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# Game over” for the Amazon forest and global climate if Trump wins? (commentary)

by **Philip M. Fearnside** on 11 July 2024



- *Both global climate and the Amazon Forest are near tipping points beyond which irreversible processes would lead to unprecedented catastrophes. A second Trump presidency would both boost greenhouse gas emissions and would risk a critical delay in global efforts to avert a runaway greenhouse.*
- *The various interrelated tipping points represent thresholds where the annual probability of a catastrophic change increases sharply, after which the risk of a disaster at some point in time increases constantly.*
- *Climate change threatens the Amazon Forest, and if the rainforest collapses it would push global warming past a tipping point in the climate system. This risk would be greatly increased by a second Trump presidency.*
- *This is a commentary and does not necessarily reflect the views of Mongabay.*

Would another Trump presidency be “game over” for the Amazon forest and global climate? At least there is still a question mark at the end of that sentence! Global warming is very close to escaping from human control, and the chances of this happening would be significantly increased if Donald Trump (Figure 1) wins a second term as US president. In addition to a surge in US emissions, his presidency could result in a four-year delay for global action to contain climate change to reach an effective level. A runaway greenhouse would [eliminate the Amazon forest](#). The reverse is also true and is part of the problem: if the Amazon forest collapses, global

climate would be [pushed past a tipping point](#) and global warming would proceed irreversibly to a “hothouse Earth.”

Trump denies the existence of anthropogenic global warming and withdrew the US from the Paris Agreement during his first term in office (see [here](#) and [here](#)). If he wins a second term, he has promised to revoke the greenhouse gas emissions reduction measures instituted under President Joe Biden, including those authorized under the Inflation Reduction Act (see [here](#) and [here](#)). He plans to open all federal lands to oil and gas extraction and he uses the slogan “[drill, drill, drill](#)” in his campaign rallies. Trump’s campaign says he would [withdraw the US](#) from the Paris Agreement again if elected.

[Project 2025](#), drafted by the Heritage Foundation, argues (p. 709) that the US should withdraw not only from the Paris Agreement but also from the entire Climate Convention (United Nations Framework Convention on Climate Change, or UNFCCC). Trump claims to “[know nothing](#)” of Project 2025. Although the veracity of that claim is improbable, he has undoubtedly not read the 886-page document given that his reading is [reportedly limited](#) to less than a single page. However, the ultra-conservative think tank that drafted the document designed it to help facilitate and justify a basket of policy proposals for a second Trump presidency, and it fits with his well-known penchant for withdrawing the US from international agreements.

The United States is critical to containing global warming both because it is the world’s second-largest emitter of greenhouse gases (having been displaced from first place by China in 2006) and because many other countries are likely to be unwilling to make economic sacrifices to cut their emissions if the US refuses to do so, simply acting as a “free rider” on the mitigation efforts of the rest of the world.

Global climate change will escape from human control if it reaches a point where even completely eliminating net anthropogenic emissions would be insufficient to halt further warming. The Climate Convention’s “[global stocktake](#),” released at COP28 in December 2023, calculated that human society currently emits approximately 55 billion tons of carbon dioxide equivalent, which is 15 billion metric tons of carbon (i.e., not counting the two oxygen atoms in CO<sub>2</sub>) (Figure 2). This means that if we don’t burn a single kilogram of fossil fuel or cut a single tree, we only avoid 15 billion metric tons of carbon emission per year. Global warming escapes control if what we are emitting “indirectly” is greater than this, as the climate doesn’t distinguish whether or not an emission is “directly human induced” (the term used in the Kyoto Protocol for what was included in that 1997 agreement and has been the focus ever since). Anthropogenic climate change is causing “indirect” emissions by increasing the frequency and severity of [wildfires](#), by exposing peat by [melting the permafrost](#) in the tundra, by warming all of the soils in the world and causing them to lose carbon (including the [soil under the Amazon forest](#)) and by warming the oceans so that they [absorb less CO<sub>2</sub>](#).

