Member-only story

The Coffin in the Room: Catastrophic Impacts on Human Population

The Future of Humanity, Part 5

Steve Genco · Following
14 min read · Nov 26, 2022

Photo by WantTo Create on Unsplash.

This is the fifth — and most distressing — post in my 7-part series on the future of humanity. The series starts here.

Climate projections versus population projections

There is a puzzling disconnect at the core of climate science between climate projections and population projections. Indeed, comparing the two, one might be forgiven for thinking that population scientists and climate scientists live in two completely different worlds.

On the one hand, climate scientists foretell a world of unprecedented disasters over the next decades and centuries: deadly heat, floods, droughts, mega-storms, abandoned coastlines, freshwater scarcity, food shortages,

etc., etc. But on the other hand, population scientists at the UN are projecting a world population that continues to grow, largely driven by high birth rates in poorer countries (those most vulnerable to climate change impacts). In a report released in 2019, UN scientists projected that world population would rise from *7.9 billion* today to *9.7 billion* by 2050, before leveling off at nearly *11 billion* around 2100 (source).

The disconnect between these two visions of humanity's future is dizzying. To take one example, the UN estimates that the population of sub-Saharan Africa will double by 2050. Yet the latest climate warnings from the IPCC tell us that a 2°C hotter world by 2050 is both *likely* and *likely to devastate* sub-Saharan Africa, producing droughts, floods, food shortages, and regional warming so deadly that outdoor work may become impossible for much of the year in much of the region (source). How can anyone expect population to double in such circumstances?

The answer has to do with how the IPCC climate models are constructed.

> The climate models used in the IPCC reports only include population as an input variable, not as an output variable. They predict climate changes based (in part) on a given level of population (usually taken from those UN projections), but they do not predict population changes based on a given level of global warming. In other words, the population and climate models are not bidirectionally coupled (source).

So the reason why climate models don't show population declines in the face of unprecedented global warming is because they don't include population as an output variable in their models. If they did, they would probably find that these UN world and regional population projections are wildly overoptimistic for the hotter world we are entering.

> The UN population projections are an "all things being equal" projection for a world in which all things are very, very far from being equal (source).

When we look at all the interlocking elements that define the global predicament humanity faces today, **what is the weakest link in the chain of climate change causes and effects? It's the human body.** Humans are a scrappy species. But our bodies have biological limits beyond which we

cannot survive.

- We cannot survive in *wet-bulb temperatures* greater than 35°C for more than a few hours (source).
- We cannot survive without water for more than three days (source).
- We cannot survive without food for more than one to two months (source).

Given these limitations on human survivability, what are we to make of warnings like these from the 2022 IPCC's Sixth Assessment Report (source)?

- Approximately 3.3 to 3.6 billion people live in areas that are *highly vulnerable to climate change*. (that's close to half of all humans alive today)
- Global hotspots of high human vulnerability are found particularly in West Africa, Central Africa, East Africa, South Asia, Central America, South America, Small Island Developing States and the Arctic.
- Future human vulnerability will be concentrated where the capacities of local, municipal and national governments, communities and the private sector are least able to provide infrastructures and basic services.
- Risks are highest where species and people exist close to their upper thermal limits (i.e., in already-hot climates), along coastlines, or in close association with ice (which will melt) or seasonal rivers (which will dry up and/or flood).
- At approximately 2°C global warming, snowmelt water available for irrigation is projected to decline in some areas by up to 20%, and global glacier melt is projected to diminish water availability for agriculture, hydropower, and human settlements in the mid- to long-term, with these impacts projected to double with 4°C global warming.
- Climate change will increasingly put pressure on food production and access, especially in vulnerable regions, undermining food security and nutrition.
- Global warming will progressively weaken soil health and ecosystem services such as pollination, increase pressure from pests and diseases, and reduce marine animal biomass, undermining food productivity in many regions on land and in the ocean.
- At 3°C or higher global warming level in the long term, areas exposed to climate-related hazards will expand substantially compared with 2°C or lower global warming level, exacerbating regional disparity in food security risks.

What the IPCC is saying, in polite but unambiguous language, is that the impacts of climate change on human bodies are going to be felt first and most severely by the most vulnerable among us. This is where the deadly heat will first be felt, where the famines will first appear, and where the droughts, floods, and ecosystem collapses will be most devastating.

> It simply seems implausible that already-struggling regional populations will grow as projected by the UN under the burden of 2–4°C higher average global temperatures.

