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The Optimal Global Population from a Climate and Social Justice Perspective

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ABSTRACT

This paper examines the concept of the optimal global population from a climate justice perspective, arguing that it is one where negative environmental externalities are minimized to prevent any individual from experiencing "slow violence" and living in "sacrifice zones." In doing so, this paper critiques the sustainability of the current global population by highlighting the detrimental effects of capitalism's infinite growth paradigm, which exacerbates environmental degradation and social inequalities. Synthesizing Aisha and Partha Dasgupta's studies and Benoit Cushman-Roisin's trifurcated IPAT equation, this paper utilizes the theoretical number of 1.8 billion as the optimal global population to demonstrate how a sustainable global population is achievable not solely by reducing population size but also by transforming consumption patterns and technological impacts, particularly in wealthy and rapidly developing nations. Ultimately, this paper declares that the optimal global population is one in which no one's rights are being violated as outlined by the UN's Universal Declaration of Human Rights.

Introduction

A zero-sum game: what one enjoys, another suffers from. Every flick of a light switch or turn of an ignition key may seem insignificant, yet these mundane, everyday actions are coined by Rob Nixon as "slow violence," rippling outwards and manifesting into "sacrifice zones," marginalized areas concentrated with toxins.[1] This essay seeks to set forth a criterion for the optimal global population through a climate justice perspective, establishing that the optimal global population is one in which negative environmental externalities can be distributed such that any person will not have to be subject to slow violence and live in a sacrifice zone. Given the current prevalence of sacrifice zones primarily created by the extensive capitalistic growth and overconsumption in the world's richest countries, it is abundantly clear that the current global population cannot be sustained unless paradigmatic changes are made to ensure that every person, including the worst off individuals, can live without violations to their human rights as established by the UN's Universal Declaration of Human Rights (UDHR).[2] While Aisha Dasgupta and Partha Dasgupta's study justifies 1.8 billion as the optimal global population,[3] a joint analysis with Benoit Cushman-Roisin's study[4] demonstrates how various changes in consumption and technological development across countries of varying economic states can be reevaluated to minimize climate impact and reach a sustainable and optimal global population.

Capitalism and its Pitfalls

Capitalism, an economic system maintained by the purported premises of infinite growth and expansion, often leads to the exploitation of natural resources, exacerbating both environmental degradation and social inequalities.[5] In this system that prioritizes economic development and technological growth, the finite nature of the

Earth's resources is frequently overlooked, leading to what is known as the tragedy of the commons. This concept, introduced by American ecologist Garrett Hardin in 1968, illustrates how individuals, acting in their self-interest, can collectively deplete shared resources, resulting in long-term detriment to an entire community.[6] The tragedy of the commons conceptualizes the tension between capitalism's logic of infinite expansion and the finite nature of the Earth and its resources.

As the global population and overproduction of goods continue to increase, the strain on our finite planet intensifies. This strain is visible in the escalating environmental destruction and negative externalities[7] from overproduction and overconsumption, which create slow violence and sacrifice zones.[8] These externalities are often not reflected in market prices, which is what leads to the continuation of detrimental overproduction and overconsumption.[9] Slow violence and sacrifice zones represent the direct manifestation and concentration of negative externalities as dictated by global economic power dynamics. These wealthier and more powerful regions or countries disproportionately outsource their environmental and social costs to areas that are economically marginalized and less empowered to resist exploitation, creating sacrifice zones.[10]

Slow Violence and Sacrifice Zones

Mundane and life-giving habits ultimately become acts of slow violence, resulting in sacrifice zones.[11] Coined by environmental humanities Princeton University professor Nixon, "slow violence" is "a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all."[12] What the concept of slow violence posits is that the process of fulfilling the standards and everyday desires of life in the world's richest countries, result in destructive harm and death disproportionately suffered by other people and places.[13]

For example, in first world countries, people's lives unknowingly contribute to waste and detrimental consequences to places like Agbogbloshie, Ghana—one of the world's largest e-dumps.[14] Workers in Agbogbloshie disassemble and burn materials from discarded electronics, making them and everyone living nearby highly susceptible to toxic chemical exposure, like lead and mercury, and more prone to certain health concerns.[15] In this scenario, the purchasing and discarding of electronics—a common act for someone living in the U.S., for example—represents slow violence that deteriorates the health of certain communities and turns places like Agbogbloshie into sacrifice zones.

