



# The Climate Emergency Has Already Begun as Earth Systems Collapse



Demonstrators from several environmental groups including Extinction Rebellion and Sunrise Movement demand broad action at a youth-led climate strike near City Hall on December 6, 2019, in New York City. Scott Heins / Getty Images

By [Bruce Melton](#), [Truthout](#) Published December 7, 2019

[More than 11,000 scientists](#) across 153 countries are shouting out a [new climate change warning](#). The delay for action has been too long. Addressing our rapidly degrading and already overly dangerous climate is now [officially an emergency](#). Here is an excerpt from the article in the [journal \*BioScience\*](#),

Exactly 40 years ago, scientists from 50 nations met at the First World Climate Conference (in Geneva 1979) and agreed that alarming trends for climate change made it urgently necessary to act.

Since then, similar alarms have been made through the 1992 Rio Summit, the 1997 Kyoto Protocol, and the 2015 Paris Agreement, as well as scores of other global assemblies and scientists' explicit warnings of insufficient progress. Yet greenhouse gas (GHG) emissions are still rapidly rising, with increasingly damaging effects on the Earth's climate.

Forty years of urgency to act, and what have we done? We have put the machine into reverse. The single country that is responsible for [two-and-a-](#)



[half times as much climate pollution](#) as has ever been emitted and that still remains in our sky, the U.S., has already abandoned all climate pollution reform mechanisms and strategies that have been adopted or signed.

“An immense increase of scale in endeavors to conserve our biosphere is needed to avoid untold suffering due to the climate crisis,” the signatory scientists note.

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The authors tell us the primary reasoning they use in determining a climate emergency is not what most popular discussions cite: “Most public discussions on climate change are based on global surface temperature only, an inadequate measure to capture the breadth of human activities and the real dangers stemming from a warming planet.” To define the emergency, this work “present[s] a suite of graphical vital signs of climate change over the last 40 years for human activities that can affect GHG emissions and change the climate ... as well as actual climatic impacts.”

The “indicators” developed are simply summaries of trends relevant to climate change that go beyond temperature and greenhouse gas concentration: population, meat consumption, ruminant production, deforestation, fossil fuel subsidies, sea ice loss, ice sheet loss, glacier thickness, ocean heat content, ocean acidity, sea level rise, area burned, extreme weather events.

The climate emergency proclamation goes on:

Despite 40 years of global climate negotiations, with few exceptions, we have generally conducted business as usual and have largely failed to address this predicament. The climate crisis has arrived and is accelerating faster than

most scientists expected.... It is more severe than anticipated, threatening natural ecosystems and the fate of humanity.... Especially worrisome are potential irreversible climate tipping points and nature’s reinforcing feedbacks (atmospheric, marine, and terrestrial) that could lead to a catastrophic “hothouse Earth,” well beyond the control of humans.... These climate chain reactions could cause significant disruptions to ecosystems, society, and economies, potentially making large areas of Earth uninhabitable.

## **The Solution?**

All of the traditional climate culture solutions are represented, but there is a glaring hole relevant to advanced climate reform strategies that are most current in the literature. These most recent additions to climate reform strategies, however, are not yet quite ripe, according to the climate consensus establishment. This presents what is likely the most important aspect of why our climate culture has yet to respond to the imminent threat displayed by climate change over the last 40 years, and by the existential threat that is illustrated today in impacts happening far ahead of schedule. This glaring hole is atmospheric greenhouse gas reductions, and the most important aspect of the climate change discussion is the speed that science can be adopted and acted upon.

No amount of future emissions reductions or complete cessation of emissions can reduce the accumulated greenhouse gases in our sky that are causing Earth systems collapses right now.

Our climate culture has been on a path of dangerous climate change avoidance since the beginning of the understanding of the degrading meaning of humanity’s greenhouse gas emissions. This dangerous avoidance has come in the form of avoiding 2°C of warming above the preindustrial period, as that was the temperature that was deemed dangerous to



humanity [in 1990 when it was developed](#). In 2018, this dangerous climate change limit was lowered to 1.5°C with the Intergovernmental Panel on Climate Change report, *Global Warming of 1.5°C*.

The climate change discussion is no longer about dangerous climate change avoidance. Our climate is already overly dangerous. To be safe, we must restore a climate that is cooler than today.

We have an acute collapse reaction across our Earth systems that has been caused by current warming of about 1°C, itself caused by accumulation of greenhouse gases in our atmosphere. Earth systems are the vital parts of our planet that provide stability to our climate, among other things. The systems consist of the land, oceans, atmosphere and poles and include the planet's natural cycles — physical, chemical and biological. Nine Earth systems collapses have been [identified by scientists as active](#): Arctic sea ice, Greenland ice sheet, boreal forests, permafrost, the Gulf Stream, the Amazon, coral, the West Antarctic Ice Sheet and parts of the East Antarctic Ice Sheet.

