
COMMENTARY**Bending the Curve by 2030:
On the Path to a Population Safe Harbour**Christopher Tucker¹Chairman, American Geographical Society

Abstract

Half the global population has birth rates below replacement and several advanced nations already have birth rates half that. There is no question that restoring a sustainable population via low birth rates is feasible. There is even a scientific consensus around the non-coercive, empowering strategies focused on women and girls that could expedite the inevitable process of bending the global population curve. The question is simply the level of investment required to make it happen. As such, this article explores the 'art of the possible', walking us through how we could approach a safe harbour population of three billion soon after 2100 – a new lower population plateau that would enable humanity to pay down the massive ecological debt it has accrued over recent centuries.

Keywords: population; population restoration; 1.5 TFR by 2030; empowering women and girls; climate restoration

We have been lulled into thinking that our ever-growing population has no role in driving the destruction of our planet. We have also been lulled into believing that the only way modern, prosperous societies can function is through perpetual economic growth that is fundamentally dependent on perpetual population growth. Of those who understand that neither of these propositions are true, still

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too many seem convinced that nothing can be done about it, short of unethical and coercive measures. This article rejects these notions.

Here we seek to draw attention to the art of the possible in bending the global population curve, in order to avert climate catastrophe, ecological annihilation and the untold human misery, instability, conflict and insecurity born of runaway population growth. This paper will strike many as strange and unrealistic, based on their reading of the many different efforts to 'predict' population growth, typically centred on validating or challenging the United Nations population projections. This paper is explicitly not an effort to predict, but rather an effort to determine what demographic dynamics might be desirable for the wellbeing of future generations and feasible with regard to achieving a long-term sustainable human population.

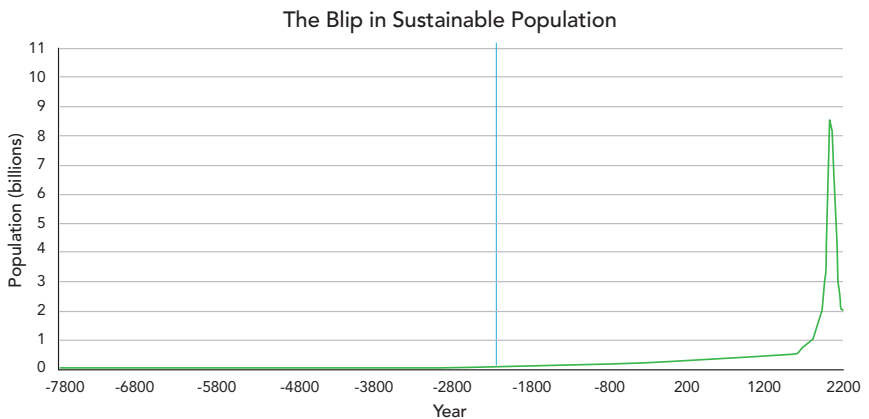
In a world where half the global population has birth rates below replacement and several advanced nations already have birth rates half that, there is no question that restoring a sustainable population via low birth rates is feasible. The question becomes, what is a sustainable population for humanity, and how we might achieve this goal without coercion. For those that say bending the population curve is unfeasible without coercion, we respectfully disagree, and undertake this analysis with a sober commitment to the wellbeing of our planet, our species and the families and children that will comprise the future of humanity. For those that say it is too late, and that even bending the population curve will not be enough to avert climate and ecological catastrophe, we again respectfully disagree that every action possible should not be taken to increase probability of our collective survival over the coming decades.

Demography runs 'open loop', meaning that the modeler sets parameters such as education levels, the average starting date of childbearing, access to family planning technologies, assumptions on longevity and the like, and sees what happens. In this exercise in 'restoration modelling' we ask, what Total Fertility Rate (TFR) would need to be encouraged and normalised in order to restore something akin to the historically sustainable population plateau that preceded the runaway population growth of the past two centuries, through ethical, non-coercive and empowering strategies.

For those who believe that we have not yet overshot the carrying capacity of our planet, this will appear a silly exercise. And, for those who believe that there is no such thing as just, ethical and empowering strategies for nudging reproductive behaviours and norms toward a more sustainable future, and that any initiative is necessarily coercive in nature, this will seem to be a morally repugnant exercise. To be clear, we reject both of these notions. Humans long ago exceeded our planet's carrying capacity. There are non-coercive, indeed empowering, strategies available for bending the curve. There is no reason to resort to coercive measures to achieve this goal, as has been attempted in the past. It is important to note that these coercive measures never actually worked at bending the population curve.

We recommend conservative goals regarding the survival of humanity, as we may only have one chance to fail. The most conservative baseline is to return to the stable global population at the start of the industrial revolution (1740, roughly 800 million), which was a population our planet sustained for centuries. A less conservative, more aspirational baseline would be roughly three billion (Tucker, 2019a).

