Nature Sustainability Article: "*Impacts of Meeting Minimum Access on Critical Earth Systems Amidst the Great Inequality*"

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Global distributive justice and systemic transformations key to planetary stability, study finds

Researchers find that achieving access to minimum resources and services for all whilst safeguarding the stability of the Earth system requires redistribution and societal transformations

In a new study published in the journal Nature Sustainability, an international team of scientists from the Earth Commission, convened by Future Earth, investigates the Earth system impacts of escaping poverty and achieving a dignified life for all. The research was inspired by discussions on potential trade-offs between achieving social and environmental goals.

This new research comes ahead of an associated Earth Commission report due out in early 2023 that will outline a range of 'Earth System Boundaries' (ESBs) to safeguard a stable and resilient planet and underpin the setting of science-based targets for businesses, cities and governments. The Earth Commission is the scientific cornerstone of the Global Commons Alliance.

The authors conclude that redistributing resources and transforming society are key to ensuring universal access to basic needs while staying within Earth's limits. These transformations include redistribution and improvements to water, food, infrastructure and energy provisioning systems.

The study asked: what would be the additional pressures on the Earth system, in 2018, if adequate minimum access to food, water, energy and infrastructure was achieved? The authors looked beyond the international poverty line and instead defined ‘just access’ as minimum per capita requirements that would allow people to lead a dignified life and escape poverty. Their analysis showed an increase of pressures on the Earth’s natural systems, raising greenhouse gas emissions by 26% whilst raising water and land use, and nutrient pollution by 2-5%.

The analysis also showed that these pressures, arising from the poorest third of humanity achieving adequate resource access, equalled the pressures caused by the wealthiest 1-4%. It provides scientific evidence for concluding that in order to achieve societal and environmental goals, it is the wealthy (who appropriate the bulk of Earth’s resources and ecosystems - not those escaping poverty) who need to undergo transformative change. The authors therefore link the ‘Great Acceleration’ of rapid increases in human-driven environmental impacts with a ‘Great Inequality’.

Lead author, Crelis Rammelt, Environmental Geography and Development Studies at the University of Amsterdam and Earth Commission expert says; “Our research is important because many people assume that meeting the needs of the poorest is possible without major redistributions and transformations in society.”

“We show that in 2018 – so with 2018 levels of inequalities, technologies and behaviors – providing dignified lives for the poor would have led to further crossing of Earth system boundaries, especially for climate.”

“However, it is important to frame these potential impacts in the context of wider inequalities in resource use and environmental impacts today. It is the wealthy who appropriate the bulk of the Earth’s resources, not the poor” Rammelt continued.

Co-author Chukwumerije Okereke, Alex Ekwueme Federal University Nigeria and Earth Commission expert says; "The research is significant because it shows that the aching poverty and inequality suffered by people in the Global South can be addressed to provide a meaningful life for all, without transgressing key Earth system boundaries and thresholds.”

"Rather than asking poor countries of the world to tighten their belts or make do without, as some in the North often tend to suggest, the emphasis should be on promoting ideals of global distributive justice and systematic transformations that will enhance wealth and opportunities for the poor” he continues.

Co-author Johan Rockström, Co-Chair of the Earth Commission and Director of the Potsdam Institute for Climate Impact Research says: "While it becomes clear that the poor are not causing the climate problem, it's also clear that we need to solve climate, to solve inequity. Climate impacts are hitting harder on those who lack the resources to cope with them, both

internationally and within countries. When it comes to taking action, those who have more means to reduce dangerous greenhouse gas emissions also have a greater responsibility to do so. Stabilizing our climate is in their own interest, also because it means stabilizing societies."

Co-lead author Joyeeta Gupta, Co-Chair of the Earth Commission and Professor of Environment and Development in the Global South at the University of Amsterdam says, "This paper focuses only on one aspect of justice; to ensure minimum access to resources and services for the most disadvantaged."