Because of the disconnect between climate models and population projections, we don't have a clear picture of exactly how devastating to human populations different levels of global warming will be. Perhaps this has been an intentional strategy by climate scientists to avoid "spooking" their audience, but it has left us with a big gap in our understanding of the single most important consequence of climate change — its effect on human mortality. Without plausible data and models to guide us, that gap gets filled by speculation and guesswork, and a lot more heat than light.

Climate science and carrying capacity: what is a "sustainable" world population?

Climate scientists' opinions on population tend to fall into two camps. The first I would call the **"I'm not going to touch that" camp**. These folks appear to be quite happy to keep population impacts out of their climate models. Their job, they might argue, is to provide data and models to help humanity *avoid* the worst population consequences of climate change, not to document the magnitude of devastation we can expect *if we fail* in that mission. Fair enough. But as governments continue to underperform on their climate commitments, and greenhouse gas levels continue to rise, some scientists have begun to acknowledge that 2°C global warming is now inevitable, 3°C is likely, and 4°C is well within the range of possibility (source). Given these latest projections, disregarding the potential population impacts of warmer global temperatures may no longer be an option (source).

The second camp of climate scientists might be called the **"carrying capacity" camp**. The concept of *carrying capacity* has been a staple of ecological studies for decades. It refers to the maximum population size a biological species can sustain within an environment, given the food, habitat, water, and other resources available in that environment. Its application to human populations has been controversial (source). Critics

point out that humans, unlike other species, can alter their environments, thus increasing their local, regional, or global carrying capacity (source). Both the Industrial Revolution and the Green Revolution are often cited as proof that human carrying capacity on planet Earth can be vastly increased through innovation and the exploitation of untapped energy sources (source). Humans also differ from other species in that we know how to capture and store resources for later usage on an industrial scale, thus effectively delaying any impacts of exceeding carrying capacity by drawing upon stored resources (until they are depleted).

Proponents of the carrying capacity concept acknowledge that humans have successfully increased the planet's human carrying capacity many times over, but warn that this does not mean carrying capacity is *infinitely* expandable, or that energy sources are infinitely renewable (source). Rather, they argue that whatever energy sources or technology innovations a human population might enjoy, that population's environment imposes a finite carrying capacity: the number of individuals whose lives the current resource base can support, either at a bare subsistence level or, preferably, at a higher level of life satisfaction, health, and well-being.

The thing about carrying capacity is that as long as population remains well below an environment's capacity to support it, the concept is of little interest or value. But given now that we are on the "hockey stick" portion of the global population curve, the idea of revisiting carrying capacity is gaining momentum among climate scientists (source). Indeed, in a world in which global population has doubled from 4 billion to 8 billion in 50 years, the question of whether and for how long the planet's natural environment can meet the survival needs of such an exploding population can no longer be avoided.

> Human population has been growing exponentially, but resources are growing at best linearly, and at worst, not at all.

One approach that has taken the carrying capacity concept in promising directions is the *Planetary Boundaries* framework proposed by Rockström (2009) and updated by Steffen (2015). This approach reinterprets carrying capacity as a function of nine absolute biophysical boundaries that "*guardrail and govern the Earth system in the Anthropocene period*" (source, p. 1). The nine boundaries include climate change effects but also identify other potential threats to human survivability such as ocean acidification, nitrogen and phosphorus emissions, global water and land availability, and eroding biodiversity.

To learn more about the *Planetary Boundaries* framework, I recommend any of the references in the previous paragraph. I mention it here because scientists working in this area have begun to build models that address the missing piece noted above: *the effects of climate change and resource depletion on human population at global, regional, and local levels*. Their analyses finally give us some indication of how global population is likely to respond to our current environmental trajectory:

> *"Physical needs (that is, nutrition, sanitation, access to energy and elimination of poverty below the US$1.90 line) could likely be met for 7 billion people at a level of resource use that does not significantly transgress planetary boundaries. However, if thresholds for the more qualitative goals (that is, life satisfaction, healthy life expectancy, secondary education, democratic quality, social support and equality) are to be universally met then provisioning systems — which mediate the relationship between resource use and social outcomes — must become two to six times more efficient". (source, p. 92)*

I interpret this as a rather obliquely expressed warning: seven billion people might be able to live miserable, subsistence-level lives within the planetary boundaries that will protect us from a 2–4°C hotter world, but for that many people to live a *good life*, our profligate consumption of the world's resources (including but not limited to fossil fuels) would have to be radically reduced, either by getting two to six times more use (i.e., efficiency) out of each unit of resource consumed or, failing that, by *having only one-half to one-sixth as many people equitably consuming the resources currently being consumed — very unequally — by 8 billion people*.

