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Contents

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EDITORIAL

Spatial and temporal abstraction, individual agency and aggregate trends in population dynamics

David Samways

The relationship between population growth and environmental impact, whilst complex, is well established in the scientific literature (Samways, 2022) and can be understood at a number of levels of spatial and temporal abstraction – from the global and long-term to the local and short-term. At the most abstract level, the expansion of the human enterprise, of which per capita consumption and the size of our population are major components, is clearly correlated with environmental change at a planetary level. However, at lower levels of abstraction the role of population growth, as Robin Attfield (1983) has noted, may be a sufficient but not a necessary condition in environmental change, with other factors, including the particular values and social practices of a community, being significant drivers. Thus, a combination of population size and the practices and preferences of that population determine anthropogenic environmental change.

Concomitantly, explaining the causal influences on population size itself is also dependent on the level of abstraction at which the argument is pitched. In this issue, Russ Hopfenberg's *Perspective* article, pitched at a global long-term level of abstraction, argues that it is the expansion in food availability that is the underlying determinant of human population growth. Hopfenberg shows that populations of non-human species are determined by the carrying capacity of their environment – that is, the availability of food, water, space and air, and the level of predation and disease. Whilst recognising that humankind has altered

carrying capacity variables to produce greater amounts of food, he extends this argument to our species, arguing that food availability is the critical determinant in human carrying capacity.

Hopfenberg identifies four key points in human history where new modes of living or production methods increased food availability and population expansion followed. The neolithic revolution around 10,000 years ago marks a significant increase in food availability and population expansion[1] as the dominant mode of human subsistence shifted from hunting and gathering to settled agriculture. Incremental improvements in agricultural productivity and associated population growth followed, but Hopfenberg points to significant change around 1500[2] and further dramatic increases as the industrial revolution intensified production. Further expansion followed the so called 'Green Revolution' of the mid-twentieth century. Acknowledging the influence of decreased child mortality on population growth,[3] Hopfenberg observes that, since the third law of thermodynamics cannot be violated, population cannot grow beyond the level of food availability. He argues that, rather than food supply expanding to meet the demand from a larger population, increasing food supply is the root cause of population growth.

Feeding the global population is one of the greatest contributors to climate change; yet the effects of global heating are already feeding back, decreasing yields, increasing pressure on the food system and leading to greater numbers of people experiencing food insecurity (Mbow et al., 2019). Rather than attempting to increase the food supply – which he argues has paradoxically increased the number of malnourished and starving people – Hopfenberg concludes that we must urgently address population growth to ensure sustainable human welfare.

1 Bocquet-Appel (2011) explains this Neolithic demographic transition as beginning with increased female fertility due to shorter birth spacings consequent on improved calorie intake and a sedentary existence. However, the Neolithic baby-boom was eventually checked by a rise in child mortality caused by greater disease amongst denser sedentary populations. It is also interesting to note that changes in hunter gather practices from 'immediate return' on labour (without food storage) to 'delayed return' where foodstuffs were stored and even simple forms of agriculture were practised, has also been associated with population growth (Feeney, 2019).

2 Associated with novel foodstuffs from the New World (Nunn and Qian, 2010).

3 Eductions in child mortality are themselves associated with improved nutrition (Pozzi and Fariñas, 2015).

While, as Russ Hopfenberg argues, it is clear that food availability must have been a limiting factor on population growth, at more granular levels of abstraction average total fertility rates in premodern societies, including hunter gatherers, have been recorded as four to six children per woman – around half the ten or more believed to be physiologically possible (Coale, 1984; Wilson and Airey, 1999; Page and French, 2020). However, although strong social norms confining sexual relationships and childbearing to marriage are common across cultures, evidence of widespread parity-specific fertility regulation (i.e., controlling the number of births) within marriage in traditional societies is almost non-existent (Cleland and Wilson, 1987). These two intriguing observations have led to considerable speculation about a possible homoeostatic mechanism regulating long-run population size so that it remained within the limits of the particular era's carrying capacity (Wilson and Airey, 1999).

However, as Wilson and Airey comment: 'a successful homeostatic theory of fertility must be able explicitly to link individual actions and aggregate processes' (1999: 124). In other words, any general theory must be able to shift seamlessly between micro and macro levels of abstraction. Yet, the breadth and diversity of social practices and institutions connected with moderate fertility (including extended breastfeeding, later age of marriage and infanticide amongst many others) and the manifold social, cultural, political and environmental contexts in which they occurred (Wilson and Airey, 1999) leave abstract macro theories of population homoeostasis somewhat wanting.

Human social and cultural life is complex, involving both conscious and unconscious motivations for individual actions, with agents drawing upon, and in turn reproducing, social structures (values, norms, institutions) which inform their hermeneutic frames of meaning. Moreover, while agents are knowledgeable about their social conditions of action, unacknowledged conditions produce unintended consequences. Macro level theories, such as theories of population homoeostasis, must therefore be able to account for the conscious motivations of actions for which agents can readily discursively account as well as those which form part of their practical consciousness – which includes taken for granted knowledge of their social world including prevailing social norms such as the age at which people marry (Giddens, 1979; 1984; Stones, 2005). Almost all the examples of fertility moderation cited by Wilson and Airey are the unintended

consequence of the intentions and meanings – themselves rooted in prevailing social norms – attached to the social practices in which agents were engaging.

The importance of agency to understanding demographic change could not be clearer than in the modern era where fertility is subject to a greater degree of individual control. The recognition of the reflexivity and purposefulness of agents acting in the context of acknowledged and unacknowledged social structural conditions and of the intended and unintended consequences of those actions is essential to understanding contemporary demographic change. For example, much of the recent decrease in fertility can be seen, amongst other things, as a mixture of intentional birth control and the unintended consequences of factors such as the extension of years spent in education, greater female participation in the economy, and the opportunity to order a hierarchy of priorities which may favour establishing material security in preference to childbearing. Despite individual fertility preferences, these factors potentially lead to family building later in the female reproductive window of opportunity and hence lower total fertility (Samways, 2022).

Agency is also critical to contemporary population and sustainability questions since it is pivotal to ethics. Without agency, moral choice, responsibility and accountability would be meaningless. I have argued elsewhere that the relationship between population and sustainability is intrinsically value-dependent and inseparable from politics and ethics, and that inequality and justice are central to the environmental crisis (Samways, 2021; 2022).

Clearly, demographic transition from high to low rates of mortality and fertility is not autonomous and predictably determined by universal drivers, but relatedly, and perhaps more importantly, the progress and timing of fertility transition is amenable to population management policies (Coole, 2018; Samways 2022). However, although population growth is acknowledged as a significant indirect driver of the environmental crisis (Brondízio et al., 2019; Almond et al., 2022; IPCC, 2023), tackling the rate of growth is frequently regarded as morally perilous since fertility decisions are closely associated with notions of personal autonomy and basic human rights. Moreover, the history of population control has been associated with coercion and discourses of racism, eugenics and imperialism (Samways, 2022).

Focussing on the climate crisis, Patrick Hassan's article published in this issue addresses many of these ethical questions in a critical examination of the charge of 'climate colonialism' – the perception that policies of rich nations attempt to shift responsibility and the economic burden of climate change onto developing countries. Proposals to tackle population growth as a climate mitigation strategy have been the subject of particular criticism, since the relatively small per capita emissions of low-income, high fertility, countries are juxtaposed with the very large per capita emissions of the low fertility rich world. Many, such as Monbiot (2020), have argued that population policies distract attention from dealing with the excessive consumption of the rich world.

However, in their latest report the IPCC (2023: 142) are clear that:

> Globally, Gross Domestic Product (GDP) per capita and population growth remained the strongest drivers of CO_2 emissions from fossil fuel combustion in the last decade (*high confidence*).

While, due to population momentum, tackling population growth as a climate mitigation strategy is recognised as a long-term measure, it could nonetheless make a significant impact on future emissions (O'Neill et al., 2012). Moreover, deferring action that will shift the population growth curve decades down the line only endangers the welfare of future generations, especially those born in low-income countries.

Hassan points out that the logic of the I (impact) = P (population) x A (affluence) x T (technology) equation means that, if human impact is to be merely kept at the current level, then consumption must decrease and/or less impactful technology must be deployed to compensate population growth. Hassan shows that this 'Compensation Thesis' means that the objection that tackling population growth distracts from addressing consumption is fallacious since it is impossible to treat them in isolation. He points out that, if tackling population growth in developing countries is denied, then reducing consumption and/or employing less impactful technology are the only options left. However, as O'Neill et al. (2018) argue, the notion that a reduction in rich world consumption alone could allow all to live well is erroneous. Even with a social and technological revolution in welfare provisioning systems, O'Neill et al. conclude that an equally good life for all could

only be provided for seven billion people within planetary boundaries. Hassan argues that, if tackling population growth is morally out of bounds, then, in the absence of a 'miraculous' technological breakthrough, climate colonialism re-emerges if restrictions on consumption in the developing world are required. Therefore, he argues, tackling population growth will be necessary to offset the growth in consumption required to meet the welfare aspirations of people in the least developed countries without exacerbating the climate crisis.

However, imposing restrictions on reproductive autonomy is morally troubling and Hassan examines the range of non-coercive approaches to lowering fertility including choice-based approaches (e.g., improving female access to healthcare, family planning, education and economic participation), fertility preference adjustment (nudging family size preferences) and incentive models (e.g., financial rewards for smaller completed family size). Whilst these methods are non-coercive they are not without possible difficulties in terms of autonomy; moreover it can be argued that ideological displacement of traditional cultural values and practices with those from a typically more powerful exogenous culture is itself a form of climate colonialism. Hassan comprehensively neutralises such arguments, contending that much comes down to the nature of the delivery programmes themselves. Importantly, he points out that, as with many climate colonialism arguments, it is a genetic fallacy to conflate past examples of colonial manipulation with non-coercive policies aimed at changing fertility outcomes.

Hassan recognises that it follows from the compensation thesis that the consumption of affluent countries must be tackled and technology transferred to developing countries in order to lower emissions and meet developmental aspirations. However, these will not be sufficient to tackle the climate crisis and non-coercive policies directed at reducing population growth in high fertility, low-income countries are necessary and morally defensible. Moreover, Hassan raises the disturbing possibility that coercive fertility policies could be morally justified if it was determined that they were required to avoid a global climate catastrophe that produced massive suffering. Even this, he argues, could not be construed as climate colonialism if equally radical sacrifices were initiated in affluent countries. Finally, on the rhetoric of climate colonialism as an objection to population limitation, Hassan remarks:

> Even the most sincere proponents of [the] charge of climate colonialism, out of genuine concern for the just treatment of developing nations, will do harm to all, and especially to those same developing nations that will feel the early effects of global warming the hardest. Given the alarming stage of climate change is now impossible to ignore, as well as doubts about the efficacy of technological fixes and consumption decreases, it would be deeply irresponsible to wholly ignore the real variable of population size in our attempts to reduce emissions. (pp.51)

Whilst critically important to long-term global sustainability, global population growth is not the only demographic variable relevant to sustainability when considered at more regional scales. Although about eighty million people are added to the global population annually and most of the forward growth in population will occur in high fertility counties of Sub-Saharan Africa (O'Sullivan, 2023), in below replacement fertility countries such as the UK and USA population continues to grow mainly due to immigration (Cangiano and Brindle, 2024; US Census Bureau, 2024).

In his article published in this issue, Philip Cafaro examines US immigration trends and policy in respect of both national and global environmental sustainability. Working from a 'Nature Needs Half' perspective involving the restoration of wilderness (Crist et al., 2021), Cafaro argues that the global population is already three or four times that which can be justly sustained at good levels of human welfare. In line with these principles, he contends that the current US population of 340 million is several hundred million more than is ecologically and morally defensible.

Cafaro shows how the immigration policies of various administrations have led to a missed opportunity to shrink the population of the United States to sustainable levels. Moreover, he argues that the US Census Bureau projections of national population growth are based upon the assumption of large decreases in net immigration from current levels – even incorporating a projection based on the improbable scenario of zero migration. Developing his own model, Cafaro shows that using actual net migration figures for 2020 (750,000) and 2023 (3 million) leads to a US population ranging from 340 to 615 million by 2100 rather than the Census Bureau's range of 217 to 436 million by the same date.

Cafaro argues that US congressionally mandated immigration policy has been between 1.1 and 1.2 million annually; however various factors including the Covid pandemic and a tolerance of illegal immigration led to significant differences in the actual numbers in recent years with net immigration during the Trump administration averaging 1 million and during the Biden years 2 million. He concludes that the environmental and demographic implications of the wide divergence in policies actually pursued should be reflected and communicated in official national population projections.

Taking his argument further, Cafaro produces a projection based upon the recommendations of the 1997 US Commission on Immigration Reform (known as the Jordan Commission) – i.e., limiting immigration to around 300,000 a year by only meeting the need for exceptional workers, providing sanctuary to genuine political refugees and enabling spousal reunification. Following this scenario, Cafaro forecasts US population to fall to 285 million by 2100 and to as low as 168 million by 2200, conferring substantial environmental and social benefits. He contends that the implications of a low immigration policy would extend beyond the boundaries of the United States and lower fertility rates in developing world since, he argues, the flow of remittances from immigrants to their countries of origin incentivises larger families.[4]

Like Patrick Hassan, Cafaro argues that, rather than a choice between the two, population reduction is a complimentary strategy to the reduction of consumption and that affluent nations must take the lead in reducing ecological overshoot by reducing their consumption. However, he concludes: 'But if they are to share the world's resources more fairly and show the way forward by creating prosperous yet sustainable societies, developed nations must reduce their bloated populations.' (pp.79)

This issue of the *JP&S* also includes Anastasia Pseiridis' review of *Capitalism, Degrowth and the Steady State Economy* by Theodore Lianos. In the broadest

4 In in the interests of balance, it should be noted that there is considerable debate about the positive and negative effects of remittances on both fertility and environmental impact. For environmental impact see: Hecht et al., 2006; Davis and Lopez-Carr, 2010; Jaquet et al., 2016; Oldekop et al., 2018; Edwards 2022. On the effect on fertility see: Anwar and Mugha 2016; Ifelunini et al., 2018; Green et al., 2019; Paul et al., 2019.

terms, Lianos' work is concerned with the ecological imperatives requiring humanity to challenge discourses of endless economic growth and actively disrupt and remake our apparently autonomous and structurally constraining economic system. Tackling the apparent autonomy of global population growth is part of the transformative process which will enable sustainable prosperity for all.