"However, our paper shows that with contemporary technology and approaches to production, minimum access cannot be met without reallocating resources, risks and responsibilities; without redistribution and transformation. In upcoming work, we look at other aspects of justice, such as minimizing harm to humans and addressing the root causes of environmental degradation and vulnerability" Gupta continued.

Wendy Broadgate, Global Hub Director (Sweden) for Future Earth says "It is clear that we need to address inequalities and justice to tackle the triple planetary crisis of climate change, biodiversity loss and pollution. This research highlights the deep societal transformations needed to tackle overconsumption. This transformation is essential to secure fair access to the global commons for all, whilst ensuring the stability of the planet. This work is a key contribution to the Earth Commission's forthcoming report defining safe and just Earth system boundaries."

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Additional quotes

Co-author Cristina Inoue, Radboud University and University of Brasilia and Earth Commission member, says, "Had we achieved access goals in 2018 with the prevailing economic frameworks and methods of production, we would have further overshot those Earth system boundaries."

"We can only conclude that economic, technological and behavioral change thus far, while improving some lives, has not been sufficient to lift people to minimum access levels whilst still respecting Earth systems. This shows the urgent need for transforming our societies." she continued.

Co-author Diana Liverman, Professor in Geography, Development & Environment, University of Arizona and Earth Commissioner says, "This new analysis shows potential trade-offs between earth system stability and development goals of eradicating poverty and ensuring food, water, shelter, mobility, and energy for all - and that reducing the consumption - especially of the

wealthiest can create the space for everyone to thrive while staying within Earth system boundaries".

Co-author Laura Pereira, University of the Witwatersrand, South Africa and Earth Commission member explains: "The paper points to the importance of fundamental transformative changes that address poverty and inequality while reducing environmental impacts - there is an urgent need for new political, economic, behavioral, and technological systems that protect people and the planet."

"Broad societal transformations across sectors, especially addressing the impacts of elites, from energy, industry and transport; food and agriculture; and the built environment, including cities and infrastructure, coupled with effective redistributive mechanisms based on principles of equity are critical to achieve a safe and just future for all." she continued

Co-author Ilona M. Otto, Wegener Center for Climate and Global Change, University of Graz and Earth Commission member adds: "While the 20th Century was characterized by the phenomenon of Great Acceleration, the 21st Century is emerging as the Great Inequality era. Reducing inequalities within and across countries are at the core of addressing the climate crisis and responding to the multitude of systemic and cascading risks we are facing today. A new global social pact is needed to renegotiate the well being for all human beings on planet Earth." she continued."

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NOTES TO EDITORS

The Earth Commission is the first holistic attempt to scientifically define and quantify a safe and just corridor for people and planet, avoiding crossing irreversible tipping points. The Commission is hosted by Future Earth, the world's largest network of sustainability scientists, and is the scientific cornerstone of the Global Commons Alliance, a sponsored project of Rockefeller Philanthropy Advisors with support from Oak Foundation, MAVA, Porticus, Gordon and Betty Moore Foundation, Herlin Foundation and the Global Environment Facility. The Commission is also supported by the Global Challenges Foundation. The Commission is chaired by Prof. Dahe Qin (Chinese Academy of Sciences, China), Prof. Joyeeta Gupta (University of Amsterdam, Netherlands) and Prof. Johan Rockström (Potsdam Institute for Climate Impact Research, Germany).

Future Earth is a global network of scientists, researchers, and innovators collaborating for a more sustainable planet. Our mission is to advance research in support of transformations to global sustainability. Future Earth hosts the Earth Commission and its scientific secretariat.

FIgures and captions from the paper

Figure 1. The Great Inequality. Note: The graph shows inequalities for selected material needs with cumulative population on the x-axis (by country and as percentage of global population) and consumption or spending levels on the y-axes, for energy (total residential electricity consumption in GJ/yr/cap), water (average water footprint of consumption for 1996-2005 in m3/yr/cap), food (protein consumption in gram/day/cap), and infrastructure (produced capital from the Inclusive Wealth Index in US$/cap).