As global economic power dynamics are leveraged, corporations also contribute greatly to the creation of sacrifice zones—exacerbating the incremental, slow violence of consumers and actively facilitating the dumping of electronics in communities like Agbogbloshie, for example. Fundamentally, sacrifice zones follow the concept that particular lands must be sacrificed for the greater economic prosperity of other communities.[16] However, sacrificing land and its life-giving resources is synonymous to sacrificing the people who reside in them.[17] And the most frequently sacrificed are the communities in the poorest countries that have not yet experienced their industrial revolutions.[18] Within the global hierarchy, the richest countries with the highest rates of consumption are only able to maintain their higher standards of life because people who they do not know or see in another corner of the world are being sacrificed.[19] The example of Agbogbloshie is merely one sacrifice zone out of the countless that exist in the world.

Dasgupta & Dasgupta's Research

Aisha Dasgupta, UN Population Division member, and Partha Dasgupta's, economics professor at the University of Cambridge, study "Population Overshoot" sought to compute the optimal global population.[20] Figure 1 of the econometric model uses Q to represent the total output of goods, K to represent the biosphere (measured in tons of biomass), and N to represent the population size:[21]

Equation 1: *Equation from Dasgupta and Dasgupta s study Population Overshoot"*

$$Q = K^{(1-\rho)}N^{\rho}, \qquad 0 \leq \rho < 1$$

Here, ρ indicates labor's role in production, while 1 - ρ reflects the role of the biosphere in production.[22] Although it is difficult to predict how the biosphere's dynamics will precisely change in the future, it is widely established that capital growth will result in environmental consequences.[23] Therefore, K is treated as a combination of biosphere and produced capital.[24] At the time this research was conducted, the global GDP was approximately 110 trillion international dollars ("the international rates of exchange adjusted for differences in the purchasing powers of national currencies"), and the population was approximately 7.6 billion.[25] However, the global ecological footprint by the Global Footprint Network was estimated to be 1.5 times the sustainable level, rendering the sustainable value of K as K/1.5.[26] This calculates the sustainable global GDP to be roughly 70 trillion international dollars (110 trillion divided by 1.5)[27] Dasgupta assumed that half the population (3.8 billion at the time of the study) is engaged in production (p = 0.5) based on the distribution of population among age groups, and used a per capita income of 20,000 international dollars as a guaranteed minimum[28] (as research shows that an income of more than 20,000 international dollars does not necessarily correlate to greater happiness).[29] The study found that the Earth could support 1.8 billion people as a sustainable population.[30]

Considering how Dasgupta and Dasgupta calculated the optimal global population using the theoretical sustainable global GDP of 70 trillion international dollars, we can assume that they equate "optimal" with "sustainable" in their analysis. This essay will use their numbers and logic but will elaborate upon the definition of "sustainable" in terms of the trifurcated IPAT equation, as detailed below.

I = PAT

In a series of articles in the 1970s by Paul Ehrlich and John Holdren titled "Impact of Population Growth," the IPAT equation was developed.[31] According to this formula, I (the adverse impact on the environment or total emission) is shown as a function of P (population) x A (affluence as a function of consumption per capita) x T (technology as the amount of environmental impact per unit of consumption).[32]

However, industrial ecology Dartmouth University professor Cushman-Roisin, proposed a trifurcated IPAT equation to address the flaws in the original that not all people globally are equally affluent or use similar technologies:[33]

Equation 2: *Trifurcated IPAT Equation by Cushman-Roisin*

$$I = P_1 \times A_1 \times T_1 + P_2 \times A_2 \times T_2 + P_3 \times A_3 \times T_3$$