The idiom of the devil being in the details is pertinent to all fields of study and, as the articles in the issue of the *JP&S* attest, understanding the relationship between demographic dynamics and the physical environment is no exception. At macro levels of abstraction, impersonal forces have shaped long-run human population growth, while, at more granular levels of abstraction, the intended and unintended outcomes of individual choices and actions, in particular given social and physical contexts, aggregate to form these macro level trends. Thus, to paraphrase Marx: 'humans make their own history, but under existing circumstances, given and transmitted from the past'. Agency is critical to understanding the production and reproduction of social systems, but also pivotal to ethics, values and responsibilities which motivate social change at both the individual and collective level.

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PERSPECTIVE

In pursuit of sustainability: The root cause of human population growth

Russell Hopfenberg[1]

Abstract

Human population growth has been identified as the primary cause of ecologically destructive phenomena. The evidence clearly shows that global human population growth proceeds as a function of the increasing food supply. Understanding and appreciating this reality is posited as a first step in successfully addressing human population growth.

Keywords: agriculture; carrying capacity; ecology; extinction; growth.

Scientists universally acknowledge environmental problems, including pollution, species extinction and climate change (Vitousek et al., 1997). In 1993, Meffe et al. reminded the scientific community that 'most environmental problems are attributable to the effects of an exploding human population'. However, the scientific community has avoided addressing human population growth, regarding it as a non-issue, a social or political concern, or a topic that is 'too hot to handle' (Allendorf and Allendorf, 2012; Bailey, 2004; Meffe et al., 1993; Mora, 2014; Pearce, 1984; Weiss, 2016).

The human species relies on the rest of the biological community for support. The most salient example of this support is human food, which consists of other

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species. An increase in human food species necessarily precipitates a decrease in the biomass of non-food species. Turning a forest into a cornfield reduces the number of trees, as well as the number of other creatures living in that space, in favour of corn. Creating vast amounts of human food necessitates a substantial decrease in the biomass of other (non-food) species, inevitably leading to species extinction (Marshall, 2016; McKee, 2004; Quinn, 2010).

The notion that human population dynamics is an ecological and behavioural process seems to be taboo in and of itself (Bailey, 2004; Meffe et al., 1993; Stebbing, 2011). There are additional ways in which humans view themselves as being immune from scientific laws (Skinner 1990). For example, although the perspective that humans evolved via the same process by which all other species evolved is well established and accepted among scientists, evolution continues to be contested by lay people, politicians and educators (Scott,1997).

Regarding non-human species, it is well accepted that there are specific and clear ecological laws that govern the population dynamics of all species, from microorganisms to the largest plants and animals. Carrying capacity determines population growth and decline. The environmental variables that determine carrying capacity consist of food, water, space, air, predation and disease. For plants, carrying capacity includes sunlight and soil nutrients. Regarding the entire non-human biological community, it has been demonstrated, and is universally accepted, that the population of every species increases to the level of its food supply (Pimentel,1966).

Quinn (2010) and others (Hopfenberg and Pimentel, 2001; Hopfenberg, 2003) have made explicit the reality that the ecological laws that govern the population dynamics of all other species also govern the population dynamics of humans. The human condition seems to be different because humans have done things to alter some carrying capacity variables. As the industrial era saw major increases in agricultural production, food production increases began with the agricultural revolution 10,000 years ago. A second spike began around 1500, mainly in Britain but this had global impact. By 1850, the industrial revolution intensified agricultural production. By this time, food had become a major economic commodity. The decrease in child mortality bolstered population growth and is a vital aspect of the demographic transition model (Hopfenberg, 2014). Although the population

has grown more precipitously as a result of decreased child mortality, it can never grow beyond the level of food availability as that would be a violation of the first law of thermodynamics which states that neither matter nor energy can be created or destroyed.

One difficulty of scientifically demonstrating that human population dynamics are governed by the same laws that govern the population dynamics of all other species is that there is no human *experimental* evidence. It is important to remember that scientists have arrived at many findings regarding humans through non-human animal experimentation combined with human correlational and cohort studies. For example, it is common knowledge that smoking causes cancer. But there have been no human *experiments* that demonstrate this conclusion as it would require the unethical random assignment of people to smoking and non-smoking (placebo) groups. Also, relying only on correlational studies, one could *erroneously* argue that a propensity to contract cancer heightens an inclination to smoke. However, scientists have clearly shown the direction of cause and effect regarding smoking leading to cancer using cell and non-human animal experiments (Denissenko et al., 1996; Sasco et al., 2004).

Similarly, there is overwhelming evidence that an increase in food availability, a carrying capacity variable, is correlated with an increase in human population. The popular interpretation of this information is that the human population grows simply because that's what the human population does and then food production is increased to keep pace with this inevitable growth (Gilland, 2002). This perspective is apparent in statements such as: 'Global *demand* for food could easily double over the period 1990-2030, with two-and-a half-to threefold increases in the poorest countries.' (Daily, et al., 1998). However, non-human experimental research provides powerful evidence that the primary cause of population growth is the increase in food availability (Hopfenberg and Pimentel, 2001; Pimentel, 1966; Strecker and Emlen Jr., 1953).

Human food availability has been dramatically manipulated in favour of increases for the past 10,000 years. These agricultural increases are directly responsible for the increase in the human population and the decrease of non-food species which compete with humans for food, as well as for the space used to grow human food (Hopfenberg, 2014; Marshall, 2016; Meffe et al., 1993). The endeavour to

continually increase food production, ostensibly to benefit mankind, is the ultimate cause of the nearly exponential growth of the human population, the extinction of species and the destruction of vital ecosystems.

Not only is it accepted that 'we must continue to increase food production to feed the growing population', we also hold to the perspective that increasing agricultural production must be pursued to solve the scourge of starvation and malnutrition (Global Food Security Act, 2016; Hopfenberg, 2019). Yet as Rosset et al. (2000) pointed out, 'if the history of the Green Revolution has taught us one thing, it is that increased food production goes hand in hand with greater hunger'. Also, non-human experiments have demonstrated that, with a daily food supply that is elevated and constant, the population 'grew rapidly to the limit set by the daily food allotment, then stopped abruptly and gradually declined'. This was due to *diminished reproductive activity* even though 'no loss in weight or viability occurred' for the subjects (Strecker and Emlen Jr., 1953).

To address and ameliorate environmental deterioration, it is essential that we address human population growth as it is the driver of all other environmental problems (Bradshaw et al., 2021). The one carrying capacity variable that has been dramatically manipulated for the past 10,000 years of human history is food availability. This increase in food availability acts as an ecological magnet, drawing population numbers up to it (Hopfenberg, 2003; Rodrigo and Zulkarnaen, 2022). We all understand that a precipitous decrease in food availability would cause a catastrophic decrease in human population. Yet many have difficulty appreciating that the precipitous increase in food availability has caused the catastrophic increase in human population numbers and has, paradoxically, increased the number of starving and malnourished people (Global Food Security Act, 2016; Hopfenberg, 2019). Only by appreciating and understanding this reality will we be able to formulate ways of attending to our population problem and ensuring human sustainability and wellbeing.

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RESEARCH ARTICLE

Population, consumption and climate colonialism

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Abstract

Strategies for combatting climate change that advocate for human population limitation have recently been understandably criticised on the grounds that they embody a form of 'climate colonialism': a moral wrong that involves disproportionately shifting the burdens of climate change onto developing nations (which have low per capita emissions but high fertility rates) in order to offset burdens in affluent nations (which have high per capita emissions but low fertility rates). This article argues that once the relevance of population growth to climate change has been correctly understood as working in tandem with consumption levels, this objection fails as a general criticism. Moreover, even if population could be ignored as a variable, the climate colonialism charge would re-emerge in a different form, since, at present population sizes, it would be environmentally catastrophic for developing nations to reach the production ambitions which see their per capita emissions massively increase. Even if emission reductions in affluent nations are (rightly) prioritised, there are good reasons to prevent enormous growth of emissions in developing countries. Those environmental risks become much greater given developing nations' projected population increases in the coming century. The article then explores how the necessary radical environmental policies pertaining

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to fertility rates might be enacted in non-coercive ways, reducing the sting of the 'climate colonialism' charge. The article ends by considering some reasons to be moderately sceptical about such policies.

Key words: climate justice, climate colonialism, population, climate change, sovereignty, coercion

Introduction

There is overwhelming consensus among climate scientists that human activities are causing climate change. Recently, the IPCC have found that as a result of states not taking collective radical action, the 1.5°C threshold on limiting global warming to avoid environmental catastrophe is now likely to be exceeded by 2040 in all possible emission reduction scenarios (IPCC, AR6, 2021). Nevertheless, there is some dispute about the relevant human causes, and where to direct policy. Since the 1980s, certain environmental strategies have often been criticised as 'imperialist' or 'colonialist' on the grounds that they are thinly-veiled attempts by affluent Western nations to unfairly shift the burden of responsibility and economic sacrifice to address climate change onto developing nations (Guha, 1989; Agarwal and Narain, 1991; Whyte, 2017; Reibold, 2023). One version of this criticism has been directed at population engineering, seeking to expose it as a new form of colonial subjugation insofar as it (allegedly) erroneously treats fertility rates – typically at their highest in developing nations – as a significant driver of environmental harms (Smith, 1995; Kuumba, 1999; Mies & Vandana, 2014: Ch. 19). Such policies, it has been thought, distract from the high GHG emission habits of affluent Western nations, which contribute far more to environmental harms.

After attempting to clarify what the charge of 'climate colonialism' amounts to, this article aims to reveal a mistaken presumption at the heart of its application to population engineering generally. While the charge gets something importantly right insofar as it calls for the prioritising of affluent nations to amend their high-consumption behaviours, it erroneously treats consumption as if there were one 'real' issue for tackling climate change, overlooking the cooperative relation between consumption and population for total emissions. This article first argues that concerns over climate colonialism cannot be avoided simply by focusing on levels of consumption. The article then goes on to argue that things get worse: as well as population still being a relevant variable, it would be environmentally

catastrophic for developing nations to reach the high-consumption living standards of affluent nations, and so there are good reasons to prevent this from happening. *Prima facie*, this makes the climate colonialism charge resurface in a further form. The article ends by exploring ways in which these issues might be tackled without invoking what I identify as the feature of climate colonialism likely thought to be most problematic, namely: coercion and the loss of individual and/or national autonomy.

1. What is 'Climate Colonialism'?

It is widely acknowledged in public as well as in philosophical debate that there is a weighty issue of global justice at stake with climate change. Specific climate policies have often been criticised as disproportionately and excessively penalising developing nations – nations who are the least responsible for global GHG emissions, but at the same time the most vulnerable to their effects (e.g. Maltais & Mckinnon, 2015; Gardiner, 2011; Shue, 2014; Blomfield, 2019). As the *Global Humanitarian Forum* noted back in 2009:

> It is a grave global justice concern that those who suffer most from climate change have done the least to cause it. Developing countries bear over nine-tenths of the climate change burden: 98 per cent of the seriously affected and 99 per cent of all deaths from weather-related disasters, along with over 90 per cent of the total economic losses. The 50 Least Developed Countries contribute less than 1 percent of global carbon emissions (GHF-G, 2009: 3)

In recent years, it has often been further argued that there is a specific subset of injustice at play in at least some such cases, namely 'climate imperialism' or 'climate colonialism' (e.g. Whyte, 2017; Blomfield, 2019; Dyett & Thomas, 2019; Táíwò, 2022; Sultana, 2022; Reibold, 2023).[2] What distinguishes climate colonialism from broader climate injustice?

At present in the literature, the concept is imprecisely defined and thus open to ambiguity. Often, the term 'climate colonialism' has been used – in both academic and public spheres – to refer merely to how climate-related inequalities (e.g.

2 For the purposes of this article I will treat 'climate imperialism' and 'climate colonialism' as roughly equivalent (though see Mercer & Simpson, 2023).

vulnerability to the effects of climate change; responsibility for pollution, etc) are a causal product of historical colonialism. Institutions such as Greenpeace, for example, have described the present environmental emergency as 'the legacy of colonialism' (Greenpeace and Runnymede, 2022: 23). The IPCC, too, have in their 2022 report, for the first time included 'colonialism' as an historical driver of the climate crisis (IPCC, 2022). While the historical origins of such disparities among nations is important (for reasons I shall come to make explicit), 'climate colonialism' can also refer to a specific type of harmful and unjust practice. At the most general level, it amounts to a process whereby the Global North spares itself the greatest socio-economic sacrifices demanded by climate change and the fight against it by way of exploiting the vulnerabilities of the Global South; a process which is enabled by and consequently perpetuates their existing imbalance of power.

Beyond this broad construal, however, the concept is poorly understood, making inter- and intra-disciplinary engagement with it problematic. Sometimes 'climate colonialism' can refer to different types of *action*, such as: (a) the low-cost purchasing of forests and land in the Global South for carbon offsetting, which comes at the expense of forced evictions and restriction of access to traditional lands for the locals, not to mention allowing nations and companies in the Global North to pollute as normal (e.g. Oakland Institute, 2014); or (b) resource-extraction for 'green' technologies such as electric cars, which require highly dangerous and environmentally damaging cobalt and lithium mining in Africa and Latin America (Sovacool, 2019; Soto Hernandez & Newell, 2022), and the use of land in the Global South to cultivate cleaner biofuels for export to the Global North, creating local food scarcity (Smith, 2000). In addition to assorted types of actions, the *actors* relevant to 'climate colonialism' (i.e. perpetuators and victims) can also vary. We have so far spoken of climate colonialism as involving the 'Global North' and 'Global South', but this can include actors such as nation states as well as collectives such as companies and corporations that operate under their economic jurisdiction, or perhaps even their direct control. Moreover, the same relations may apply *mutatis mutandis* to states' or companies' activity towards smaller collectives such as indigenous communities – domestic or foreign – dwelling on their traditional land (see Whyte, 2017: 125; Bacon, 2019; Reibold, 2023).

