit climate change to 1.5°C above pre-industrial levels.

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<sup>1</sup> Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report* (IPCC: Geneva, Switzerland, 2014), 18 and 19.

<sup>2</sup> *Ibid*, 19.

A 2°C increase in global temperature would have more devastating consequences than the difference of a mere 0.5°C might be taken to imply. The half-degree difference more than doubles the consequences of climate change. That is, the effects on species loss, crop yields, fisheries, sea level and human populations are all doubled or more than doubled. The report's overall message is again pretty straightforward: "a warming greater than 1.5°C is...not geophysically unavoidable" yet this would require, "ambitious mitigation actions."<sup>3</sup> If present trends continue, the 1.5°C warming threshold will be surpassed by 2040. Preventing this outcome requires reducing carbon dioxide emissions by 45% below 2010 levels no later than 2030. Meeting these goals would require a rapid reduction in the use of fossil fuels in the places they are used most—electricity generation and transportation. Of course, the political track-record for action on GHG emissions is not good, to say the least. In the absence of a radical change in GHG emissions, a realistic expectation is that average global temperatures are going to rise to 1.5°C by 2050 and almost certainly higher by 2100.

In light of this unhappy expectation, *Global Warming of 1.5°C* continues the Fourth Assessment Report's theme of "adapting" to climate change. But the latest report also includes a conceptual element that is new to IPCC discourse. The IPCC begins by pointing out that the onset of climate change confronts us with a clear question with no clear answer: "whether it is feasible to limit warming to 1.5°C and adapt to the consequences?"<sup>4</sup> The report then links this crucial and difficult question to a concept that is entirely new in IPCC reports, "the Anthropocene." In its opening pages, the 1.5°C Report observes that, "the unprecedented rate and global scale of human influence on the Earth System...has led many scientists to call for an acknowledgement that the Earth has entered a new geological epoch: the Anthropocene."<sup>5</sup>

The term "Anthropocene" was coined by Paul Crutzen and Eugene Stoermer in the International Geosphere-Biosphere Project's relatively obscure *Global Change Newsletter* in 2000.<sup>6</sup> The term emerged from obscurity in 2010 when Crutzen published a "concepts" piece in the science journal *Nature*. In that piece, Crutzen proposed that given "the effects of humans on the global environment" it seems "appropriate to

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<sup>3</sup> Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C* (IPCC: Geneva, Switzerland, 2018), 52. Available at: <https://www.ipcc.ch/sr15/>. Retrieved December 2018.

<sup>4</sup> Ibid.,

<sup>5</sup> Ibid., 54.

<sup>6</sup> Paul J. Crutzen and Eugene F. Stoermer, "The Anthropocene" in *Global Change Newsletter* 41 (May 2000), 17-18.

assign the term ‘Anthropocene’ to the present, in many ways human-dominated, geological epoch.”<sup>7</sup> Crutzen could make this sweeping generalization in such a prestigious forum because he was a co-recipient of the Nobel Prize in Chemistry in 1995 for his contribution to work on “the formation and decomposition of atmospheric ozone.”<sup>8</sup> That is to say for his work on the Antarctic “ozone hole” caused mainly by the release of human-made chlorofluorocarbons (CFCs), once widely used as refrigerants and aerosol propellants. There is some historical irony in the fact that the problem of CFC emissions was dealt with first on a voluntary basis and then formally by The Montreal Protocol (1987), but there has been no similar success managing the emission of carbon dioxide and other GHGs. Some human-made changes to the Earth’s atmosphere are more tractable problems than others, apparently.