Index 1 refers to "highly industrialized nations" ("the 1st world"), index 2 refers to "nations in rapid developmental phase" ("the 2nd world"), and index 3 refers to "poor nations" ("the 3rd world").[34] Index 3, having limited affluence and technology, is virtually negligible compared to index 1 and 2.[35] However, index 1 and 2 variables meaningfully affect the I.[36]

Synthesis

Analyzing Dasgupta and Dasgupta's assertion of the optimal global population as 1.8 billion through the lens of Cushman-Roisin's trifurcated I=PAT formula, we can derive meaningful observations on how the components of the formula interact and explore the global implications from a climate justice perspective.

In the UDHR, Article 3 states "everyone has the right to life, liberty and security of person" and Article 25 states "everyone has the right to a standard of living adequate for the health and well-being of himself and of his family."[37] These articles clearly indicate that everyone has the right to be protected from slow violence and from living in sacrifice zones that undermine one's life, security, and health.

The presence of slow violence and sacrifice zones today demonstrate that the I in Cushman-Roisin's formula far exceeds what is optimal, as many people's rights set forth in the UDHR are being violated. In order to reduce the I while keeping A and T constant, the P would need to be reduced. If we are to assume 1.8 billion to be the optimal population, then perhaps a drastic decrease in global population to that number would bring the I to an optimal level; it is plausible that such a drastic drop in population, assuming that it is maintained, will free up land to serve as the "sacrifice zones." The environmentally harmful facilities can be built in completely isolated locations so that no human is "sacrificed" or subjected to slow violence.

Given the theoretical nature of this scenario derived from Cushman-Roisin's formula, it is not practical to aim to reduce the global population to 1.8 billion. Therefore, an alternative way to decrease the I to a globally sustainable level while holding the Ps constant would be to decrease other variables: the As and Ts. Given the negligible impact by index 3, an impactful priority would be to decrease consumption among the wealthiest people (decrease A1) and support sustainable infrastructure and technology in emerging economies of the second world, (decrease T2) as A1 and T2 represent the most significant contributors to the I.[38] Alongside these changes, industrialized economies could also accelerate the green technology transition (decrease T1) and developing nations could seek to decrease overall consumption (decrease A2).[39] The combined impact of these changes across all three indexes would diminish the need for a drastically lowered population, and the significant decrease in environmental destruction would work towards the key goals of reducing slow violence and preventing the creation of sacrifice zones.

By definition, since A1 > A2 > A3, it can be assumed that A1xT1 > A2xT2 > A3xT3, from which it can be concluded that the same percentage of decrease in P1 would be more impactful than in P2 and P3. This observation demonstrates the need for populations with the highest standard of living to drop in order for everyone to have a more equal standard of living.

Conclusion

The optimal global population is one in which no person experiences environmental externalities to the extent that they violate their human rights as established by the UDHR, meaning that all people must be protected from slow violence and sacrifice zones. By deriving an optimal and sustainable global population based on a system that ensures that those who live in the most concentrated areas of negative environmental externalities are guaranteed their human rights, the least economically prosperous in the world will still be protected from unjust disadvantages and violations.

Under the current global power dynamic, these negative environmental externalities that manifest into slow violence and sacrifice zones are concentrated in the most marginalized communities around the world.[40] While the population of 1.8 billion calculated by Dasgupta would be able to diminish slow violence and sacrifice zones through the increase of land access, there currently is not an ethical or feasible way to reduce the population to such a number. While the theoretical projection of 1.8 billion entails many assumptions and generalizations, the core message of this number is that the current global population far exceeds the optimal level, and the strain on the Earth's natural resources and lifestyles of overconsumption primarily in the developed world are killing those in marginalized communities through slow violence and sacrifice zones. By aiming to transform cultures of overconsumption and committing to sustainable technological infrastructure developments as proposed by the trifurcated IPAT formula, our planet can shift closer to a sustainable and, in turn, optimal global population—one that protects even the most economically vulnerable.

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End Notes

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