In light of this, I suggest that the term 'climate colonialism' is best understood as an umbrella term which includes some or all of the following features:

(i) a disproportionate shifting of specific socio-economic burdens to tackle climate change from one nation to another nation or community;

(ii) these burdens are placed onto the shoulders of developing, often historically exploited, nations or communities in the Global South that are the least responsible for climate change, yet typically the most vulnerable to its effects;

(iii) an undermining of the autonomy of a target people, or the sovereignty of their nation, in facilitating this shift of socio-economic burdens.

Critics of this practice typically take it to be *systemic* as opposed to an isolated phenomenon. That is to say, there seems to be a recognisable pattern and structure to when and where (i)–(iii) occur. One reason for this will likely be the material effects of actual, historical colonial practice, whereby the resulting poverty of previously colonised nations places them in a weak political position with respect to forming contemporary climate policies, and they are thus easier to exploit when distributing climate burdens (see Gardiner, 2011: 119; Figueroa, 2011; 235–236; Shue, 2014: 38–39; Whyte, 2017: 156–157; Blomfield, 2019: 199–200, 206–208). This indicates the necessity of a *real historical competency* in understanding and diagnosing the phenomenon of climate colonialism, rather than erroneously treating it as an ahistorical evil. Another feature of this practice often taken to be typical if not essential is that (i)–(iii) are often presented by their perpetrators as motivated out of a concern to help (or 'fix') both developing nations and the planet broadly, masking exploitative self-interested motives – and perhaps racist assumptions – behind a veil of moral conscience and responsibility (see Sultana, 2022).

The specifically 'colonialist' component of this phenomenon seems to be most vividly reflected in claim (iii). By 'the undermining of autonomy', I mean measures taken which diminish the scope of rational choices that a state, or community within the state, may take on a given issue, as well as diminishing the ability to do so on an informed basis. Interfering with socio-political and cultural self-determination in this way may manifest in a variety of forms. They may be explicitly coercive, or remain implicitly coercive. The latter might, for example, involve a process of morphing indigenous people's cultural, moral, and

religious values and beliefs into an ideology more conducive to the aims of those exploiting them, thus facilitating more efficient means of resource extraction (see Reibold, 2023: 625). Alternatively, it might involve relying on the effects of climate change upon an ecosystem to make traditional occupations that engage with it impossible, forcing nations or communities within them to integrate within the cash economy on terms favourable to affluent nations (e.g. providing access to land and resources; becoming dependent on affluent states' help to sell the relevant technology to make use of their land in economically viable ways) in order to subsist (see Surralles and Hierro, 2005: 9; Reibold, 2023: 633–634). It may also involve economically pressuring nations to sign on to climate initiatives which are not necessarily favourable, and which obfuscate disparate levels of responsibility for current ecological harms. While I am open to a more conceptually robust definition of climate colonialism that builds more features into it,[3] claims (i)–(iii) given above will, collectively, suffice for the purposes of this article.[4]

The moral badness of climate colonialism may be manifold. Typically, it is understood as failure to satisfy a required standard of justice, where various rights – of individuals or collectives – are undermined. However, climate colonialism may be considered morally wrong on alternative grounds. For example, it is plausible that it embodies a failure to meet a required standard of fairness or respect, or that it expresses a deep chauvinism. For my purposes, it will matter little which substantive moral wrong is at stake, and so I shall leave open the way(s) in which it might be unjust, unfair, disrespectful or chauvinistic. I will, however, in the final section assess the relevance of the perceived injustices of climate colonialism to the aims of global cooperation on GHG emission reduction.

3 For example, climate colonialism may additionally be defined in terms of the potential effects of burden-shifting and bypassing autonomy, such as the disruption of individual and collective human relationships to their environment (Whyte, 2017: 125; Bacon, 2019; Reibold, 2023: 628).

4 The term 'climate colonialism' has also been used in further ways that are not as relevant to the present discussion. Doreen E. Martinez, for example, has proposed that referring to the ecological crisis as 'climate change' is itself a subversive colonial tool which obscures its real causes, and suggests the use of the term 'climate colonialism' instead to force 'a re-embodiment and relocation of how, why, and who is at fault/responsible' (Martinez, 2014: 79). I am sceptical of how much weight should be placed on this linguistic point, especially given that the vast majority of work being done on climate justice now acknowledges the disparity of responsibility for climate change.

2. Population engineering as an instance of Climate Colonialism?

One proposed climate policy that has attracted the charge of climate colonialism has been population control and/or reduction. Over the last century, the world's population has grown at an exponential rate, now standing at 8.1 billion and continuing to grow, albeit at a slower rate than any time since 1950. According to the *UN World Population Prospects: 2024*, the world's population is likely to reach 10.3 billion in the mid-2080s (UNWPP, 2024: 1),[5] with the majority of this growth being accounted for in the least economically developed areas – primarily sub-Saharan Africa (UNDESA, 2024: 1–2).

Rapid population increase has been thought to be problematic for a variety of reasons, including, but not limited to: neo-Malthusian concerns over food, water and resource scarcity; poverty; war; land degradation; and species extinction. I will say nothing about these concerns here. Instead, my focus will be on the relevance of population size as a contributing factor to climate change. The issue of human population growth has 'seen a revival within the climate debate' (Wichterich, 2012: 23). It has sometimes been argued – to varying degrees – that human overpopulation is a major part of the problem, and that some form of population engineering may be required to solve it (e.g. Hardin, 1968; Erlich, 1968; Rolston, 1996; Young, 2001; Campbell, 2007; Cafaro, 2012; Cripps, 2015; Hickey, Rieder & Earl, 2016; Hedberg, 2019; Gheaus, 2019). The essence of the concern is that the more humans that are brought into existence now, the greater total GHG emissions will be, which increases climate change. Indeed, some recent studies suggest that the most 'high impact' way of reducing greenhouse gas emissions is to have fewer children. In one study, it is argued that in developed countries having one fewer child is by far the most effective method of reducing individual carbon emissions, saving an average of 58.6 tonnes CO2-equivalent emissions per year (Wynes & Nicholas, 2017). This is over 24 times more effective than the second most impactful lifestyle change, living car-free; and over 26 times more effective than the third most impactful lifestyle change, avoiding airplane travel (Wynes & Nicholas, 2017).

As a result, it is not uncommon to see arguments for constraining population growth being offered as a (partial) solution to climate change. What such

5 High-variant projections place the human population in 2100 as high as 14 billion.

arguments mean for public policy is a matter of dispute. Some advocates hold that while we have a moral duty not to reproduce, either at all or beyond a certain number, this is not enforceable by the state (e.g. Overall, 2012: 183–184). Others, however, argue that the enforcement of reproduction limits is sometimes permissible (Conly, 2005), or even required (Hardin, 1968: 1246–1248). If it can be shown that rapidly increasing human population is indeed a significant driver of climate change, then such policies need to at the very least be considered a serious option.

How might environmentally-focused population control strategies attract the charge of climate colonialism? As a preliminary, there have been (justifiable) suspicions over population engineering generally as thinly veiled racist and/or imperialist programmes as a result of sterilisation campaigns that have been perpetrated under the guise of various moral causes. This has been observable in both US domestic policy and foreign policy (see Dillingham, 1977: 27–28; Bellanger, 1982: 30–35). Since population control 'has been associated with imperialism, racism, eugenics' (Samways, 2022: 35), there are grounds for *prima facie* suspicion about their contemporary use. But anything more than *prima facie* suspicion here risks a genetic fallacy. Just because population control may have originated for pernicious ends, that in itself does not rule out that population control may be required now, for independent reasons. The objector would have to show that contemporary population initiatives with respect to tackling climate change are (a) misguided, and (b) reducible to the same pernicious motives. Here I will focus on (a), which I take to be a thesis that is more straightforwardly falsifiable in principle than (b).

As a means of combatting climate change, population engineering has been objected to as a form of climate colonialism on the grounds that it erroneously locates the primary causes of the problem. As mentioned earlier, fertility rates are the highest in the least economically developed nations, in particular nations in sub-Saharan Africa (UNWPP, 2024: 1–2). But the levels of *per capita* consumption and emissions in these countries is disproportionately lower than in affluent western nations (e.g. US, Canada, Australia, Russia, Japan, United Kingdom, Germany and a number of other EU states).[6] In 2018, the average American, for example, was responsible for 16.9 metric tonnes of CO2 emission. Australia's *per*

6 See, for example, GHF-G, 2009; Boden et al., 2011.

capita emissions for the same year was 16.6 metric tonnes, and the European Union 6.7 metric tonnes. Compare this with India, whose *per capita* emissions were 2.0 metric tonnes, meaning that the average American's levels of consumption and pollution are roughly equivalent to the emissions of eight average Indians. The contrast is even starker when considering Africa's average CO2 emissions of 1.1 metric tonnes (Jackson et al., 2019). In addition to this, as the *UN World Population Prospects of 2024* has found, the fertility rate in countries with the highest levels of consumption and emissions is actually below the replacement level (UNDESA, 2024: 5). So it appears that the imposition of population control policies in themselves would demand little sacrifice in affluent nations, and a much bigger sacrifice in developing nations. Though he doesn't cash the point out in terms of 'climate colonialism', Henry Shue rightly observes the significance of this kind of sacrifice in poor nations as 'unprecedented and extreme' (Shue, 2014: 71). He claims that in such circumstances, it is possible that 'the rich will be asking parents in the poorest regions of the world to show a level of concern about the global environment unimaginable among today's rich' (Shue, 2014: 71).

The sharp disparity in *per capita* emissions/fertility rates between affluent and developing countries seems to suggest that a focus on population size looks to be a red herring (see Klein, 2014: 114; Monbiot, 2020). If so, not only would focusing attention solely on the high fertility rates of less economically developed nations disproportionately blame and penalise those least responsible for climate change (as well as those most vulnerable to its effects), but it would do so while exonerating those most responsible in affluent nations (Mies & Vandana, 2014: Ch. 19). This kind of deflection and distraction from the most pressing causes of climate change will only perpetuate inaction on relevant issues surrounding consumption habits. But further, it has been claimed that population engineering, as well as disproportionately affecting developing nations, will have harmful effects on certain demographics within those nations insofar as anti-natal policies will facilitate racial inequality, class exploitation and gender subordination (Kuumba, 1999; Smith 1995; Mies & Vandana, 2014: Ch. 19; Sultana, 2022).

The primary focus, it is thought, ought to instead be consumption and carbon emission levels, which have radically increased over the last 50 years.[7] Dyett &

7 For a detailed report of the severe consequences of a rise to 2°C, see the IPCC Report, 2018, Summary: B.

Thomas, for example, claim that 'framing Africa's population growth within the context of catastrophic climate change with no comparison of resource use to that of the Global North is disingenuous' (Dyett & Thomas, 2019: 210). Moreover, that '[b]laming [communities in developing nations] and requiring them to change, instead of critically engaging the over-consumptive people of the developed states, is an ignorant expression of capitalist-driven technocrats placing the blame on anyone but themselves' (Dyett & Thomas, 2019: 213). Not only, they claim, are population control models 'degrading, domineering, and false antidote[s] to the ecological crisis' (Dyett & Thomas, 2019: 206), but, they suggest, they are implicit and often explicit tools of colonial subversion: 'mainstream discussions of overpopulation and climate change are performances of Western masculinity, coloniality, patriarchy, and white supremacy' (Dyett & Thomas, 2019: 210). This form of objection is not restricted to the academy, but finds frequent expression in contemporary popular discourse (e.g. Monbiot, 2020).

3. How population remains a relevant variable

As it stands, the essence of this critique gets something importantly right, but also something importantly wrong. What it gets right is that far greater efforts must be made to acknowledge and reduce the (disproportionately high) *per capita* emissions in affluent western nations in order to tackle climate change. In fact, given *inter alia* the levels of these emissions, such efforts may even have to be more radical than measures taken anywhere else. Moreover, the critique is also correct that it would be severely misguided to lay the blame for climate change solely – or even primarily – at the feet of individuals or communities in low-emission but high-fertility nations.

However, the crucial mistaken assumption at the heart of the objection is that there is one 'real' root cause of climate change – i.e. consumption rather than population – and that fertility rates can thus be ignored, with projected population growth treated as an invariable descriptive fact.[8] This is the inverse of the same problem with taking climate change to be solely a function of population growth. The reality is that total GHG emissions, which are the primary drivers of climate

8 David Samways has argued that 'reticence' among environmentalists to discuss population growth as a problem stems not only from an observation of inequalities between Global North and Global South, but also from a failure to appreciate the temporal dimension of population growth as it interacts with consumption levels (see Samways, 2022: 34; 23–27).

change, are a function of 'not only … the carbon-intensity of individuals' activities, but also the number of individuals engaged in those activities' (Hickey, Rieder & Earl, 2016: 847; see also Samways, 2022: 22–23). So intimate is the relationship between these two variables for GHG emissions that, as William Ryerson has noted, while *per capita* rates of carbon emissions in the US peaked in the 1970s at around 20.2 metric tonnes of CO2 and have remained relatively stable (only modestly declining in recent years), the total carbon emissions in the US have increased with a near 1:1 correlation with rising populations (Ryerson, 2010: 3). This point can be expressed with reference to the I=(PAT) equation (Chertow, 2000),[9] now familiar since its development by environmental scientists in the 1970s:

> I=(PAT): Environmental impact (I) is a function of the proportionate relations between population (P), affluence (A) and technology (T).