Figure 1. The Blip in Sustainable Population from 8800 BCE to the end of the twenty-first Century



We consider this lower population plateau a 'safe harbour' which we should all strive for. Per person consumption is far higher now than in the distant past, but there are good reasons to believe that a newer, more sustainable technology mix

is possible that would allow a more efficient use of many natural resources with a safe harbour that is, say double the sustainable population plateau that existed before the historic population 'blip' that we are currently experiencing. Of course, it would take decades to come close to any such safe harbour, leaving us plenty of time to calibrate our long-term target.

In the case of restoration modelling, there is a recognised feedback loop. This feedback loop is based on our appreciation of the scientific consensus that shows that more resources applied to initiatives around girl's education, integration into the workforce, access to family planning and the promotion of modern reproductive norms can indeed have a powerful impact on TFR. (Ripple et al., 2019).

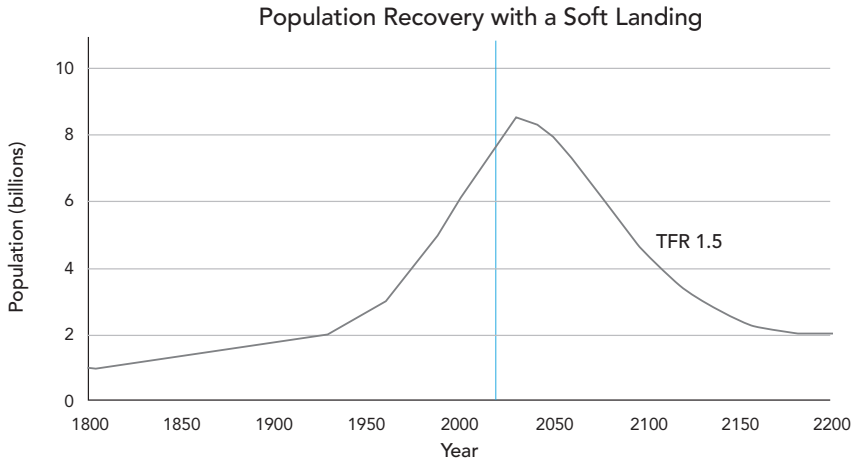
While some may say that it is impossible to ethically achieve a global 1.5TFR over the next decade, from the 2.3TFR (2021) of today, we will assert that the current reproductive norms are much more malleable than most appreciate (PRB, 2020). We argue that ethical, just and empowering investments focused on women and girls – in their education, their integration into the workforce and their access to family planning technologies and programmes, as well as reproductive norms shifting media investments could rapidly change the fertility patterns in most, if not all, nations. This, plainly, includes investments in boys and men which would coax more just, equitable and empowering behaviours toward women and girls. There is a large community of thoughtful practitioners, who have spent decades building data-driven foundations for their programmes' effectiveness, who would simply argue, 'Give us the budget to do it, and we will achieve the goal – ethically'.

Modelling the Art of the Possible

This exercise is illustrated in the simple plot below. Total population change is births minus deaths. As in the recent past, mortality levels continue to improve gradually over the coming decades. The total fertility rate (TFR) is assumed to be 1.5 births per woman, i.e., approximately a half child less than the fertility replacement level of about 2.1.

Even in this exercise's assumed peak TFR of 1.5 by 2030, so-called 'demographic momentum' would delay any decrease in total population by two decades after the 1.5 TFR change is achieved.

Figure 2. Population Recovery with a Soft Landing – prospects for population decline through achieving a TFR of 1.5 by 2030.



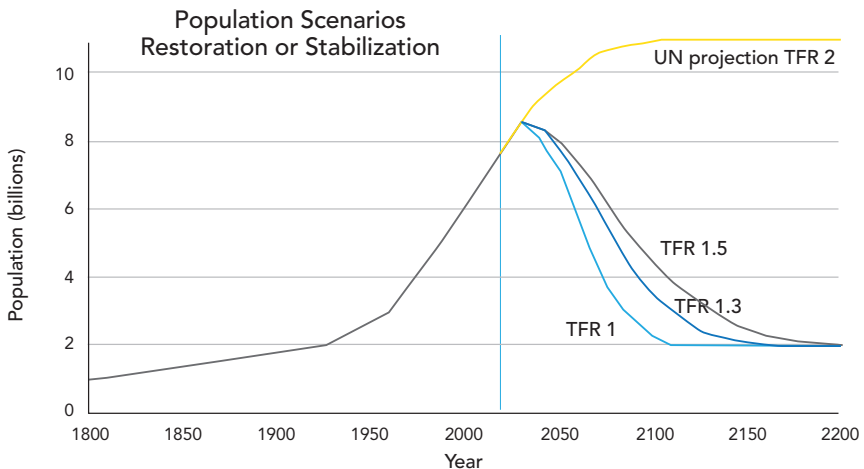
It is important to note that this model assumes that the age of first birth will remain at today's global average of 25. Measures to end child marriage and children having children would see this average age drift upward slightly. This is certainly a global cultural norm we should all strive to achieve through proactive investment. However, we do not need to rely on that change to occur for us to reach a total population of about three billion in about one hundred years, or around 2125.