**Historical emissions from 1950, projected emissions in 2030 based on nationally determined contributions, and emission reductions required by the Sixth Assessment Report of the Intergovernmental Panel on Climate Change**

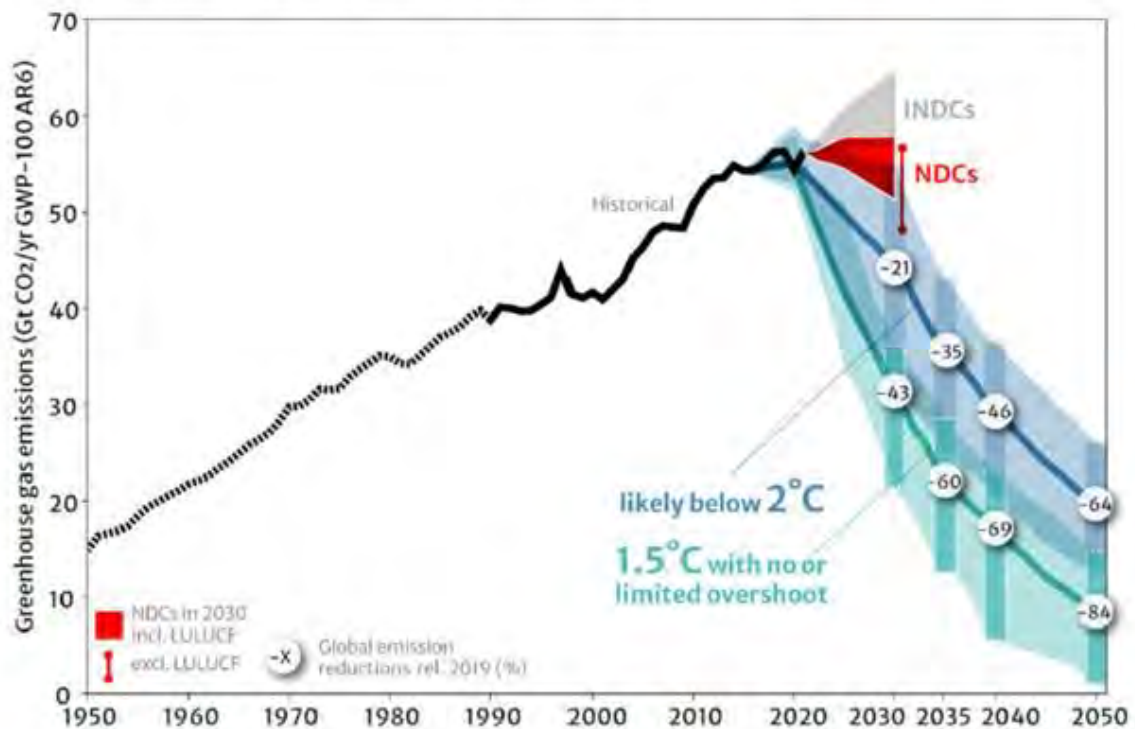


Figure 2. The Climate Convention’s “[Global stocktake](#),” showing historical global anthropogenic emissions and future pathways that would be needed to maintain temperature within limits of 2 °C and 1.5 °C. The effect of implementing the Nationally Determined Contributions (NDCs) promised under the Paris Agreement is also shown.

The [Climate Convention](#), approved at the Eco92 “Earth Summit” in 1992 and ratified by 198 countries, has as its objective maintaining atmospheric greenhouse gas concentrations below a level that would cause “dangerous interference with the global climate system”. What level is “dangerous” was not defined in the convention, and negotiations proceeded in the succeeding years. Environmental groups, such as [350.org](#), pressed for a limit at 350 ppmv. A CO<sub>2</sub> concentration of 400 ppmv was a frequently mentioned value, but we [passed that milestone](#) in 2013. Among other factors, the 400 ppmv mark represents a threshold above which the probability rapidly increases of “[Atlantic dipole](#)” events with warm water in the tropical North Atlantic and colder water in the Tropical South Atlantic, a combination that causes severe droughts and forest fires in the southwestern Amazon, as in 2005. The standard atmospheric CO<sub>2</sub> concentration at the Mauna Loa Observatory in Hawaii was [424.5 ppmv](#) on 6 July 2024.

In 2015 the criterion shifted from the concentration of gases to the increase in mean global temperature above the pre-industrial mean, with the [Paris Agreement](#) describing the limit as “well below 2 °C”. In 2021 at COP26, 1.5 °C above the pre-industrial mean was decided as the definition of “dangerous,” although a constant struggle is needed to [keep this target from being abandoned](#). The term “pre-industrial” had traditionally been considered to be the year 1750, but in its

2018 [special report](#) on 1.5 °C the Intergovernmental Panel on Climate Change (IPCC) redefined the term as referring to 1850-1900, thus relaxing the implied limits. Temperatures are rising at record rates, and in 2023 global temperature averaged [1.36 °C](#) above the 1850-1900 mean. Between July 2023 and June 2024, the world had its first year above the 1.5 °C mark, with a global average of [1.64 °C](#).