No amount of future emissions reductions or complete cessation of emissions can reduce the accumulated greenhouse gases in our sky that are causing Earth systems collapses right now. These collapses have tipping points that may or may not already be reversible, in time frames that matter.

These collapses represent unrecoverable scenarios that the scientists speak to when they say “hothouse Earth well beyond the control of humans,” and “potentially making large areas of Earth uninhabitable.”

All of these collapses are underway. Their collapse initiation periods have begun or likely begun, but we don't know how fast they will proceed. This is the real climate emergency.

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The science behind Earth systems collapse is still nascent, and this is one of the main reasons why these collapses are not a larger part of climate science and policy. We cannot model them well like we can model the slow, linearly-based changes from temperature we are so familiar with, and modeling is what future projections are based upon.

There is one glimpse of the complete solution to a climate emergency in this work. From the “Energy” section, “The world must quickly implement massive energy efficiency and conservation practices and must replace fossil fuels with low-carbon renewables ... and other cleaner sources of energy if safe for people and the environment.... We should leave remaining stocks of fossil fuels in the ground ... *and should carefully pursue effective negative emissions using technology such as carbon extraction from the source and capture from the air and especially by enhancing natural systems.*” (Emphasis added.)

Capturing carbon from the air is the quintessentially critical part of the quote above. This “*capture from the air*” reduces the load of climate pollutants already in the sky that are responsible for current warming and all the extreme weather event mayhem that is happening now — that includes unrecoverable Earth systems collapse initiations.

To reverse warming and to reverse extreme weather events and collapses, we must reverse warming from today. The limits to dangerous warming referenced in this article are 2°C and the more recent 1.5°C in 2018. Science has been around for over a decade now that [says](#) less than 1°C is the dangerous limit to warming.



Very importantly — and what we will very likely see with near-future climate science — is that the “safe limit” to warming is below that temperature where the unprecedented extremes and Earth systems collapses began, from sometime in the 2000s, when the temperature was about 0.5°C warmer than preindustrial Earth.

The important emphasis added to the quote above also tells us something else. The part of the quote, “*and especially by enhancing natural systems*” is critical. The [Nature Section](#) of the scientists’ article states:

We must protect and restore Earth’s ecosystems. Phytoplankton, coral reefs, forests, savannas, grasslands, wetlands, peatlands, soils, mangroves, and sea grasses contribute greatly to sequestration of atmospheric CO<sub>2</sub>. Marine and terrestrial plants, animals, and microorganisms play significant roles in carbon and nutrient cycling and storage. We need to quickly curtail habitat and biodiversity loss ... protecting the remaining primary and intact forests, especially those with high carbon stores and other forests with the capacity to rapidly sequester carbon (proforestation), while increasing reforestation and afforestation where appropriate at enormous scales. Although available land may be limiting in places, *up to a third of emissions reductions needed by 2030 for the Paris agreement (less than 2°C) could be obtained with these natural climate solutions....*” (Emphasis added.)

This means that air capture of carbon dioxide — just to meet 2°C — must comprise two-thirds of all the air capture that is done, and fundamentally, these scenarios are all in addition to net zero emissions by about mid-century. In other words, we must scale solutions to remove greenhouse gases from the atmosphere far in excess of the possible amount of removal that could be done with nature-based systems alone. Keep in mind, this is just to meet the 2°C dangerous limit.

The technologies already exist to enhance natural systems to remove the excess greenhouse gases in our sky far in excess of what is needed to meet the 2°C limit. We have been practicing these types of nature-based sustainability strategies for nearly 100 years. We have also been using industrial processes to remove carbon dioxide from the atmosphere since the 1930s with amine chemicals. Since World War II, we have been removing CO<sub>2</sub> from the air with potash and lye in submarines to keep sailors safe from carbon dioxide poisoning. In the 1950s, amine chemicals became one of the most important chemicals in industry.

We have the money, too. Costs will be little different from the half-trillion dollars we spend globally every year attempting to ensure safe drinking water. What is needed is giga scaling to meet the extraordinary demand of atmospheric removal allowed by 30 years of delay. (Giga scaling refers to industrial processes that do something a billion times.)

This giga scaling is something we know how to do well. We have done it with computer chips, solar cells and giga battery factories. We have giga-scaled other things as simple as the [53 gigatons of aggregates](#) that we mine every year to make concrete and roads. We treat about [52 gigatons of human sewage](#) every year in the U.S. alone, and about [64 gigatons of potable water](#) in the U.S. alone.

The challenge is big, but it’s nothing we have not done before. Now we face a climate emergency. Hopefully, this new emerging climate culture we see will now allow us to act. Time is short.