'Environmental impact' can be measured in a variety of ways other than climate change (e.g. desertification, bio-diversity loss, pollution and so on), but for our purposes this can be ignored. 'Affluence' refers to the average consumption *per capita*, using the proxy of GDP *per capita* (which normally measures production, but assuming consumption increases when production increases, can reveal consumption rates). 'Technology' refers to how resource intensive and polluting the production, deployment, transportation and disposal of goods are within a society. The equation holds that the population – multiplied by its consumption *per capita*, and by the resource requirements of producing, transporting and disposing the goods that make up the population's consumption – amounts to that population's environmental impact.

What this entails is that if the rate of human environmental impact is even just to be stabilised as the population increases, consumption must decrease and/or humans must innovate and deploy more efficient technology. In other words: sustainability requires that population growth must be compensated for. This can be vividly demonstrated by contrasting the differing *per capita* emissions of nations with their total GHG emissions. As we noted in the previous section, *per capita* emissions in the USA, for example, are significantly higher than in India and China. Yet India and China (along with the USA) are the top three biggest

9 The I=(PAT) equation has been significantly confirmed by its more concrete form, the Kaya Identity, used by climate scientists to explain and predict changes in CO2 emissions (see Kaya and Yokobori, 1997).

producers of total GHG emissions (China being the biggest). The reason for this is largely because of their comparatively greater population. More people equals more emissions, whatever the *per capita* figure. This point is well recognised in the climate justice literature. Henry Shue, for example, writes that it is 'arithmetically evident' that 'the more humans there are, the lower the *per capita* emissions rate must be in order for the global total of emissions to hold constant' (Shue, 2014: 71). We may call this point the Compensation Thesis.

The import of the Compensation Thesis for the issue at hand is that there is no single 'real' issue, as the climate colonialism objection to population engineering presumes: population and consumption are both issues, all the time. Higher *per capita* consumption is more of a problem the bigger the population. The question of which we ought to focus on – population or consumption – is like asking whether we ought to care more about the height or the length of a rectangle when determining its surface area. Thus, any ecological narrative containing the proposition that population is irrelevant to climate change involves a serious misunderstanding of how climate change occurs. Consequently, anti-colonialists that decry attributing weight to concerns over population size also risk inadvertently endangering indigenous communities and citizens of developing nations – those most vulnerable to the effects of climate change, and currently the least suited to manage satisfactory food distribution for an increased population – even further.

4. The return of Climate Colonialism: preventing consumption ambitions

As shown above, including population as a variable does not mean replacing talk of consumption reduction; it is in addition to, not instead of. The importance of this is reflected in the outcome if we were to ignore population size in developing effective climate policies. As I argue in this section, accepting the Compensation Thesis demonstrates that focussing exclusively on limiting production and consumption habits is no less vulnerable to the climate colonialism charge, and perhaps even more so if population is ignored.

The largest producers of *per capita* emissions uncontroversially reside in the most affluent nations. No matter what the rest of the world does, these nations could easily push global warming beyond 2°C all by themselves if their emissions remain

constant or increase, so the emphasis on structural changes in policy ought to be on the lifestyles of the affluent. One might hold that this alone would dissolve the climate colonialism charge. However, accepting the Compensation Thesis reveals that climate colonialism would only re-emerge in a different form than previously proposed. This is because the production and consumption ambitions of many developing nations, if achieved, would have significant consequences for climate change. If all or most of, say, Africa raised their average *per capita* emissions – certainly to the average North American level, but even marginally – the goal of capping global warming to avoid environmental collapse would been forlorn. As Stephen Gardiner writes, 'it would be disastrous for the poor countries to adopt the more energy- and pollution-intensive lifestyles of the west, and so … there is reason to prevent this' (Gardiner, 2011: 455). Similarly, Shue claims that the planet 'simply could not tolerate a majority emitting GHGs at the *per capita* rate reached by today's rich minority, or anywhere near that rate', and so 'the poor' – which, in the context of the present discussion, amounts to historically colonised developing nations in the Global South – 'must prepare to live with a level of economic activity compatible with *per capita* GHG emissions well below the present levels of the rich' (Shue 2014: 70). Many of the world's poorest are becoming wealthier, and their *per capita* GHG emissions will consequently begin rising. But moreover, the population of Sub-Saharan Africa alone, for example, is expected to increase exponentially. In nine countries within this region, populations are likely to double or more in size between 2024 and 2054, accounting for more than one fifth of the projected increase in global population during this period (UNDESA, 2024: 42–43). Increased consumption is yet more catastrophic if this comes to pass.

If, in the way the Compensation Thesis suggests, increased consumption must be compensated for by population reduction, and increased population must be compensated for by consumption reduction, there is an uncomfortable decision to be made. Either population growth in developing nations ought to be controlled, or their *per capita* GHG emissions ought to be controlled. But if population engineering is an objectionable form of climate colonialism, it is unclear why requiring less economically developed countries to limit their consumption habits to well below those previously and presently enjoyed by wealthy and developed countries fares any better. We have earlier looked at the burdens that population control measures especially place upon poorer nations, but as Shue argues, mitigation strategies of the latter kind also demand a 'unique

sacrifice' (2014: 70) from poorer nations, namely: that poorer nations choose to live at an economic level (a) 'much lower than levels previously attained by other people'; and (b) 'lower than they themselves could sustain, for at least some time, with their own resources' (Shue, 2014: 71). Shue then reasonably asks:

> Is it humanely possible for whole peoples to choose less rather than more? We are asking people who have never enjoyed a plentiful, or even an economically adequate, life, to accept and help to implement a limit on the hopes they can have for their children's and grandchildren's economic welfare (Shue, 2014: 71).

The proximity of such demands to climate colonialism would look even starker where there was (understandable) scepticism about whether poorer nations could be expected to voluntarily adopt this position – particularly in light of historical injustices – and a highly restrictive economical paternalism is the suggested solution. Indeed, it is precisely this sort of enforced financial disparity and failure to respect sovereignty that is, and has been, condemned as paradigmatically colonial in nature.

We are left with a dilemma. Barring a miraculous breakthrough in the development and effective distribution of cleaner technologies – a point to which we shall shortly return – there are two options: either (i) measures are taken to prevent anticipated population growth in developing countries, or (ii) measures are taken to prevent developing countries from reaching (or even moderately progressing towards) the consumption and emission levels of wealthier nations. Because of the Compensation Thesis, those adamant about the moral badness of population strategies as a form of climate colonialism must compensate for the resulting GHG emissions with radical restrictions in *per capita* emissions that would otherwise emerge from economic growth and consumption ambitions. The problem is that if (i) amounts to climate colonialism, (ii) looks to as well. The challenge of 'climate colonialism' thus re-emerges, not in its previous form as a policy-specific objection, but as a *pro tanto* wrong that now needs to be weighed against catastrophic risk.

5. Preventive measures: choice, incentive and coercion

The previous section sought to establish that the concern over climate colonialism remains, even after recognising that consumption reduction in affluent nations

ought to be prioritised. In the final sections of the article we shall ask: what can be done about it?

A presumption at the heart of the point linking climate colonialism with either population engineering or economic restriction is, I believe, a concern over coercion. There is something deeply unsettling about the idea of undermining reproductive autonomy by attempting to control and enforce fertility rates – a right enshrined in the UN Declaration of Human Rights. This might especially be the case in circumstances in which enforcement of such restrictions could cross international boundaries. The right of self-determination of sovereign states within the limits of their territorial jurisdictions is widely acknowledged in international law. Violation of this may be particularly alarming given historically exploitative endeavours from the very same affluent nations toward the very same developing nations. As such, there is understandable apprehension about population-engineering discourse, especially at the international level. But for the same reasons, suggestions of a need to instead coercively enforce restrictions on the socio-economic autonomy of developing nations by the more affluent and powerful – again, those who perhaps profited from the historical exploitation of those developing nations – raises a number of ethical concerns.

One may plausibly wonder, however, whether this type of response grants too much. There is a legitimate question as to whether the move from (i) warranted concern to prevent increased emission levels in developing nations, to (ii) endorsing a requirement of coercion, is one that can be directly established. If there is a non-coercive path for public policy programmes on the scale required for global emission reduction, it would go some way to taking the sting out of the remaining climate colonialism charge, as most would agree that coercive policies are both morally and practically justifiable *iff* non-coercive alternatives are unavailable. There are at least three non-coercive alternatives for fertility reduction that I shall briefly consider: (a) choice-based models; (b) preference-adjustment models; and (c) incentive-based models. I shall also consider one possible non-coercive method of emission reduction for consumption: (d) technology research, development and transfer.

One proven non-coercive method for dramatically reducing fertility rates is to adopt a choice-based policy model, increasing commitments to social

infrastructure, and in particular providing women with access to healthcare, family planning, education and greater career prospects (Campbell, 2007; Speidel et. al, 2009; Engelman 2010; Cafaro, 2012; Das Gupta, 2014; Bongaarts, 2016; Bongaarts and Sinding, 2011). Recent evidence from the Middle East and North Africa (MENA), for instance, strongly suggests that improving family planning services, economic development and gender equality leads to a predictable decline in fertility. The total fertility rate for the MENA region has declined from around 7 in 1960 to around 3 in 2006. This is largely due to 'delayed marriage, wider acceptance of and access to family planning services, and increased education of girls and young women' (Roudi-Fahimi and Mederios Kent, 2007: 8). Choice-based models are attractive because they demand not autonomy restriction but autonomy enhancement. Affluent nations assisting developing nations to set up and maintain the required social infrastructure thus would not appear to be coercive. Choice-based models are also attractive because they are highly cost effective. The UN has estimated that 'for every dollar spent in family planning, between two and six dollars can be saved in interventions aimed at achieving other development goals' (UNDESA, 2009; cf. Huesemann, 2006: 563).

Another non-coercive and historically successful method for dramatically reducing fertility rates is to adopt a preference-adjustment model (Ryerson, 2012; Hickey, Rieder and Earl, 2016: 857). This involves influencing desires, beliefs and attitudes towards child-bearing within a given society to the end of the reducing fertility rates. The mechanisms for effecting this kind of cultural shift are manifold. They may include: information dissemination campaigns via Radio, TV, podcasts, social media and other modes of advertising; public lectures; school outreach programs; performance art and music; and more. These methods preserve the bodily autonomy and liberty of citizens while acting as light prompts for, or 'nudges' toward, desired behaviours, mainly by highlighting the difficulties facing large families and the advantages of smaller families. Like choice-based models, preference-adjustment is also relatively cost-effective. Ryerson claims that comprehensive media campaigns are 'probably the most effective strategy for reducing fertility rates' and estimates only a $35 million a year investment to be sufficient for an efficacious campaign across the entirety of the developing world (Ryerson, 2012: 248).

Yet another non-coercive method for inducing fertility decline is an incentive-based model, according to which legitimate authorities engineer the outcomes of

particular reproductive behaviours to incur certain benefits or penalties. 'Positive' incentives that aim to motivate citizens to limit their reproduction may include tax breaks or reduced fees for medical charges. 'Negative' incentives may range from surcharges for hospital fees after the first child, to limiting maternity leave or denying access to certain specialist roles in the labour force beyond the first child. In both cases, the subject is free to accept or refuse the benefit/penalty. This remains a non-coercive method so long as the penalties of the negative incentive are not sufficiently heavy as to outweigh the subject's freedom to refuse (a point about which I shall say more in the next section). Incentive-based models – as deployed in Singapore (Saw, 1975), amongst other countries – will be especially pertinent in developed nations, where the gulf between access to education, healthcare and family planning services is far narrower.

But what about the need to ensure that consumption does not significantly increase in the developing world (as well as in affluent nations)? Do affluent nations need to coercively interfere with sovereign nations' economic development? Perhaps not. Recall the I=(PAT) equation: one of the three proportionate relations which measures environmental impact – alongside population and consumption – is technology (i.e. how resource intensive the production, deployment, transportation and disposal of goods are within a society). It has long been suggested that tech R&D and tech-transfer are a necessary condition for global action on climate change (e.g. Speth, 2009). Emission-efficient technologies are expensive, and developing nations have little immediate incentive to spend their limited resources acquiring them. As a result, there is a strong practical reason for affluent nations to develop, share and install efficient technologies in developing nations to ensure they bypass long, energy intensive, high-emitting stages of development; schemes which are in some places already underway (European Commission, 2014).

This is not to deny, of course, that there will also be normative reasons for affluent nations to incur higher costs of climate action, given the fact they have contributed the most to global emissions, and/or may have rectificatory duties derived from historical injustices (e.g. Shue, 2014: 4; Blomfield, 2019: Ch. 9). As far back as 1992 the United Nations Framework Convention on Climate Change advocated on these grounds for 'differentiated responsibilities' among affluent and developing nations to mitigate climate change, placing the duty on the former to 'take the lead' on emissions reductions (UNFCCC, 1992: Article 3). I leave open what the

substantive normative reasons and outcomes might be. But one other practical reason for affluent nations to bear the brunt of the burden for climate change concerns the perceptions of international justice, fairness and respect. In addition to familiar international prisoner's dilemmas (Gardiner, 2011), distrust emanating from historical exploitation and present inequality makes political cooperation on climate change between the Global South and Global North extremely difficult (Timmons and Parks, 2007). Aside from whether the considered policies are unjustly coercive or not, the beliefs (and corresponding sentiments) of those in the developing world that they are or might be remain legitimate practical obstacles to implementing policies aimed at emission reduction. Cases such as this can be remedied where one can easily reveal a cognitive error by sharing empirical evidence. But given the highly complex nature of the geo-political issues surrounding global climate justice, and the fact that it is not just empirical data which is at stake (i.e. there are moral questions in play), it is much harder to overcome. This is made worse when it is combined with deeply entrenched perceptions of previous and current injustices perpetrated by the countries leading the way on climate change, and the corresponding resentment towards them felt by developing nations. Tech-R&D-and-transfer, as well as the three fertility reduction aid strategies considered, would be one instrumentally useful way of building the trust between the Global South and Global North that is a requirement for collaborative and sustained climate action. Furthermore, I agree with Gardiner that prioritising emission reduction in affluent countries is 'probably also a politically necessary prerequisite for preventing the developing countries from following a Western path' (Gardiner, 2011: 455). This is not only because 'even without [developing nations'] contribution existing patterns of behaviour in the developed countries would have serious consequences, and must be addressed' (Gardiner, 2011: 455), but observable commitments to radical emission reduction in affluent nations are likely also required for developing nations to trust their climate proposals as fair-minded.