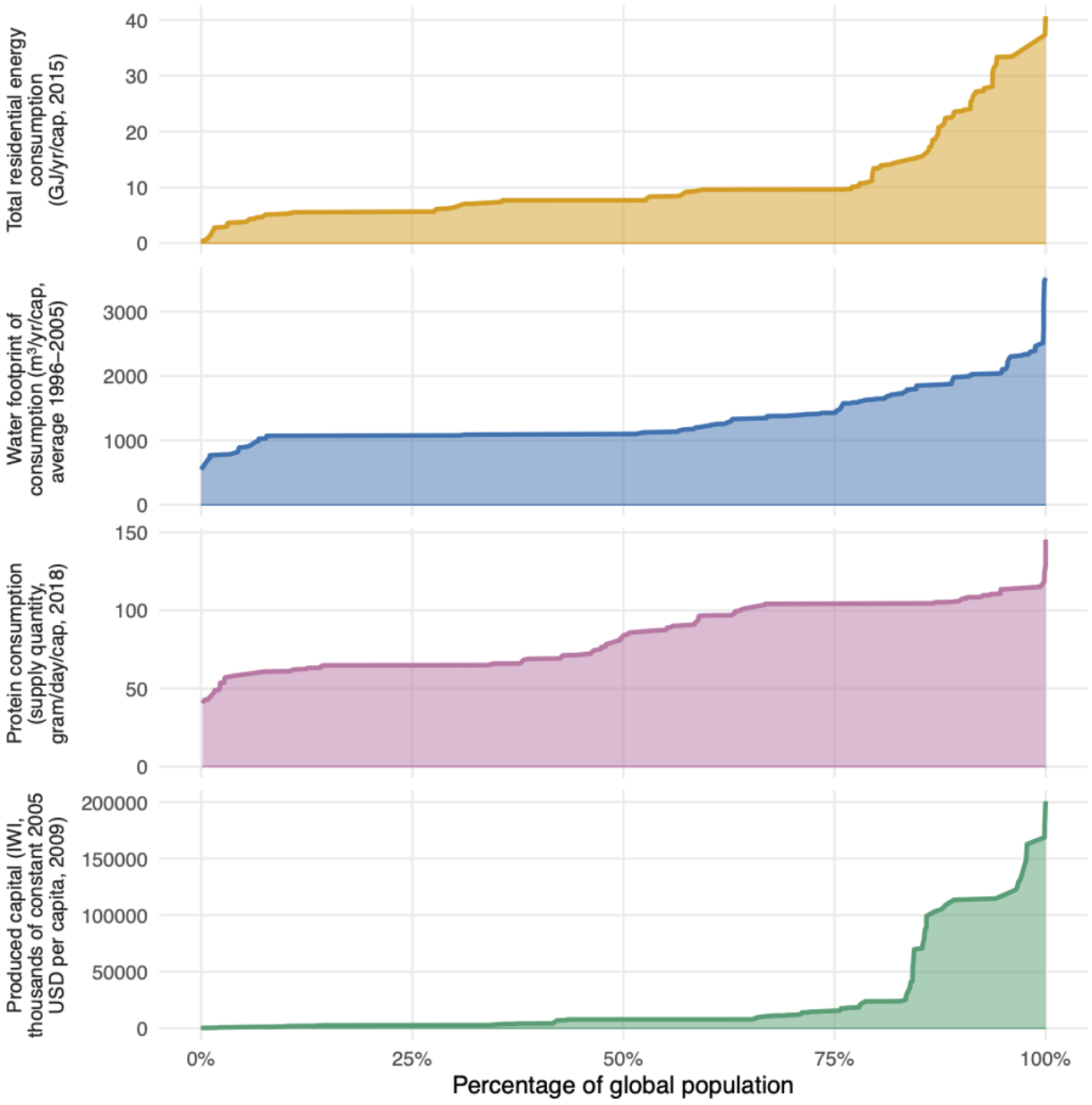
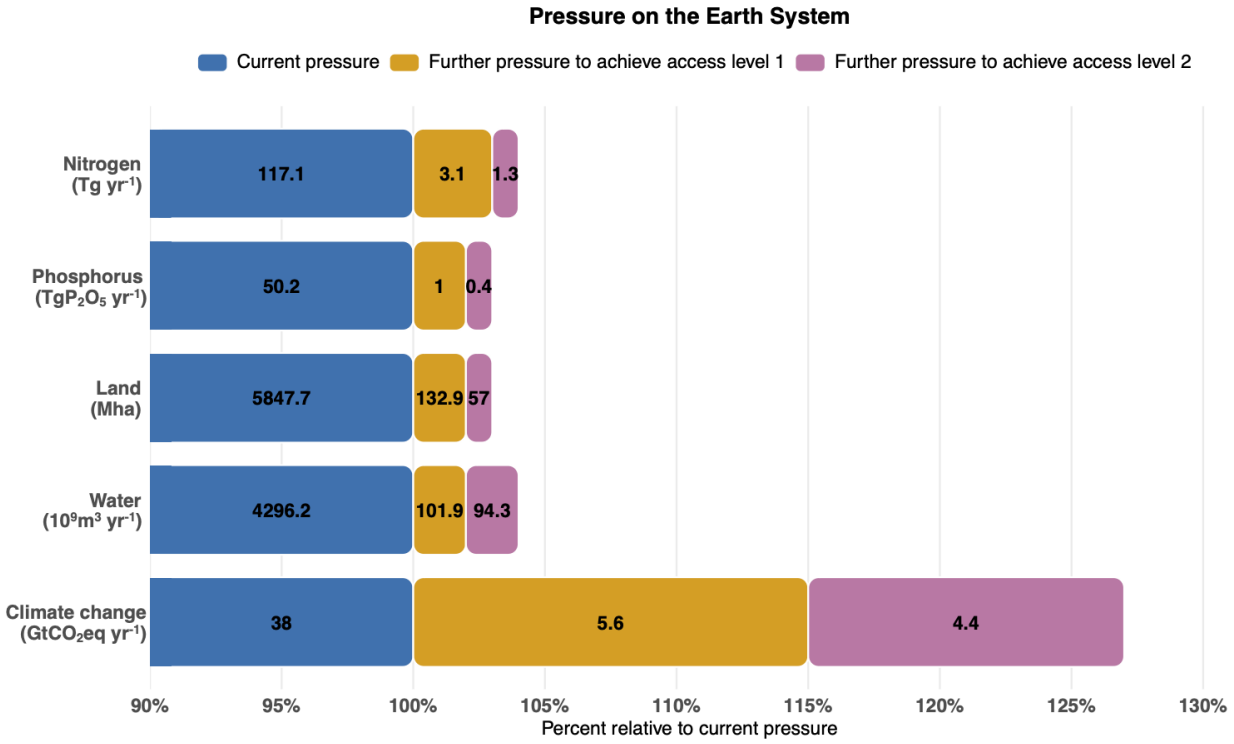


Figure 2. Earth system Impacts of Just Access for 2018. Note: The x-axis is truncated at 90%. Total current pressure amounts to 100%. We include percentages to show the additional pressures in relative terms. The purple area 'Further pressure to achieve access level 2' is equal to the impact of achieving level 2 minus the impact of achieving level 1.


Pressure on the Earth System
Current pressure
Further pressure to achieve access level 1
Further pressure to achieve access level 2
Nitrogen (Tg yr-1)
117.1
3.1
1.3
Phosphorus (TgP2O5 yr-1)
50.2
1
0.4
Land (Mha)
5847.7
132.9
57
Water (10^9m^3 yr-1)
4296.2
101.9
94.3
Climate change (GtCO2eq yr-1)
38
5.6
4.4
90%
95%
100%
105%
110%
115%
120%
125%
130%
Percent relative to current pressure