Some will point out that all the people who will have children by 2050 are already born, and there is no real opportunity to bend the curve. In order to accept that observation, we would need to accept that all of their reproductive behaviour will and must mirror that of previous generations. That notion is rejected. Indeed, that notion is rejected and replaced with a call for investments that will expedite the bending of the fertility curve downward to a TFR of 1.5 over the next decade.

Many, including the United Nations leadership, seem to think that achieving replacement value fertility is the most ambitious goal we might reasonably consider – mostly because they believe that a TFR of 2 will just kind of happen without the UN doing anything beyond the current Sustainable Development Goals. This graphic shows the stark contrast between a TFR of 2 and a TFR of 1.5 or lower. Quite simply, settling for a TFR of 2 is unacceptable and will crush

our planet and put our species in peril. At the eleven billion global population that would result, the probability of massive discontinuous change that would involve unimaginable human suffering is extremely high. However, even if these catastrophes crushed the lives of billions of people, we would likely still have far more people than the earth can support over the long term without incurring even more ecological debt than we have already accumulated.

Figure 3. Population Scenarios – Restoration or Stabilisation. Alternative pathways for population growth or degrowth to sustainable levels (average age at first birth = 25, average age at death = 80).



What this Means for Humanity’s Carbon Footprint

If we are able to achieve the Paris goals for carbon emissions - a goal of eighty per cent emission reduction by 2050 – within their assumed framework of continuous population growth, then it stands to reason that a move toward a 1.5TFR by 2030 would further reduce these emissions.

For those that think that the trend lines for our use of fossil fuels are inexorable, you should become familiar with the reality that the costs of wind and solar electricity are already as low as \$.01 / kWh, a quarter the cost of natural gas or coal, which means that the transition away from fossil fuel will be rapid – even with politically retrograde forces seeking to further enrich entrenched fossil fuel interests. The

emergence of a greater variety of cheaper and more effective long-term storage solutions means that almost all parts of the world will be using renewable energy and electric vehicles by 2040.

While it may seem as though a mix of ethical, just and empowering population strategies will simply amplify existing energy market trends, leading to a wonderful outcome, the situation is actually somewhat more complex.

First, while this strategy may reduce humanity's active carbon emissions to a manageable level over the long term, it does nothing to eliminate the more than a trillion tons of carbon already trapped in our atmosphere and oceans. This will leave the CO₂ PPM level well over 400, which will continue to drive median temperature well above two degrees Celsius – leading to ecological annihilation of unimaginable scale, and climate catastrophe in many forms. This will require investment in so-called 'climate restoration' strategies. The good news is that there are permanent, scalable and financeable climate restoration strategies based on biomimicry – accelerating those natural processes that have already demonstrated their ability to extract carbon from our atmosphere and oceans (Fiekowsky and Douglis, 2022).

Second, it is important to make an obvious point that is often overlooked in climate discussions. While humanity's carbon footprint deserves our focused attention, carbon represents only one small portion of our larger footprint (Tucker, 2019b).

Runaway population growth, and its cumulative ecological footprint, has been actively deleting nature, hectare by hectare, for centuries – steadily depleting the natural production of ecological goods and services that we rely on, while demanding more and more of them each year. Most people are unaware that the world's population has more than quadrupled over the past century, adding approximately eighty million additional humans to our finite planet in each recent year – the equivalent of ten New York Cities, or one additional Germany each year – with no clear end in sight.

Furthermore, humanity has managed to burden what natural resources remain with debilitating forms of pollution – from ocean plastics to endocrine disrupters,

and so many other forms of ecological burden. Together, the accumulated ecological debt (far beyond just the accumulated carbon) demands that we bring humanity's numbers back in balance with our planet's long-term ecological carrying capacity. This is about our larger human footprint, not just our carbon footprint (Penna, 2009).