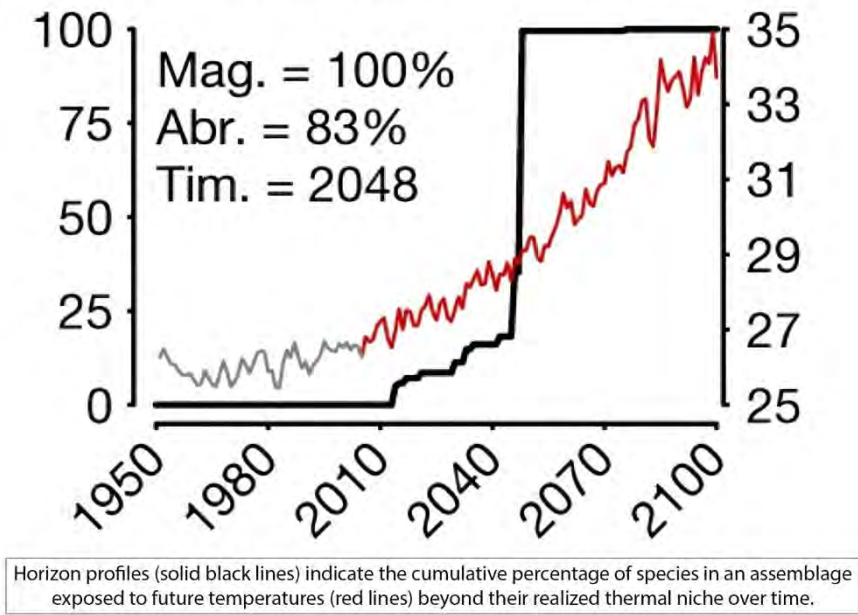
“Tipping points” represent thresholds where a stressor such as high temperature or severe drought causes a rapid increase in the probability of a catastrophic shift, for example by rainforest being replaced by savanna ([IPCC, 2007, p. 775](#)). The increase in probability is not the same as stepping off a cliff, immediately resulting in a fall to certain death. Instead, there is a sudden rise in the risk of the catastrophe occurring each year, and, with the passage of time at this increased risk level, the likelihood of the catastrophe occurring at some point in the journey climbs constantly.

Decision making must recognize that the greater the magnitude of the catastrophe in question, the smaller the level of risk that is acceptable, and that the consequences of either the collapse of the Amazon rainforest or of the global climate are such that extreme precaution is needed. Unfortunately, the progression of damaging decisions and failures to act in both spheres over the past few decades show clearly that [this principle](#) has been ignored.

The 1.5 °C limit is believed to coincide with a tipping point for the Amazon forest, and [one calculation](#) of this foresees the forest collapsing in the year 2048 (Figure 3). The precision of the forecasted 2048 date is surely exaggerated, but the fact that a tipping point is near at hand is true. Continents warm more than the global mean temperature because 70% of our planet is covered by water and air temperatures over the oceans are lower than those over the continents. At a global mean of 1.5 °C above the 1850-1900 baseline, the mean temperature over Amazonia would increase above current temperatures by approximately 2-3 °C, and the climate would also be dryer with increased numbers of consecutive dry days (Figure 4). At higher mean global temperatures these factors increase dramatically (Figure 4). Of course, the extremes of temperature and drought severity are much higher than the means, and heat and drought [act together synergistically](#) to kill trees. “[Unprecedented](#)” [droughts](#) in the Amazon are predicted, including “[super-El Niños.](#)”



### Biodiversity climate horizon profile for the Amazon Basin



Adapted from Trisos et al (2020)

Figure 3. Calculation of Amazon forest collapse in 2048 under a business-as-usual scenario (Trisos et al., 2020).