> According to this formulation, the Earth only contains enough finite resources to support a "good life" for between 1.3 billion and 4 billion people.

Other estimates of the Earth's carrying capacity arrive at similarly low numbers. William Rees, a Canadian population ecologist and founder of the Global Footprint project that measures resource consumption on a nation by nation basis, recently observed:

> *"The long-term human carrying capacity of Earth — after ecosystems have recovered from the current plague ["plague phase" is a term used by ecologists to describe the peak of a population boom-bust cycle] — is probably one to three billion people, depending on technology and material standards of living." (source)*

Paul Ehrlich, he of *Population Bomb* fame, takes up the question in a 1994 piece titled "*Optimum Human Population Size*". Ehrlich and his coauthors conclude that optimum population might vary significantly given different values and policies, but overall is likely to fall somewhere between 1.5 billion and 2 billion people (source).

Johan Rockström, one of the founders of the Planetary Boundaries approach and director of the Potsdam Institute for Climate Impact Research, stated in a 2019 interview that in a 4°C-warmer world:

> *"It's difficult to see how we could accommodate eight billion people or maybe even half of that. There will be a rich minority of people who survive with modern lifestyles, no doubt, but it will be a turbulent, conflict-ridden world." (source)*

Rockström was essentially echoing his colleague Hans Joachim Schellnhuber, a founder of the Potsdam Institute and a leading climate scientist and advisor to the German government, who was called out in a 2009 *New York Times* article for stating at a climate conference:

> *"In a very cynical way, it's a triumph for science because at last we have stabilized something –- namely the estimates for the carrying capacity of the planet, namely below 1 billion people."*

This statement — basically an offhand joke gone bad — was met with significant backlash. The *Times* piece referred to Schellnhuber's "aggressive stance on climate change" and called his comment "an apocalyptic prediction." Others accused him of advocating genocide and supporting policies to *deliberately* reduce world population to one billion. At a later climate conference in Melbourne in 2011, an audience member held up a noose while Schellnhuber was speaking (source). As late as 2015, Schellnhuber was still being questioned about his comment. In an interview, he explained:

> *"What I said is, if global warming is not in any way mitigated, and we go into a six or eight degrees [Fahrenheit] warmer world, then our planet will probably only be able to support a billion people." (ibid.)*

Climate scientists' reticence to talk directly about how climate change impacts population may in part be a reaction to this treatment Schellnhuber received for a single, relatively casual comment about the potential impact of climate change on human mortality. The lesson for other climate scientists was hard to miss: **people, including some in their own field, did not want to hear about the direct effects of global warming on human mortality.** The

topic was simply too horrific for most people to contemplate.

Even the *Planetary Boundaries* researchers fail to describe the population costs of climate change directly. They refer to the number of people a particular environmental scenario "can sustain." They leave the next step, I suppose, as an exercise for the reader. Subtract the sustainable population from the current population, the remainder is the unsustainable population. What happens to *them*? There would seem to be only one answer: They will not survive because their basic biological needs — for food, water, and shelter from wet-bulb temperatures — will not be met.

> That's what "failing to be sustained by your environment" means: you do not have enough food, water and shelter to keep yourself alive.

Obviously, population decline via *decreasing birth rates* would be far preferable to population decline via *increasing death rates*. As population scientists are quick to point out, *birth rates* are falling in many wealthy countries, in some cases to levels low enough to produce population declines over the next several decades (source). But, at least today, these declines are more than compensated for globally by high birth rates in many of the most climate-vulnerable and economically-fragile countries of the less developed South.

Can a "demographic transition" in the vulnerable South stabilize the world's population at current levels of consumption?

Proposals to stabilize population growth in developing countries tend to revolve around an attractive idea called the *demographic transition*. This concept says the best way to bring developing countries' populations under control is to make them more like developed countries. If these countries and regions can be brought up to developed-country standards of living (and consumption), the expectation is that they will naturally settle into lower birth rates as they adopt the policies and reap the benefits of joining the developed world.

The *political* appeal of this concept is obvious. It offers the poor a path to wealth. It offers the wealthy a painless way to claim the moral high-ground without risking any decline in their own standard of living (and consumption). It offers politicians a way to sound equitable and honorable. Unfortunately, there is a fatal flaw in the logic of the demographic transition. While we may not know *exactly* what the Earth's carrying capacity is right now, we can easily calculate that it is far below what would be required to support 8 billion people at the same level of resource consumption enjoyed

by the wealthiest nations today (source).