Of course, it is important to note that the Global North's (GN) carbon footprint is much higher, per capita, than that of the Global South (GS) – and that the GN is responsible for some ninety per cent of the historic carbon emissions that are driving our current climate crisis. Still, it is foolhardy to ignore the ongoing explosive population growth in many nations of the GS, given the billions of humans that will be entering the global middle class over the coming decade, and adopting consumption patterns resembling those of the developed world. While the developed world has committed to reducing its carbon footprint, this energy transition has a long way to go. Given the 10:1 GN:GS emissions ratio, the substantially lower TFR in the GN does not absolve the GN. Indeed, it suggests that the GN should abandon the remaining relics of coercive pronatalism in their policy structures and cultural institutions and seek even lower TFRs if they are to help global humanity achieve a productive balance with the natural world, as the GS continues on its delayed journey of demographic transition.

Getting to 1.5 TFR by 2030

There is still hard work to do to calibrate the levels of investment in the various kinds of policy interventions outlined above, if we are to achieve 1.5 TFR by 2030.

There is the well-documented and well-understood decrease in fertility that would occur in a number of high TFR nations if only investments were made to address their 'unmet need' for family planning technologies. This not only refers to servicing the existing desire for access to family planning technologies and programmes that, in this day and age, are inexcusably unavailable to many women and girls (and even men and boys) all over the world. It also refers to those sexually active women who report not wanting to have more children, or wanting to delay the next child, but who, for some reason have no intention to use contraception. There is something called the 'S Curve' of contraceptive use. Where use is low, often demand is also low – so doing more to change social norms is important (The Track 20 Project, 2019).

This is separate from policy measures that would end child marriage and the trend of 'children having children'. Not only would this shift the average age at which females begin childbearing, but it would increase the status of countless women in their societies, since they would be able to finish secondary school, creating more financial autonomy and therefore bodily autonomy for the rest of their lives. On the other side of the same coin, of course, investing in the education of girls helps set norms that combat child marriage and children having children. Investing in the education of women, over the age of eighteen, means more prosperity, wellbeing, security and stability.

Integrating women into the workforce, and providing financing mechanisms for female entrepreneurs, also reinforces such fertility dynamics. Quite frankly, this would also increase economic prosperity and wellbeing.

Investments in reproductive norm-shifting media interventions have been proven, time and time again over the past half century, to have amazing transformational effects on fertility by encouraging small family norms which then reinforce all the dynamics outlined above. Of course, without ensuring that women and girls (as well as men and boys) have comprehensive access to family planning technologies and reproductive health programmes, such media interventions will needlessly be less effective than they otherwise could be (HIP, 2017).

When paired with the fertility and childbearing themes dominating today's global youth culture as the next generation grapples with the existential issues of climate change, we have a real chance of reducing fertility rates, year over year, at a pace not seen since the 1960s – expediting the demographic transition that our global society must achieve if it is to live in balance with the planet. Having one less child is indeed the most impactful choice an individual can make to reduce their carbon footprint, and their larger ecological footprint – and this is now being openly discussed by the younger generation (Shao, 2021).

It seems that achieving the goal of 1.5TFR by 2030 is indeed possible, if only the global community invests more robustly in ethical, just and empowering 'nudges' toward a more sustainable population plateau.

Conclusion

The 'World Scientists' Warning of a Climate Emergency' article of November 2019, which had 14,000+ cosignatories from the global scientific community, made it clear that:

Still increasing by roughly 80 million people per year, or more than 200,000 per day, the world population must be stabilized – and, ideally, gradually reduced – within a framework that ensures social integrity. There are proven and effective policies that strengthen human rights while lowering fertility rates and lessening the impacts of population growth on GHG emissions and biodiversity loss. These policies make family-planning services available to all people, remove barriers to their access and achieve full gender equity, including primary and secondary education as a global norm for all, especially girls and young women. (Ripple et al., 2019, 11)

It is critical that we begin investing in stabilisation and reduction of humanity's numbers if we are to avert climate catastrophe. This includes the reduction of fertility in many wealthier nations that are already below replacement value fertility. After all, the carbon footprint of children in wealthier nations can be eight to thirty times the size of that of children in developing nations. A sustainable population that lives within the carrying capacity of our planet must be achieved if any of our other climate and ecological interventions are to have the desired effect. The only foreseeable way to achieve this goal is to empower women and girls in a way that encourages small, educated and prosperous families through the end of the century. This will require achieving a global birth rate in the 1.5 range, sooner than later – recognising that some countries will lag in this demographic transition. The suggestion that we must all passively await some immutable population peak of more than nine billion, ten billion or even eleven billion (as the UN projects) sometime after 2050 is insulting, disempowering and misguided.

In the end, women and girls should enjoy gender equity, everywhere on Earth – as a good in and of itself. In the end, small families – on average – live better. In the end, small families are better for the climate and for the natural world in general. It is entirely possible for humanity to step up to this challenge. But first, we must all collectively embrace the art of the possible.

Acknowledgements

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