For Crutzen and also for the IPCC, the Anthropocene concept is intimately linked to tackling anthropogenic climate change. For Crutzen, “fossil-fuel burning” marks the onset of the Anthropocene, while for the IPCC, “The concept of the Anthropocene can be linked to the aspiration of the Paris Agreement.”<sup>9</sup> Yet, the latest IPCC report puts aside Crutzen’s original suggestion that the Anthropocene has geologically superseded the Holocene. The issue of whether the Anthropocene should be recognized as a geological epoch is left entirely to the Anthropocene Working Group (AWG) of the International Commission on Stratigraphy (ICS). Instead, the IPCC invokes the Anthropocene as a “boundary concept” that “frames critical insights into understanding the drivers, dynamics and specific challenges in responding to the ambition of keeping global temperatures well below 2°C while pursuing efforts towards and adapting to a 1.5°C warmer world.” The IPCC’s original turn towards climate adaptation perhaps signaled an increasing pessimism about averting significant climate change and, more generally, achieving ecological sustainability. The IPCC’s recent invocation of the Anthropocene may further signal the need to reflect more broadly on future expectations and hopes now we have arrived at the moment of a geo-historical change in the relationship between humans and global climate.

Let’s be clear: we are now living in a human-warmed world. Exactly how much warmer it will become remains an open question, but we should expect at least a 1.5°C increase in mean global temperatures.

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<sup>7</sup> Paul J. Crutzen, “Geology of Mankind,” *Nature* 415, No. 3 (3 Jan. 2002): 23.

<sup>8</sup> See: “Paul Crutzen: Facts” at <https://www.nobelprize.org/prizes/chemistry/1995/crutzen/facts/>. Retrieved November 2018.

<sup>9</sup> Crutzen, “Geology of Mankind,” 23.

The result will be that the Earth is going to become a much harder planet for humans to live on, even with adaptation. Infrastructure will need to be protected from the floods, fires and storms that will occur with increasing frequency and ferocity. Agriculture and aquaculture will need to be retooled to cope with changing growing conditions brought about by drought and higher water temperatures. Migrants displaced by water scarcity and rising sea-levels will need to be supported. To make these adaptations, in affluent regions of the world, real incomes will decline as nation-states divert ever more economic resources to grapple with the effects of climate change. In less affluent regions, the diversion of economic resources to adaptation measures will frustrate development ambitions, and as a result, “sustainable development” will become more problematic and less meaningful. A warming planet is going to exacerbate the global issues of poverty and inequality. The world’s affluent will be merely inconvenienced by a warmer climate, while the world’s poorest will be left in greater poverty and greater precarity. It’s not exactly a tale of the Eloi and Morlocks but it has an unhappy resemblance.

If this sad future prospect is not to become history, then this is the time to act decisively on climate change by sharply reducing GHG emissions. Even if this were to happen, however, it is not enough. The present climate predicament did not arise blindly or by chance. The onset of climate change has been long anticipated. The first IPCC Assessment Report was published in 1990. As early as the 1980s, Stephen H. Schneider (to whom the IPCC’s 2014 report was dedicated) argued that the need to aggressively reduce GHG emissions was indicated by research on how atmospheric carbon dioxide and other aerosols changed temperature. In 1965, under the Lyndon B. Johnson administration, the President’s Science Advisory Committee warned that increases in atmospheric carbon dioxide from the use of fossil fuels, “may be sufficient to produce measurable and perhaps marked changes in climate, and will almost certainly cause significant changes in the temperature and other properties of the stratosphere.”<sup>10</sup> At the turn of the twentieth century, Svante Arrhenius (the Swedish chemist) and T.C. Chamberlain (the American geologist) independently proposed that changes in the quantity of atmospheric carbon dioxide could alter the climate.<sup>11</sup> These are just a few of the Cassandra’s of climate change who have provided, in one form or another, almost a century of unheeded cautions. The causal connection

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<sup>10</sup> President’s Science Advisory Committee, *Restoring the Quality of Our Environment* (Washington: The White House, 1965), 126-127.

<sup>11</sup> *Ibid.*, 114. See also: Christophe Bonneuil and Jean-Baptiste Fressoz, *The Shock of the Anthropocene*, trans. David Fernbach (New York; Verso, 2016), 77.

between GHGs and climate change is as clear as need be. Yet, the most affluent on the planet Earth could not believe—and arguably still cannot believe—that their way of living is changing the global climate in unprecedented and unpredictable ways. The cartoonist Walt Kelly—famous for the comic strip *Pogo*—sharply pointed out the reason for our inaction: “We’ve met the enemy and he is us.”<sup>12</sup> Kelly made this comment in a poster for the first Earth Day in 1970, but it remains poignant some fifty years later.<sup>13</sup> (The poster is the cover for this collection of essays.)