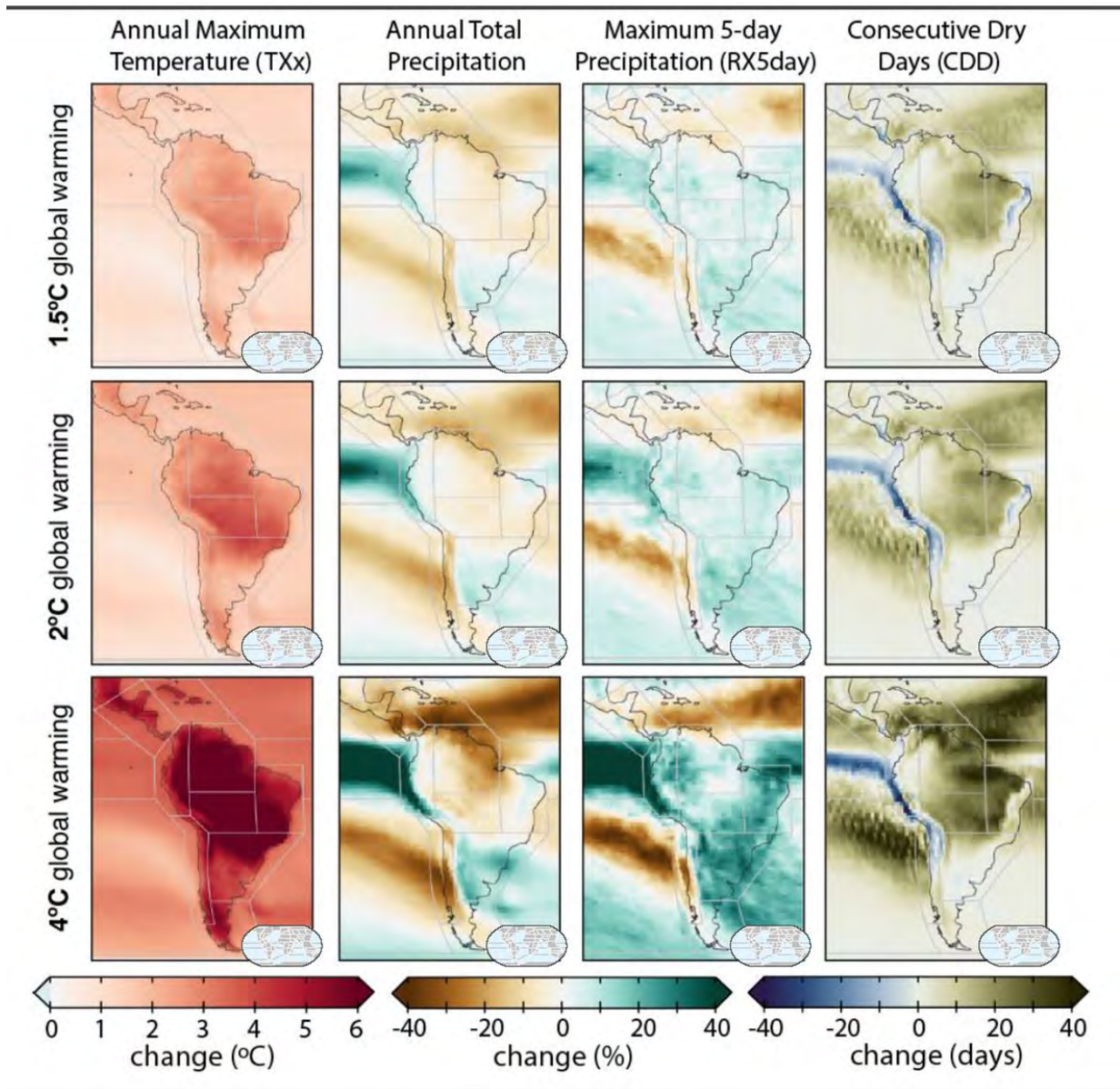


Figure 4. Maps of mean values of climate variables at different levels of global mean temperature (IPCC, 2021).

There are various tipping points for the Amazon forests in addition to temperature, and these are all close at hand. These include [dry-season length](#) and the percentage of the Amazon forest that is deforested (see [here](#) and [here](#)). Signs of stress on the Amazon forest are already apparent. The forest is [losing its resiliency](#) to recover from droughts. In southeastern Amazonia the forest is losing carbon, as shown both by [ground observations](#) and by [air samples](#) collected from aircraft. An estimated 47% of the Amazon forest could be at [risk of collapse](#) by 2050 under a “business-as-usual” climate scenario (Figure 5).