This section has argued that there are at least three general methods for reducing fertility rates, and (at least) one method for reducing emissions from consumption, which do not appear to involve coercion. If the concern motivating the resurfacing charge of climate colonialism is over coercion, then it seems it can be deflated. I shall now consider how the four methods discussed in this section may face challenges, especially in the context of global governance, which may preserve the need for coercion, and thus (potentially) the charge of climate colonialism.

6. Some doubts about non-coercive methods & re-assessing the Climate Colonialism Charge

A strategy to respond to these claims that rapid population limitation can be achieved through non-coercive methods could take two forms. One could show that the choice, preference-adjustment and incentive models are in some way futile for the aims of preventing global warming. Alternatively, one could show that such allegedly non-coercive measures are, after all, coercive in the relevant sense. In what follows I shall present some reasons for thinking that these strategies may each have force for at least some of the fertility reduction models considered, but not all. Moreover, that if they did undermine them and coercion is in fact required to enact the necessary climate action, this would either not be a form of climate colonialism, or (if it is) it would likely be worth the cost of averting total environmental collapse.

The alarming stage of the climate crisis has implications for the relevance of choice-based models. In particular, the main concern is that while they have had tremendous success in bringing down fertility rates, they are slow to bring about results relative to climate change. For instance, average total fertility rates in Singapore decreased from 4.5 in 1966 to only 1.4 in 1988 as a result of choice-based population policies and incentive-based policies (Weeks, 1992; Saw, 1975). Similarly, family planning campaigns in Iran that were introduced in the late 1980s saw the predicted number of births by 2006 fall by around 37 million (Roudi-Fahimi and Mederios Kent, 2007: 8). In both cases the reductions took around 20 years to achieve. Similar time-frames can be observed in cases where choice-based models were combined with preference-adjustment schemes. In Bangladesh, for example, substantial access to contraception and family planning was introduced in the mid-1970's alongside massive media campaigns – via radio and TV – that emphasised the benefits of smaller families. While this saw a successful shift from a total fertility rate of 6.8 to 3.3, the latter was only achieved by the late 1990s (Bongaarts and Sinding, 2011: 575).

Huesemann (2006: 562) describes such methods as 'extremely rapid'. While this may be true relative to prior trends in fertility rates, the luxury of decades is simply not available given the aim of limiting global warming to below 1.5°C or even 2°C and above. One study suggests that even implementing a universal choice-based fertility reduction scheme within the next few years would still result in

approximately reaching moderate existing global population projections by 2050 (9.23 and 9.30 billion, respectively) and 2100 (10.42 and 10.35 billion, respectively), with significant reductions beginning only in the following century (Bradshaw and Brook, 2014: 16612).

A contributing factor to such delays is often ideological resistance to crucial elements of non-coercive methods of fertility reduction, and perhaps especially choice-based schemes, namely: deeply entrenched cultural, religious and political beliefs about the importance of the family, the value of the unborn, and of procreation. Access to birth control and family planning services, for example, have historically been puritanically opposed by the Catholic Church, including in (but not limited to) the developing nations that would benefit from them the most, and crucially in those same nations with the highest fertility rates.[10] Given the urgency to limit GHG emissions and prevent further global warming, there is warranted scepticism about the relatively slow impact of all non-coercive models for population reduction. As Bradshaw and Brook (2014: 16613) conclude:

> Even if the human collective were to pull as hard as possible on the total fertility policy lever (via a range of economic, medical and social interventions), the result would be ineffective in mitigating the immediately looming global sustainability crises (including anthropogenic climate disruption), for which we need to have major solutions well under way by 2050 and essentially solved by 2100.

This conclusion, they qualify, excludes the possibility that average global total fertility will decline to 1. The same study found that, drastically opposed to more 'humane' choice-based models, 'more draconian fertility reduction to a global one child per woman by 2100 … resulted in a peak population size of 8.9 billion in 2056, followed by a decline to ~7 billion by 2100 (i.e., a return to the 2013 population size)' (Bradshaw and Brook, 2014: 16612).

10 However, it should be noted that the effects of religious institutions upon family planning efficacy is not straightforwardly negative. Some Catholic countries (e.g. Mexico) have instituted effective family planning programmes (though this is in spite of Catholicism, not because of it). Other countries, such as Iran, have had success by advocating for family planning from an explicitly religious perspective (Roudi-Fahimi and Mederios Kent, 2007: 11).

A different kind of response would be to hold that some of the allegedly non-coercive fertility reduction strategies are coercive after all. This type of response pertains to preference-adjustment and incentive models in particular. Concerning the former, while efforts to influence the beliefs, desires and attitudes of citizens do not look like a direct restriction of liberty, one might be suspicious of them as implicit means of psychological manipulation, and thus an affront to autonomous agency. This is especially pressing in the present context, which concerns international governance and how affluent nations can ensure GHG emissions do not rise in developing nations. Ideology-crafting and cultural dissemination have been effective means of colonial suppression in the past, facilitating an easier extraction of resources. Would an attempt to influence the reproductive choices of citizens in developing nations via preference-adjustment necessarily be pernicious? There are good reasons to think not.

First, the objection that preference-adjustment amounts to manipulation rests much of its force upon the term's connotations of deception, subversion, bias and misinformation. There is no doubt that some campaigns for preference-adjustment embody these features, but they are by no means essential to the practice. Preference-adjustment can involve the purely impartial delivery of the relevant data. It may also go further in delivering this data using rhetorical techniques and emotion-targeting to illicit non-cognitive responses from the subject, 'priming' them for the desired motive. For instance, this could include: celebrity endorsements of the practice in advertising it; the conveying of the desired behaviour as a civic, moral or religious duty; the visual association of the ideal behaviour with prosperity. Both forms of preference-adjustment are already widely used in other domains beyond traditional advertising, with even the latter finding success as fertility reduction strategies in Mexico and East Africa, where norms relevant to the local culture were used to express the value of smaller families (Ryerson, 2012: 244–248).

Second, the objection in question, as it stands, fails for the same reasons given in Section 2 as to why the origins of population engineering does not undermine the evaluation of population engineering now: it risks a genetic fallacy. Just because preference-adjustment has been used as a tool for colonial subversion before, it does not mean that preference-adjustment necessarily continues to be so used, or could not be required now for independent reasons.

But what about incentive-based models? Some may worry that offering benefits and (especially) penalties for certain kinds of behaviour blurs the distinction – or, at least, is difficult to place on a continuum – between coercive and non-coercive policy. As we noted in the previous section, incentive schemes can be coercive where the penalties incurred by refusal are sufficiently severe to effectively leave the subject with no choice but to conform. Moreover, previous incentive models have in some circumstances involved significant moral sacrifices insofar as they have disproportionately affected poorer and illiterate classes of society. Fertility reduction campaigns have, in some societies, led to an increase in abortions and sterilisation without informed consent among specific demographics (see Hickey, Rieder and Earl, 2016: 863). However, as with preference-adjustment models, incentive schemes need not suffer from these problems. First, the risk of a genetic fallacy is again present if we assume that incentive-based models cannot be amended to address the faults of previous attempts (e.g. through more refined data collection; greater transparency about the results, intended outcomes and methods of the policies; and more careful catering of policies to reflect the peculiarities of class, gender, sex, religion and how they intersect). Second, as has been noted (Hickey, Rieder and Earl, 2016: 857), incentive schemes are already routinely deployed – seemingly unproblematically – to influence citizen behaviour in a variety of other areas. For example, positive and negative incentives are used to affect diet, the amount and kind of sexual activity, drug usage, immigration and more. Such schemes have also historically been deployed for the purposes of increasing fertility rates. There are, of course, better or worse ways to do this. But in itself, there does not seem to be anything coercive about incentive models *per se*. One might argue that the moral right to procreation is more fundamental than the moral right to these other forms of autonomy. But this is highly contentious, and would require significant argumentative support.

A final type of scepticism concerns the tech-R&D-and-transfer strategy for emission reduction. This faces two sceptical challenges. First, like the other strategies considered, tech-R&D-and-transfer is a necessary but not sufficient condition for effectively tackling climate change. As Huesemann's comprehensive study shows, 'no single technological approach, such as efficiency improvements, terrestrial, geologic, and ocean carbon sequestration, or renewable or nuclear energy will by itself be able to bring about the drastic reductions in *per capita* carbon emissions' (Huesemann, 2006: 559). Optimism about technological development

is the dominant narrative in the climate debate among policymakers. Recent IPCC reports remarkably neglect both consumption reduction and (even more so) population control methods for reducing emissions, focusing almost entirely on technological and managerial fixes which can accommodate ever larger economic goals.[11] But a significant portion of philosophical contributors to the discussion of climate change increasingly agree that tech-R&D-and-transfer is not the sole solution to climate change, and that both consumption and population are necessary variables to address, given the alarming stage of global warming and the relevance of the I=(PAT) equation. While this does reveal a concerning gap between growing philosophical consensus on the one hand, and government policy and UN climate initiatives on the other, we need not misguidedly place all hope in a solely technological solution to climate change in the first place. Unless we have independent reasons to think other initiatives will concurrently fail, this objection is weakened.

A second sceptical challenge concerns the difficulties inherent to tech-transfer, specifically.[12] For the reasons given in the previous section, collaborative global governance among self-interested and competing states is difficult, not least because of interlocking prisoner's dilemmas at international and inter-generational levels, but also because of deep-seated distrust between affluent and developing nations (Timmons and Parks, 2007; Gardiner, 2011). These are legitimate concerns. But we have also seen reasons for thinking that non-coercive methods of emissions reduction – e.g. financial aid for choice, preference-adjustment and incentive models; and priority of reduction in affluent nations – may collectively go some way towards developing sustained trust to enable climate collaboration. It may turn out to be too little too late, but this is difficult to establish with reasonable certainty *a priori*.

We have seen that the present strategies for deflating non-coercive methods of population limitation, and technological improvements towards consumption accommodation, are, at the very least, not decisive. But what it means if they could be decisive, and if coercive policies are in fact necessary for effective

11 This near-exclusively tech-focused approach is symptomatic of a broader aversion to population engineering in climate policy (Huesemann, 2006: 560; Samways, 2022: 34).

12 See Pachauri and Bhandari (1994) for specific difficulties of this kind pertaining to South America and Asia.

climate action, bears upon the alleged link between population discourse and climate colonialism. By that point, where coercion is the only remaining option, there are legitimate reasons to consider whether such coercive measures to curb emissions would be sufficiently bad to warrant non-interference, and thus to incur the horrific effects of climate disaster for all. Restrictions on even fundamental forms of autonomy protected by moral and legal rights may, under some extreme circumstances, plausibly be justified. Even those that place tremendous weight on such rights, like Robert Nozick, take them to be permissibly violated if doing so is the sole means available to 'avoid catastrophic moral horror' (Nozick, 1974: 30). On population restrictions in particular, Onora O'Neill similarly holds that 'coercive population policies can be justified only by the threat of major harm, the threat of the destruction of people and of standards of life' (O'Neill, 1979: 38; cf. Vanderheiden, 2009: 257–258). If there is anything which satisfies these conditions, the multifaceted effects of climate change must surely do so.

On the other hand, it is worth noting that as regrettable and unsettling as such an outcome would be, there are good reasons for thinking that it would not look to be unsettling by virtue of being an instance of climate colonialism. Recall that we defined climate colonialism as a specific type of moral wrong whereby the socio-economic burdens of tackling climate change are disproportionately shifted onto developing, often historically exploited nations that are the least responsible for it, and typically the most vulnerable to its effects, in ways that undermine their autonomy. However, since radical environmental action in developing nations is a necessary but not sufficient condition for averting further global warming, so long as affluent nations initiate their own radical restrictions – which earlier we noted may have to be more demanding – the exploitative disparity in sacrifice inherent to climate colonialism would collapse. The harm that the coercion at hand would incur would be a *pro tanto* moral cost of a more general kind, which would (at some point) be outweighed by the need to avoid global catastrophe; the harms of which would be felt the hardest and earliest by developing nations. Put another way, if developing nations are coerced into enacting change, the badness of this overriding of liberty does not by itself entail an instance of climate colonialism unless it is further shown that either (a) that coercion is not necessary for such change; or (b) that coercion is a means of offsetting burdens in affluent countries.

Conclusion

There is currently a taboo around population discourse in debates about climate change. This article has attempted to articulate what 'climate colonialism' might be, and to clarify the reasons why it may be thought to apply to certain kinds of population discourse, thus vindicating that taboo. It has argued that the charge of climate colonialism does not generally apply to calls for population limitation, once population size has been properly understood as a contributor to GHG emissions. Population limitation may be a necessary condition for preventing environmental catastrophe from global warming, but not a sufficient condition. This means that even with recognising that minimising consumption habits in affluent nations ought to be prioritised, there are reasons to prevent developing nations from raising their emissions, whether that is via increased consumption following growing wealth, or via increased population size, as they are projected to have. However, there are a variety of avenues for initiating these restrictions that do not appear to rely on coercion; the concern of which is likely motivating the resurfacing charge of climate colonialism. Finally, the article has argued that even if these non-coercive methods are together insufficient for the required action on climate change, then either (i) coercion by that point would not obviously be morally impermissible as a means of avoiding climate catastrophe; or (ii) such coercive methods would not be an instance of climate colonialism, even if they would be *pro tanto* bad.