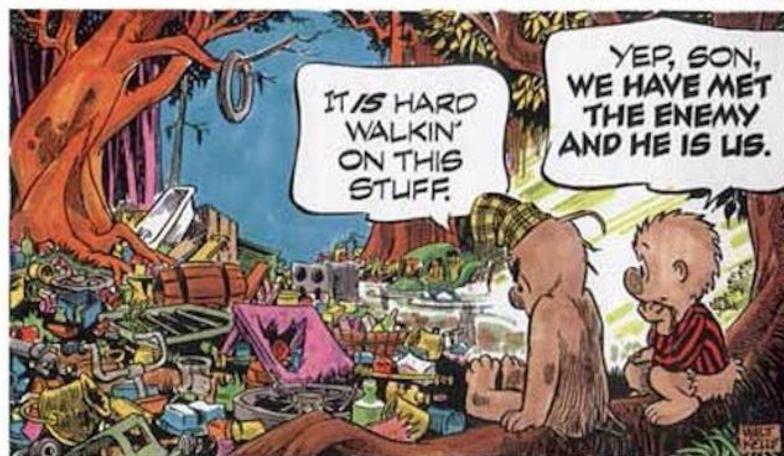
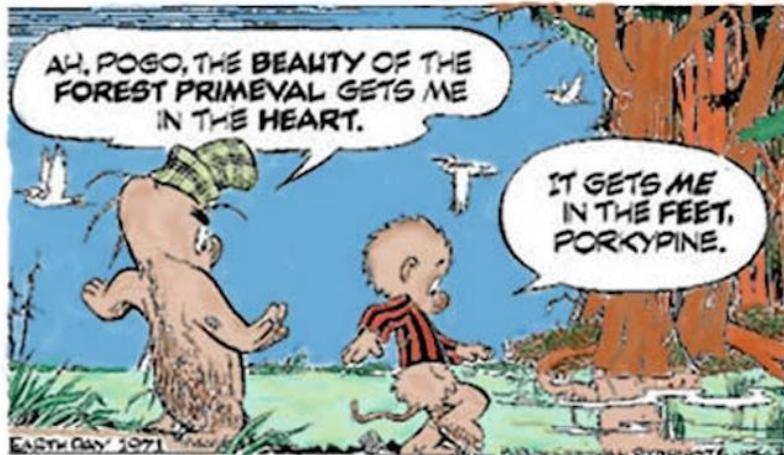
This is certainly the geo-historical moment to *act* on climate change by substantially reducing GHG emissions, but it is also the time to *think* just as decisively. As already observed, the IPCC has now embraced the new concept of “the Anthropocene” along with its commitment to adapting to the world’s new climate. But, what it means to adapt to 1.5°C or more of climate change is not just a matter of making infrastructure resilient and continuing with the *status quo*. The IPCC embraces the Anthropocene because it is, “an opportunity to raise questions regarding the regional differences, social inequalities, and even capacities and drivers of global social-environmental changes.”<sup>14</sup> As the papers collected together in this volume suggest, the Anthropocene must also be an exploration of the conceptual boundaries that made taking the path to global climate change all too possible, all too easy. The papers gathered here reflect on the conceptual infrastructure of the Anthropocene and what it means to live on a now warmer Earth.

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<sup>12</sup> This is, of course, a paraphrase of Master Commandant Oliver Hazard Perry’s message to Major General William Henry Harrison after capturing the British naval fleet at the Battle of Lake Erie. Perry famously wrote: “We have met the enemy and he is ours.”

<sup>13</sup> Kelly reiterated his point in a *Pogo* comic strip a year later. The later comic appears below.

<sup>14</sup> IPCC, *Global Warming of 1.5°C*, 54.



Walt Kelly, *Pogo*, 1971.