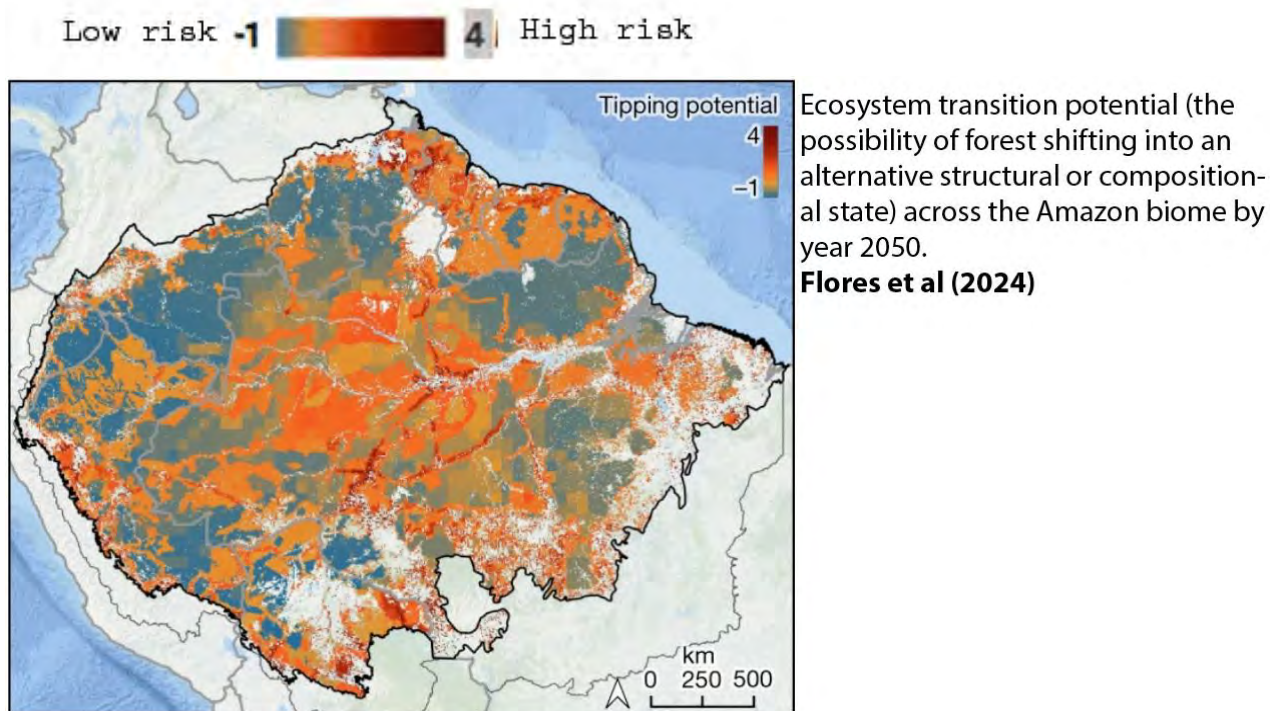


Figure 5. Map of areas most likely to collapse by 2050 (Flores et al., 2024; map from Sassini, 2024).

If the Amazon forest is replaced by non-forest vegetation, whether by deliberate deforestation for pasture and soybeans or by climate change in concert with degradation from logging and forest fires, a tremendous amount of carbon would be released to the atmosphere. In PanAmazonia (including the Amazonian portions of all eight countries) as of 2013, the stocks of [carbon in the vegetation](#) totaled 58.6 billion tons in Brazil (Nogueira et al., 2015) and approximately 20 billion tons in the remaining countries. In the soil the top meter contained 92.9 billion metric tons (based on [Quesada et al., 2011, p. 1418](#)), while the soil from 1 to 8 m contained 251.1 billion metric tons (based on [Trumbore et al., 1995](#)). All of these values are very much greater than human society's 15-billion-ton annual emission (Figure 2), meaning that global climate would be pushed into a [runaway greenhouse](#) if only a small fraction of this were released into the atmosphere over the course of a few years. The situation has been summarized as “If Amazon reaches tipping point, global warming goals will be [‘blown out of the water.’](#)”

The Climate Convention's “[Global Stocktake](#)” shows that the commitments of countries under the Paris Agreement (Nationally Determined Contributions, or NDCs) are completely insufficient to control global warming, even if all countries were honoring their commitments, which is not the case (Figure 2). Figure 2 also indicates the emission path that would have to be followed to keep warming below the 1.5 °C limit: global annual net emission would have to be lowered by 43% by 2030 (only 6 years from now), and the decrease would have to reach 84% by 2050.



These numbers are not subject to the negotiations that are customary in diplomacy, politics and business, where the norm is to seek a middle ground for compromise. The 43% and 84% values are simply fixed, unless someone does another scientific study showing that they should be different. These are not subject to Trump's "art of the deal."

In summary, both global climate and the Amazon rainforest are near tipping points that would, if crossed, later provoke irreversible catastrophes. Crossing a tipping point in either one of these spheres would lead to crossing one in the other. We do not have four years to take effective actions to prevent this. A second Trump presidency could be a deciding factor in provoking this disaster.

*An earlier version of this text was published in Portuguese by [Amazônia Real](#).*

*Header image: Generated image suggestive of a bleak and burned-out patch of Amazon rainforest*