One of the implications of the argument for why population matters to effective action on climate change is that the rhetoric of racism and colonialism embedded within some objections to calls for population limitation can itself be dangerous. Even the most sincere proponents of this particular charge of climate colonialism, out of genuine concern for the just treatment of developing nations, will do harm to all, and especially to those same developing nations that will feel the early effects of global warming the hardest. Given the alarming stage of climate change is now impossible to ignore, as well as doubts about the efficacy of technological fixes and consumption decreases, it would be deeply irresponsible to wholly ignore the real variable of population size in our attempts to reduce emissions. It would be altogether more prudent to begin addressing the uncomfortable question of how to radically curb emissions in developing nations – either in terms of population or consumption – while at the same time rightly prioritising radical de-growth policies in affluent nations. This is compatible with the eminently plausible view

that there are (and have historically been) legitimate ways that both (i) population can be used as a scapegoat for neo-colonial exploitative aims; and that (ii) climate colonialism can manifest in other ways orthogonal to population limitation.

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RESEARCH ARTICLE

The impact of immigration policy on future US population size

Philip Cafaro[1]

Abstract

Immigration will be the key factor determining whether populations in the developed world increase or decrease over the coming century. New policy-based population projections illustrate this for the United States. Expansive immigration policies could increase the US population by hundreds of millions by 2100, while more restrictive policies could lead to population stabilisation or significant reductions. For the US, there is no plausible high-immigration path to a sustainable population. Because larger populations increase human environmental impacts, sustainability advocates in the US and other countries with high net immigration levels have strong prima facie *reasons to support immigration reductions. Such reductions could achieve smaller populations in receiver countries and encourage smaller populations in sender countries, contributing to global ecological sustainability.*

Keywords: immigration, population, overpopulation, population projections, sustainability

Introduction

Population size is a key factor determining people's environmental impacts and immigration is a key factor determining the size of human populations. Given

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that, environmentalists seeking to create sustainable societies have a *prima facie* stake in immigration policy. This is particularly true in much of the developed world, where mass immigration drives continued population growth (Parr, 2021; Parr, 2023). In many developed countries, decades of below-replacement fertility levels have not led to population stabilisation or decline. Instead, increased immigration has resulted in continued population growth in the United States, Canada, Australia, France, the United Kingdom, Sweden, the Netherlands and many other wealthy countries (United Nations, 2024).

Having failed to address population matters in recent decades, some environmentalists take comfort in official projections that show populations peaking later this century and then declining, globally or nationally. For example, the United Nations' *World Population Prospects 2024* predicts peak global population by the mid-2080s, while the US Census Bureau's 2023 'main series' projection has the US population peaking in the late 2070s. This complacency is misguided for several reasons.

First, these projected trends assume policy changes that may or may not happen. In the case of the UN projections, this includes greatly expanding contraceptive availability and greatly improving educational opportunities for girls in the developing world, particularly in sub-Saharan Africa (Kebede et al., 2019; Götmark and Andersson, 2022). The US Census Bureau's projections assume large decreases in net migration into the US from current levels (Knapp and Lu, 2022; US Census Bureau, 2023b). There is no consensus on these policy changes and indeed significant resistance to them. At a minimum, they will take considerable effort to achieve.

Second, stabilising global and national populations at current levels, or even modestly decreasing them, appears insufficient to avoid continued ecological degradation and potential catastrophe. All indications are that a global population of 8 billion people is three to four times more than Earth can sustain over the long term, at least at the levels of comfort and convenience experienced in prosperous industrial democracies and desired in poorer nations (Lianos and Pseiridis, 2016; Dasgupta, 2019; Tucker, 2019). A population of 340 million in the US is probably several hundred million more than can share the temperate North American landscape justly with other species or avoid taking more than our fair share of global resources (Rosenberg et al., 2019; Pimentel and Pimentel, 2006).

There is no lack of schemes for solving environmental problems without addressing overpopulation. Selfish and dangerous proposals are made to geoengineer Earth's atmosphere or oceans to allow continued economic and demographic growth (Stephens et al., 2023). Two recent studies assert humanity's ability to feed 10 billion people; all we need to do is completely reinvent global agriculture (Gerten et al., 2020; Springmann et al., 2018). But whatever might be possible hypothetically in the future, a warming atmosphere, melting tundra, burning forests, shrinking and dying rivers, acidifying oceans, bleaching corals and dwindling wildlife all testify to humanity's excessive numbers today (Ripple et al., 2020; Richardson et al., 2023). We are grossly overpopulated now, here, in the actual world we love and completely depend upon (Götmark et al., 2021). While 'End Population Growth!' was the right slogan in 1970, with more than twice as many people alive today, living much more luxuriously on average, environmentalists' new goal should be to gradually and humanely shrink human numbers (Crist et al., 2022).

Understanding the impact of immigration policy on future population numbers helps clarify developed nations' economic and environmental policy choices going forward. That is what I seek to do for the United States in what follows, building on recent US Census Bureau projections to make explicit where future immigration policy choices may lead.

Recent Census Bureau projections

In 2023, the US Census Bureau provided their most recent population projections for the United States (US Census Bureau, 2023a). They used a standard cohort-component method; for details, see 'Methodology, Assumptions, and Inputs for the 2023 National Population Projections' (US Census Bureau, 2023b). The Census Bureau's main projection series set the total fertility rate (TFR) between 1.63 and 1.54 from 2025 to 2100, slowly decreasing over the entire period. Average life expectancy varied between 76 and 86 years for men and 81 and 88 years for women, slowly increasing over the entire period. Net annual migration levels varied between 853,000 and 976,000, peaking in 2079 and decreasing slightly thereafter.

These projections garnered the most attention for predicting that the US population would peak in the late 2070s and then start to decrease, a first for a Census Bureau main projection. This became 'Census Bureau Says US Population to Decline' in headlines and TV news stories around the country, fitting in nicely with recent concerns about falling national fertility levels (Bahrampour, 2023;

Schoichet, 2023). Reports downplayed that this decline was predicted to occur more than fifty years in the future and that the expected US population in 2100 was tens of millions larger than it is now. Some reporters framed their stories as America 'running out of people' or, especially in the business press, 'running out of workers' (Wise, 2023). Also often highlighted was population ageing.

The Census Bureau also provided projections under 'zero', 'low' and 'high' immigration scenarios, along with their most likely 'main series' projection (see Table 1). These alternative scenarios were largely ignored by reporters. Net migration under the main series averages 939,000 annually over the projection period. Net migration under the low and high immigration scenarios averages 543,000 annually and 1.534 million annually, respectively. The 'zero' migration scenario actually models an average -249,000 annual net *negative* migration, since it combines continued emigration out of the country with no immigration whatsoever (a highly unlikely scenario). These four immigration scenarios yielded populations of 226 million, 319 million, 366 million and 435 million in 2100 (US Census Bureau, 2023a).

Table 1. Projected US Population Size Under Four Different Immigration Scenarios, 2023–2100 (numbers in thousands)

Year	Main Series	Alternative Foreign-born Immigration Scenario		
		Low Immigration	High Immigration	Zero Immigration
	Population	Population	Population	Population
2023	334,906	334,394	335,675	333,369
2030	345,074	340,921	351,303	332,615
2040	355,309	345,605	369,865	326,196
2050	360,639	345,029	384,054	313,807
2060	364,287	342,510	396,954	298,951
2070	367,913	339,715	410,209	283,313
2080	369,363	334,795	421,213	265,650
2090	368,120	327,447	429,130	246,084
2100	365,558	319,032	435,346	225,961

SOURCE: US CENSUS BUREAU, '2023 POPULATION PROJECTIONS FOR THE NATION BY AGE, SEX, RACE, HISPANIC ORIGIN AND NATIVITY,' TABLE A (MODIFIED).

On the positive side, these alternative projections did show readers who dug deeply enough that immigration levels will make a big difference in future US population numbers, especially since the Census Bureau projected all the way up to 2100, something it had not done since 2000. The difference between expected populations in 2100 for the low immigration and high immigration projections was 116 million (319 million versus 435 million). In a press release, the Census Bureau stated explicitly: 'In each of the projection scenarios except for the zero-immigration scenario, immigration is projected to become the largest contributor to population growth'. And: 'Different levels of immigration between the present and 2100 could change the projection of the population in that year by as much as 209 million people, with the projected total population ranging anywhere from 226 to 435 million' (US Census Bureau, 2023c).

A problem with the Census Bureau projections, however, is that they do not accurately capture the range of immigration policy choices facing the United States today. Just in the past five years, net immigration into the United States has varied more widely and across a much higher range, from 750,000 in the last year of the first Trump administration (2020) to approximately 3 million in Joe Biden's penultimate full year as President (2023) (Knapp and Lu, 2022; Camarota and Ziegler, 2024). This is a variance of 2.25 million, compared to a variance of 0.9 million between the Census Bureau's low immigration and high immigration projections. Such a failure to consider the full range of immigration policy options is common in national statistical bureaus' population projections, which have been slow to accommodate recent large increases in immigration (Cafaro and Dérer, 2019).[2]

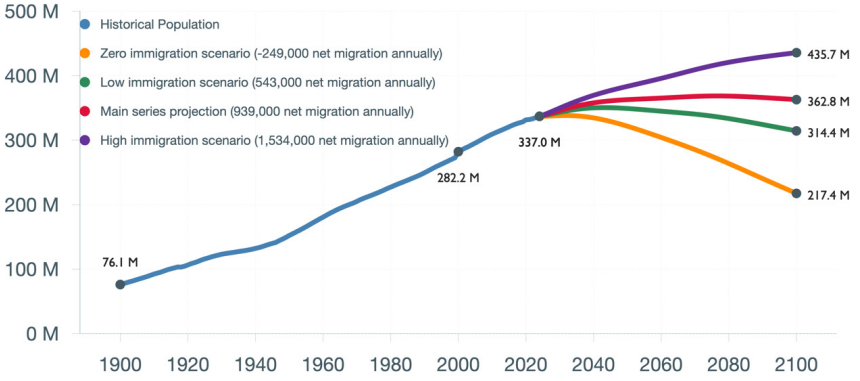
In an effort to correct this failure, I created a population projection tool to model the full range of immigration choices facing American policymakers. This tool replicates the cohort-component method used by the Census Bureau, utilising

2 As another example, in 2015 Destatis, Germany's national statistical bureau, came out with population projections that considered two annual net migration scenarios, 100,000 and 200,000 (Federal Statistical Office of Germany, 2015). These two immigration scenarios hardly accounted for the range of policy choices facing a country where annual net immigration had averaged 259,000 over the previous twenty years and varied widely (from – 56,000 in 2008 to 1.2 million in 2015) and where there was widespread support both for greatly increasing immigration (Social Democrats, *Die Grünen*) and greatly decreasing it (Christian Democratic Union, *Alternative für Deutschland*).

a single-cohort model. It uses initial population data from the Census Bureau as of July 2024 and migration, fertility and mortality data from the 2023 Census Bureau projections. I set the tool to default to the Census Bureau's 2023 main series projection values for total fertility rate, life expectancy and net migration between 2025 and 2100, all of which can then be varied to create new projections.

Using these default parameters from the main series, this 'reverse engineered' projection tool generates a US population in 2100 of 362.8 million, less than 1 per cent different than the Census Bureau's main series projection of 366 million (US Census Bureau, 2023a). Most of this difference appears to be a function of using a more up-to-date base population. Rerunning the Census Bureau's four immigration scenarios from 2023 using this tool generates the projections in Figure 1.

Figure 1. US population projections to 2100 (in millions) under Census Bureau's four immigration scenarios

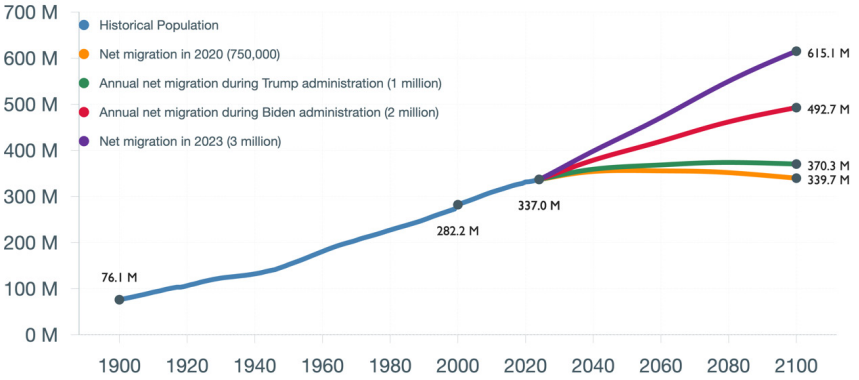


SOURCE: US CENSUS BUREAU, '2023 POPULATION PROJECTIONS FOR THE NATION BY AGE, SEX, RACE, HISPANIC ORIGIN AND NATIVITY' AND OWN CALCULATIONS.

Note that the range between the populations in 2100 under the high immigration and low immigration scenarios is only 121.3 million. Adding the zero-migration projection increases the range to 218.3 million, but this is a highly unlikely scenario which doesn't increase the range of plausible policy options.

By comparison, projecting out scenarios based on the actual figures for net migration in 2020 and 2023, 750,000 and 3 million respectively, leads to a difference of 275.4 million in 2100 (see Figure 2). In the high immigration scenario, the US population balloons to 615.1 million by 2100, while in the low immigration scenario population rises at first and then declines slowly over the second half of the century to 339.7 million – essentially today's number. Even comparing two scenarios for estimated average annual net migration under the Trump and Biden administrations – approximately 1 million and 2 million, respectively (Camarota and Ziegler, 2023) – we still see a 122.4 million difference between projected populations in 2100 (492.7 million versus 370.3 million). Both generate continued US population growth, but one scenario leads to four and a half times as much growth as the other, and a population that would still be rapidly growing at the end of the century.