The problem is that we are currently consuming the world's *renewable resources* (timber, clean water and air, healthy soils, wild fish harvested for food, etc.) at unsustainable levels (source). In other words, we are using them up faster than they can be replenished, naturally or through active management. As measured by the *Global Footprint Network,* bringing the whole world up to the "good life" standards of the US or Europe would require the resource capacity of between 2 and 5 Earths (source). Given that we have only one Earth, **the goal of the demographic transition — as attractive as it is politically — is not achievable without significantly reducing the resource consumption levels of the wealthiest nations.**

> The only way to slice the global resource pie more equitably among all nations is to give the richest nations smaller pieces than they are eating today.

One of the most recent Planetary Boundaries studies, published earlier this year, finds that high-income nations are responsible for 74% of global excess material use, driven primarily by the United States (27%) and the European Union (25%). China is responsible for 15% of global excess material use, and the rest of the Global South is responsible for only 8%. Their conclusion regarding wealthy nations' resource use:

> *"Our results show that high-income nations need to urgently scale down aggregate resource use to sustainable levels. On average, resource use needs to decline by at least 70% to reach the sustainable range." (source, p. e347)*

It seems highly unlikely that the rich nations of the world are going to *voluntarily* reduce their consumption of the world's resources, both nonrenewable and renewable, by 70%. Certainly no political leader in any of those nations would dare advocate such a change, because to do so would be career suicide. And if we look for guidance from recent history, the failure of millions of Americans to accept the minor inconvenience of wearing a face mask to avoid spreading COVID-19 is instructive. Rather than submit to a simple and painless public health measure, Americans chose to accept a million COVID deaths *of their fellow Americans.* What is the likelihood they would be willing to sacrifice 70% of their lifestyle to "save" the rest of the world from population collapse brought on by global warming? I believe it is vanishingly small.

A population disaster in the making

Humanity appears to have missed its chance to mount a *voluntary* response

to the climate-change/resource-depletion predicament it now faces. It could have listened to the science. It could have accepted the need for a significant shift in consumption in the wealthiest countries. It could have put together a global plan and made the necessary (massive) investments to achieve an orderly transition from fossil fuels to a modern, global, renewable energy infrastructure. It could have addressed the massive inequalities that exist both within and between countries. **Humanity has had the *means* to do all these things for at least half a century**. But we have done none of them for reasons that are now all too familiar — greed, selfishness, short-sightedness, political obstruction, and good old inertia.

The potential for catastrophic loss of human life due to climate change is indeed the coffin in the room. But it continues to be ignored, denied, or diminished. Climate scientists have firmly established that more people consume more resources, burn more fossil fuels, produce more greenhouse gases, raise global temperatures, and increase the risk of irreversible climate *tipping points*. But they have been more reticent to document and publicize how severely global warming might in turn decimate populations around the world, starting with the regions that will initially experience the full brunt of a 2–4°C hotter world, but spreading quickly to the rest of the world as well.

> The effects of climate change on vulnerable nations and regions will not remain local.

Given the dependence of our modern global economy on regional specialization and international trade, these initial, regionally-focused climate change disruptions and disasters will quickly produce global ripple effects, shrinking the supplies of imported energy, materials, products, and food upon which many of the wealthiest nations depend.

> And that's when the rich North's involuntary transition

Climate Change Population Politics Planetary Boundaries

To be continued ...

Written by Steve Genco

1.5K Followers · 96 Following

Following

Steve is author of Intuitive Marketing (2019) & Neuromarketing for Dummies (2013). He holds a PhD in Political Science from Stanford University.

Responses (13)

What are your thoughts? Respond

Tom Ellis
Dec 9, 2022

Thank you for sharing this grim but insightful and accurate perspective. Denial runs deep, I'm afraid, even among research scientists, about the catastrophic effects of our greed-driven global market economy on our collective future. Collectively... more

9 1 reply Reply

Jane Schaffer
Dec 21, 2022

Your artice 'The Coffin in the Room' is very interesting. As I read the start where you compare the predictions re global population as compared to climatic predictions, I couldn't help thinking of a recent article by a Medium wrtier who has... more

4 1 reply Reply

Duck Stop
Dec 25, 2022

If the population continues to grow, it is likely that amoral and authoritarian governments will step in with drastic and severe extermination measures. This is a worst-case scenario which people tend to deem unlikely. False comfort is felt when saying to oneself: Nah, that'll never happen.

2 Reply

See all responses

More from Steve Genco