Figure 2. US population projections to 2100 (in millions) at recent immigration levels



SOURCE: US CENSUS BUREAU, '2023 POPULATION PROJECTIONS FOR THE NATION BY AGE, SEX, RACE, HISPANIC ORIGIN AND NATIVITY' AND OWN CALCULATIONS.

As the Census Bureau itself emphasised, with historically low fertility rates unlikely to rebound to previous levels, immigration policy likely will be the main determinant of whether the US population will continue growing in the twenty-first century and by how much (US Census Bureau 2023a, 2023c). For those who believe achieving sustainability depends on ending or reversing population growth, wading into immigration policy thus appears unavoidable.

Recent immigration policy

Recent variations in immigration levels have been caused by a wide range of immigration policy changes. Legal immigration under congressionally mandated programs has stayed relatively stable around 1.1 to 1.2 million annually, not just during the Trump and Biden administrations but since the last major increases in legal immigration levels in the early 1990s. What changed dramatically during the past decade have been four things: decreased (Trump) and then increased (Biden) tolerance for illegal immigration; the Covid pandemic; an immense surge in political asylum applications; and new 'temporary' parole programmes bringing in several million citizens from distressed states in Latin America (Camarota and Ziegler, 2024).

In 2017, the Trump administration became the first Republican administration since the 1950s to seriously attempt to reduce illegal immigration. Efforts included the 'Remain in Mexico' policy, under which asylum applicants entering the US illegally were returned to Mexico to await adjudication of their claims; increased enforcement of employer violations of worker visa programs; a temporary suspension of foreign aid to several Central American countries to compel them to cooperate with repatriation efforts; and more (Bolter et al., 2022). These endeavours garnered mixed success, yet they did reinforce the ideas that limiting immigration is necessary and that immigration limits should be enforced (Kaba, 2019). Illegal immigration into the US decreased marginally during Trump's first term, while legal immigration levels remained steady. Covid-19 did more to reduce overall immigration levels, however, with 2020 recording some of the lowest numbers seen in decades (Knapp and Lu, 2022).

In response, from 2021 onward the Biden team went further than any modern American administration in relaxing immigration enforcement. 850,000 visitors overstayed their visas and remained in the US illegally in 2022 (US Department of Homeland Security, 2023). Nearly 1.4 million prima facie inadmissible migrants were released by federal officials into the country in fiscal year 2023, many after filing bogus political asylum claims (Arthur, 2023). During the administration's first three years, two million people from faltering and failed states were 'paroled' into the US under special programs originally designed to accommodate a few hundred people (Arthur, 2024). More recently, after a public outcry and with an impending Presidential election, these numbers were brought

down. But they represent an unprecedented increase in illegal and quasi-legal immigration which, added to stable levels of legal immigration, has led to the highest absolute net migration levels in US history.[3]

What can we conclude from the policy actions taken in the past eight years and the public's response? First, most Americans believe that citizens through their elected governments should set and enforce limits to immigration, but significant minorities on the cosmopolitan left (Dummett, 2024) and libertarian right (Kukathas, 2021) disagree. There really is a constituency for 'open borders'. Second, according to recent polls, a majority of Americans have come to believe that current immigration levels should be reduced. Most of the rest think current levels are acceptable, while only a small minority believe they should be expanded (Jones, 2024). Third, these proportions are largely reversed among the political and business elites that actually run the country. A majority of these decision-makers support continued high levels of immigration or even more expansive policies. That is why immigration levels stay high and tend to go higher. As Gilens and Page (2014) have demonstrated for a wide variety of policy issues, when public opinion conflicts with the economic interests of the wealthy, the latter almost always win out in American politics.

In sum, there are wide divergences in the immigration policies pursued and enacted within the United States. Policy analysts should grapple with the full range of policy proposals, including their demographic and environmental implications. The goal of official population projections should be to clarify those implications for informed citizens, although they often fail to do so (Cafaro and Dérer, 2019; O'Sullivan, 2020).

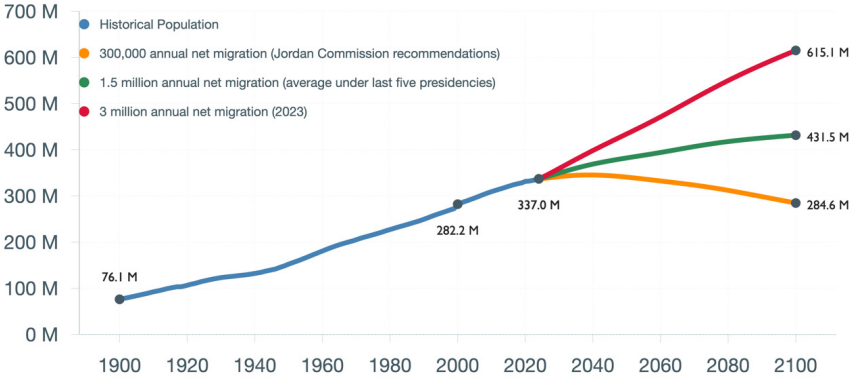
New policy-based population projections

Let's compare three scenarios that begin to capture the actual immigration policy choices facing the United States. Using the Census Bureau's (2023b) methodology, we first graph a rough 'status quo' scenario of 1.5 million annual net migration,

3 Legal and illegal immigration have become blurred categories in recent years in the United States, as Democratic administrations have become increasingly comfortable allowing illegal immigration and promoting new immigration pathways outside Congressional mandates. 'Quasi-legal' seems like a useful term to capture some of what is happening; President Biden's massive parole programs, for example, which extended far beyond Congress' original intent and are subject to ongoing litigation.

the average over the eight administrations of the past five US presidents, from 1992 to the present. Projected forward, this immigration level leads to substantial population growth throughout this century (Figure 3). We then compare this scenario to one based on the immigration levels recommended by the US Commission on Immigration Reform (1997) (commonly known as the Jordan Commission) and endorsed by President Clinton (300,000 annual net) and to the highest annual net immigration level under the Biden administration (approximately 3 million). The Jordan Commission recommendations have been endorsed by numerous advocacy groups; they reduce immigration levels substantially, while leaving some room for bringing in exceptional workers, genuine political refugees and spousal reunification. The Biden administration's numbers for 2023 stand as the high-water mark for immigration permissiveness, providing an empirically-grounded high-migration comparison to the status quo scenario.

Figure 3. US population projections to 2100 (in millions) under three different immigration policies



SOURCE: US CENSUS BUREAU, '2023 POPULATION PROJECTIONS FOR THE NATION BY AGE, SEX, RACE, HISPANIC ORIGIN AND NATIVITY' AND OWN CALCULATIONS.

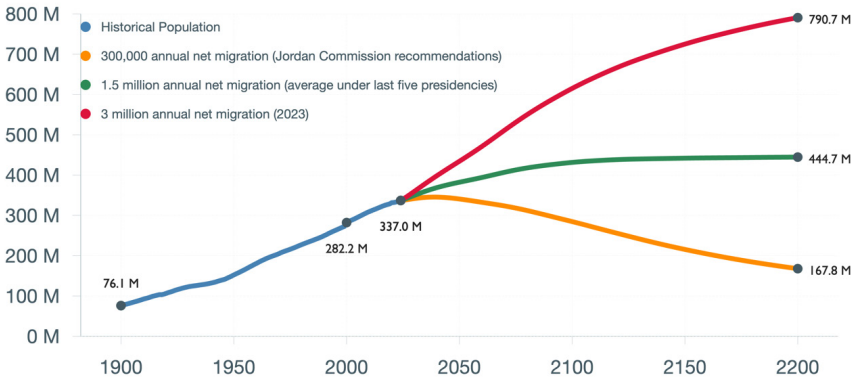
These three policy scenarios put the United States on three very different population trajectories: rapid growth, gradual growth or gradual decline. They differ in their 2100 population projections by 330.5 million – very close to the entire population today. Once again, we see that immigration policy *is* population policy in the United States, as it is throughout most of the developed world. The

environmental difference between a population of 615 million or 285 million in 2100 would be immense, impacting everything from carbon emissions to urban sprawl, air pollution to water withdrawals from our rivers and streams, habitat preservation for endangered species to housing costs and crowding for American citizens (Kolankiewicz et al., 2016).

All else being equal, we can assume that 615 million Americans will make more than twice the economic demands and inflict more than twice as much ecological damage as 285 million Americans. Furthermore, these populations would continue increasing or decreasing after 2100, if their respective immigration, fertility and mortality trends continued. This in turn would move Americans even further away from or further toward ecological sustainability. Under a post-2100 continuation of the high immigration scenario, the US population of 337 million in 2024 would double in a hundred years, increasing to 674 million by 2124.

Figure 4 below extends these three immigration policy scenarios out another hundred years to 2200. From where we sit now, this is looking out the 'seven generations' that far-seeing leaders of the Iroquois Confederacy were supposed to scan when making important public decisions (assuming 25 year-long generations). What do we see? Three radically different population futures.

Figure 4. US population projections to 2200 (in millions) under three different immigration policies



SOURCE: US CENSUS BUREAU, '2023 POPULATION PROJECTIONS FOR THE NATION BY AGE, SEX, RACE, HISPANIC ORIGIN AND NATIVITY' AND OWN CALCULATIONS.

Under the status quo scenario (1.5 million annual net migration), the US population grows slowly during the rest of this century and stabilises over the course of the next one. But it stabilises at over one hundred million more Americans than today (444.7 million in 2200). This population is almost surely unsustainable. Accepting hundreds of millions of immigrants over this period could also incentivise continued population growth in sender countries, since large families are likely to derive more support from overseas remittances, a major economic factor in many developing countries (Tohoff et al., 2024). The status quo scenario does not appear sustainable.

Under the high-level immigration scenario (3 million net annually), the US population continues to grow rapidly during the next two centuries, ballooning to nearly 800 million people with no end to growth in sight. Long before 2200, the American experiment may have come to an end, whether from ecological catastrophe or social unrest, amplified by growing ethnic divisions and an unravelling economic safety net (Rees, 2020). This choice seems even less likely to be sustainable.

Finally, under the low immigration scenario (300,000 annually), the US population declines by half by 2200 to 167.8 million. Of course, by itself such population decline would not guarantee sustainability – US citizens could try to use the ecological space freed up to engage in even greater *per capita* hoggishness. Even 168 million Americans still seems likely to remain unsustainable, given high levels of per capita resource use (Pimentel and Pimentel, 2006). But as part of comprehensive efforts to create a sustainable society, the potential benefits of halving the US population would be immense. An America closing in on 150 million (rather than 800 million!) could use less water, generate less air and water pollution and take less habitat from other species (Attenborough, 2011). In fact, it would be in prime position to restore degraded ecological lands, particularly agricultural lands no longer needed to feed so many human beings (Weber and Sciubba, 2018). This is the only potentially sustainable path of the three.

Encompassing the full range of possible policies

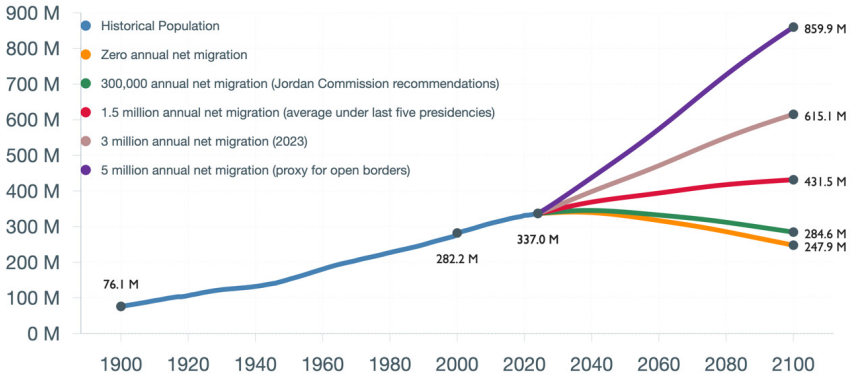
As wide-ranging as they are, the previous scenarios do not exhaust the full range of potential immigration policy scenarios seriously advocated in the United States. Figure 5 graphs two new scenarios: a zero annual net migration scenario and a 5 million annual net migration scenario. Zero net migration represents even greater immigration curtailment than the Jordan Commission's recommendations; it is supported by a substantial minority of Americans, such as those who argue for

an 'immigration pause' while the country assimilates the large waves of recent immigrants (Cafaro, 2015). Including zero net migration also has the virtue of clarifying migration's contribution to population growth under all other scenarios (subtract the population under the zero net migration scenario from that under other scenarios, at whatever year, and you will see net migration's contribution to the total population under that scenario).

At the other end of the spectrum, a minority of Americans support letting anyone immigrate into the country who wants to do so, or at least anyone without a serious criminal history. Polls routinely show an immense pent-up demand for emigration from the developing world. In 2021, Gallup estimated nearly 900 million adults in low- and middle-income countries wished to emigrate permanently from their home countries, with 160 million of them having the US as their preferred destination (Pugliese and Ray, 2023). So the *supply* is there – as is the *demand* from corporate interests for cheap and docile labour. For many years, the *Wall Street Journal* editorial page has advocated for a simple, five-word amendment to the US Constitution: 'There shall be open borders'.

An open borders immigration policy is difficult to model. Presumably, it would lead to large yet widely fluctuating numbers from year to year. In Figure 5 below, 5 million annual net migration stands in as a rough proxy for open borders. How long such

Figure 5. US population projections to 2100 (in millions) under five different immigration policies



SOURCE: US CENSUS BUREAU, '2023 POPULATION PROJECTIONS FOR THE NATION BY AGE, SEX, RACE, HISPANIC ORIGIN AND NATIVITY' AND OWN CALCULATIONS.

a policy could actually continue before devolving into chaos is an open question. Nevertheless, it is espoused by millions of Americans, both on the left and the right, so it is worth considering what a *de facto* open borders policy might entail.

Projecting this spectrum of policy choices shows once again the immense demographic importance of immigration policy. Populations in 2100 range from 859.9 million under the open borders scenario, an increase of 522.9 million over 2024 (> 255%), to 247.9 million under zero annual net migration, a decrease of 89.1 million (< 24%). Population in 2100 ranges over 612 million between the highest and lowest scenarios. This shows the power of relatively small annual differences in annual net migration to cause huge differences in the US population in less than one hundred years.

Projecting all five immigration scenarios out another hundred years to 2200 ('seven generations') increases the population range in 2200 to 1.1536 billion (from 98.6 million to 1.2522 billion). Of course, demographers rarely project out that far. But if we want to create societies that actually are sustainable, we need to think long-term. Even restricting ourselves to the next 75 years, comparing population increase under the status quo scenario (1.5 million annual net migration) and under the net zero scenario, we see that continuing immigration at recent levels could add another 183.6 million people to the US population by 2100. That's equal to the entire US population in 1962.

Discussion

Intelligent discussion of immigration policy rarely occurs in American politics these days. There exists little room for it, between Republicans' claims that immigrants are eating people's pets, Democrats' insistence that adding millions of new residents every year has no negative effects on housing or labour markets and environmentalists' refusal to consider the impacts of population growth. The policy-based population projections presented here are a modest attempt to set aside nonsense and hyperbole and make intelligent dialogue possible. Here I focus on immigration's environmental implications, recognising that a comprehensive discussion must also incorporate additional issues.

Considering these projections, a case can be made that immigration policy choices will be more consequential than any other environmental policy decisions in the US

going forward. Energy policy, agricultural policy, transportation policy – all will still be important. But energy demands, food demands and transportation demands will be determined in substantial part by the number of Americans (Foreman and Carroll, 2014). It seems clear that serious environmentalists cannot ignore immigration policies that will greatly scale up Americans' total environmental impacts, both nationally and globally. Given immigration's demographic importance, the same point appears to hold across much of the developed world. Even if we wind up endorsing continued high levels of immigration, for humanitarian or economic reasons, we should recognise its environmental costs (Hardin, 1995).

Fewer people is the environmental gift that keeps on giving. Particular technological fixes or policy changes may limit carbon emissions, decrease water use, curb overhunting or reduce plastics pollution. But smaller populations help with all our environmental problems: every single one, simultaneously, and without any adverse environmental countereffects (Crist et al., 2022).[4] Declining populations certainly pose economic challenges, but these challenges are manageable, particularly compared to runaway climate change or other global environmental disasters (Götmark et al., 2018; Lianos et al., 2023.). Meanwhile, growing populations reduce the positive impact of any technological fixes we manage to deploy.

If avoiding ecological catastrophe is the primary economic challenge of the twenty-first century, the unremitting deluge of bad environmental news from around the world is powerful evidence of the need to significantly reduce human numbers (Bradshaw et al., 2021; Rees, 2023). I would defend 100 million Americans and a global population of 2 billion as reasonable, precautionary long-term targets. In a world in rapid ecological decline (Richardson et al., 2023), 340 million Americans and 8 billion earthlings stand as gross *over*populations until proven otherwise – not in some techno-optimist manifesto (Asafu-Adjaye et al., 2015) or socialist pipe dream (Angus and Butler, 2011), but by actual economic behaviour in the real world.

4 This contrasts, for example, with solar geoengineering and increased use of nuclear power, two common technological fixes proposed to deal with climate change. Even if they succeed in their particular goals – a big if – they will have significant environmental costs. Furthermore, even if their overall benefits exceed their overall costs, by prolonging the endless growth economy they increase the likelihood and potential severity of a global ecological crash.

It should not be necessary to defend the obvious fact that more people increase human economic demands and environmental impacts, while fewer people decrease them. This has already been fully proven for climate change (IPCC, 2022), biodiversity loss (IPBES, 2019) and comprehensive ecological degradation (Reid et al., 2005). I do not attempt to quantify those demands and impacts under different US demographic scenarios in this paper, although I would welcome efforts to use these projections to do so. An earlier publication did this for the European Union, focusing on greenhouse gas emissions and biodiversity preservation (Cafaro and Götmark, 2019). However, given the complexity of human environmental impacts and the uncertainty of future trends in energy and materials use, transportation modes and agricultural techniques, such speculations are somewhat uncertain.

This uncertainty can bolster status quo bias – but the demographic status quo is leading to potential ecological disaster. So let me suggest two reasonable assumptions to guide developed nations' future immigration policy choices. First, that future citizens will make substantial per capita environmental demands on the Earth, just as we do, regardless of fantasies of 'full decarbonisation', 'dematerialisation' and the like. Second, that going forward, twice as many people will generate approximately twice as many demands as half their number would have. Deviations from these assumptions seem to me unwarranted, mere special pleading by those wedded to the economic status quo or committed to high levels of immigration (or fertility) for ideological or self-interested reasons that preclude an honest reckoning with ecological limits.

To be clear, reducing human numbers is no environmental panacea. Efforts to shrink populations should be part of comprehensive strategies to create sustainable societies, with economies based on reasonable comfort and security rather than ever-increasing wealth and consumption (Daly and Farley, 2010). Creating such societies will need to include reining in the power of large corporations, phasing out dangerous technologies and deploying more benign ones, setting aside more habitat and resources for other species, and decreasing per capita consumption, especially among the wealthy (Crist, 2019). Population reduction complements these other measures. It is not a substitute for them.

Notwithstanding techno-optimists on the one hand and ecosocialists on the other, smaller populations appear to be a necessary (but not sufficient) condition

for creating sustainable societies. In part, that's because both human cleverness and human solidarity are limited. In part, it's because increasing either per capita economic demands or the number of 'capitas' can push environmental impacts too far.

Gandhi famously said that Earth provides sufficient resources to satisfy every man's needs, but not every man's greed. When the Mahatma published those words in 1909 in *Hind Swaraj*, the world's population stood around 1.6 billion and India's at perhaps 250 million. Are they still true today at 8 billion and 1.4 billion, respectively? Probably not – at least not if we expand 'needs' beyond bare physical needs to include the common consumer goods and material comfort that most people around the world appear to want. True, creating sustainable economies will depend on people's willingness to distinguish essentials from inessentials, needs from at least some of our wants, and then limiting consumption and production accordingly. But setting such limits remains largely unexplored politically. Citizens' willingness and politicians' ability to set them remains unproved, to put it mildly.

In such a fraught situation, threatened by our own 'too much' but reluctant to accept less, it seems especially futile to espouse economic degrowth while denying the most effective and least painful way to shrink economic activity: reducing the number of consumers and producers. Yet incredibly, some leading degrowth advocates do just that (Kallis, 2019), often resorting to *ad hominem* attacks against supporters of population reduction (Monbiot, 2020). Degrowth proponents are right: we will need to decrease the size of industrial economies to achieve ecological sustainability. Mere efficiency improvements will not do the job, *cannot* do it in a context of endless economic growth. Environmental advocates will have to convince our fellow citizens to accept limits to their consumption and their pursuit of wealth. But while we are doing that, we cannot afford to turn up our noses at the one important component of degrowth that most people in the developed world have embraced already: having small families, which can humanely shrink human numbers going forward.

Conclusion

We rightly hear a lot today about the outsized role developed nations have played in causing global climate change and their responsibility to take the lead in responding to ecological overshoot. But if they are to share the world's

resources more fairly and show the way forward by creating prosperous yet sustainable societies, developed nations must reduce their bloated populations (among other measures, to be sure). The path to doing so is open. For two or three generations, citizens in the developed world have freely chosen to have the small families that would have allowed national populations to decrease gradually and relatively painlessly – while many of their governments have greatly increased immigration, leading instead to continued population growth in many countries.

Such high immigration levels are broadly unpopular, as shown most strikingly in 2016 by Brexit and the election of Donald Trump as US President (and by his re-election in 2024). Perhaps the twin threats of ecological collapse and the triumph of far-right political parties may convince mainstream politicians to finally accept reductions in immigration. Perhaps ending (and then reversing) population growth could be the first step in slowing (and eventually reversing) economic growth – our only hope for avoiding catastrophic climate change and mass species extinction and creating genuinely sustainable societies. Then again, mainstream political leaders may continue to bleat about these 'existential threats' while making them worse by ratcheting up immigration levels, as has occurred in the US and the UK since 2016.

The most plausible, and ethical, path toward lower national populations in the United States and throughout the developed world involves accepting historically low fertility rates, rather than fighting them, while also ending mass immigration. This appears to be the way forward to create flourishing societies that are both just and ecologically sustainable. Sustainable societies must take limits seriously. That necessarily includes limiting human numbers, along with our associated economic activity. In an overcrowded world, that goal necessarily requires limiting immigration.

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BOOK REVIEW

Capitalism, degrowth and the steady state economy. Debating future economic models

Theodore P. Lianos
London: Palgrave Macmillan, 2024.
ISBN 978-3-031-60246-7. 173 pp.

Anastasia Pseiridis[1]

Capitalism has fuelled unprecedented economic growth over the last three centuries. The emblematic phrase 'grow or die' aptly captures its trajectory and results. However, 'everything changes and nothing remains the same'. Capitalism, a victim of its own success and the greed it cultivated, seems to have reached its end. An objective observer can discern this by examining the state of international politics, economics, and the planet.

The end of capitalism, in its current form, is near. The interesting question is 'what will follow?' A new type of socialism? A system of a steady state economy working within the planetary limits? A truly mixed economy?

These are the topics addressed in this new book by Theodore Lianos. It is essential reading for anyone who has ever wondered about the future of humanity. There is also a latent anxiety, shared by many, about whether humanity has the luxury of time to search for the new system that will ensure her survival before being torn apart by the monstrous problems she has created.

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The main advantages of the book are its simplicity and clarity, making it particularly easy to read, despite the gravity of the topics it addresses. The author helps the reader navigate a vast bibliography of ideas presenting facts about the current state of humanity and the main arguments of competing ideas for organising society and the economy, as well as offering a brief but in-depth evaluation of these ideas. The material is organised in small chapters and the chapter sections are easy to read as standalone snippets.

Perhaps the most important aspect of the book is that the author incorporates the need for sustainability into the evaluation of each system and equips the reader with the tools to ask better versions of old questions and form their own opinion.

The content of the book can be divided into four sections. The first presents various views that have been expressed about the future of capitalism: from the Communist Manifesto of Marx and Engels to Keynes and contemporary economists, sociologists, and political scientists. The second section examines contemporary data on the state of the planet and the global population, with an emphasis on the problems of modern capitalism – economic, social and environmental. The third section explains how the growing population and the limited resources of the Earth will bring economic and political changes and small and large wars, and will lead to the search for new forms of social organisation. The final section describes and evaluates some alternative models that have been proposed: the model of the steady-state economy, participatory socialism, degrowth, eco-socialism, and the communist model of Oskar Lange. More space in the book is devoted to the steady state economy, as it serves as a tool to evaluate alternative systems.

While the book is an engaging read, many of its ideas may disturb the reader's enjoyment. Not so much because of the pessimism of the author himself, but because it will become clear that the lack of pessimism (or its deliberate avoidance) has allowed human societies to live and dream beyond their capabilities. It nurtured societies that risk self-destruction by neglecting the long-term consequences of their actions – societies that do not care for a large part of the current population nor for the future generations of humans, non-human animals, and the environment. It created fragile societies that do not consider the cost of their decisions to other people, to other animals, and to nature.

But... global GDP has increased eightfold (in real terms) in the last sixty years. One would expect, thinking simply, that the problems people faced in 1960 would be solved today, at least 7/8 of them. This remains a critical question.

By integrating sustainability and the planet's finite resources into discussions of alternative economic models, the book challenges conventional political narratives. It exposes how many of these ideas, rooted in flawed assumptions, fail to promote democracy, equality, justice, or the protection of nature and the weak. It demonstrates that humans have become the greatest enemy of their own species.

Paraphrasing Gandhi, the quality of a civilisation can be judged by how it treats the weakest. The harms currently experienced by the weakest humans (hunger, economic suffering, inequalities of all kinds, armed conflicts) show us that the quality of our civilisation is disappointingly low. Strikingly absent from discussions of justice and equality are non-human animals. These sentient beings, whether exploited for production or living freely in the few fragments of nature that still escape the continuous destruction of natural habitats, remain excluded from moral considerations in economic systems; thus, it would be unorthodox to appear in Professor Lianos' discussion – to be fair, they should; writers with similar interests have at least acknowledged this issue (Ehrlich, 2018; Daly, 2018). The destruction of the environment renders non-human animals and nature as the 'invisible weak'. If we consider the harm we inflict on them, too, then the quality of our civilisation is even lower.

While reading the book, I wondered whether there is a political figure who can claim to have achieved something positive for the weakest without burdening other people in some other corner of their country or the Earth. One thing is certain: the unbridled post-WWII 'growth party' has taken place at the expense of the weak – of all kinds – and 'politics as usual' has not served the interests of all equally. The Furies that will destroy the current system have already been born and are breathing down on us; Professor Lianos is amongst the few who clearly see this.

Towards the end of the book, one gets the feeling that humanity's primary need is not actually a strong economy but an alternative political discourse and an

alternative organisation of society, uniting people and guaranteeing peace. The trade of politics will have to create other arguments, other ethics, other goals than those it has today. The discussion about the future of capitalism underscores the urgent need to turn to more humane and more sustainable goals when discussing the economy, development, and societal wellbeing. The economy should serve as a means to promote progress, not a vehicle for self-destruction. Development and wellbeing should be redefined in terms of democracy, justice and equality, rather than being measured in monetary terms.

The myth of Erysíchthon, invoked in the book's epilogue, serves as a potent metaphor for humanity's current trajectory. If we fail to redefine progress and well-being in terms of democracy, justice and sustainability, we risk a fate akin to Erysíchthon, who died of insatiable hunger. Theodore Lianos' work is a compelling call to action that transcends political ideologies and urges a collective reimagining of our future.

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