The climate change – inequality nexus: towards environmental and socio-ecological inequalities with a focus on human capabilities

Alexia Faus Onbargi

German Institute of Development and Sustainability (IDOS) - Environmental Governance and Transformation to Sustainability, Bonn, Germany

ABSTRACT
The climate change – inequality nexus has become an increasingly important concept advanced by inequality and sustainability experts as well as international organisations like the United Nations. In this perspective paper, two arguments are made to further our understanding of the nexus and to promote action on SDG 10 (“Reducing inequalities within and among countries”) and SDG 13 (“Climate action”). First, climate change’s status as a “core” planetary boundary as well as its embeddedness in the 2030 Agenda for Sustainable Development, calls for a wider discussion on environmental and ecological degradation in the context of inequality. Second, the concept of inequalities of opportunity freedoms, under the guise of the influential human capabilities framework, is well suited to make sense of the complexity and multidimensionality of the climate change – inequality nexus. To this end, some (and by no means all) causal links between climate change, wider environmental and ecological degradations, and inequality are analysed. The paper concludes by arguing in favour of a framework that can aptly capture the full complexity and multidimensionality of the climate change – inequality nexus.

Introduction
Climate change and deepening multidimensional inequalities are two of the most pressing obstacles to global sustainable development today. Indeed, the causal links between climate change, environmental and ecological degradation, and inequality are receiving burgeoning attention by academia (see Chancel 2020; Kenner 2019; Hamann et al. 2018 for some recent examples) and policy-making circles alike (EEA, 2018; OECD 2021). One influential work has been the United Nations Department of Economic and Social Affairs’ 2016 World Economic and Social Survey, titled “Climate Change Resilience: An Opportunity for Reducing Inequalities”, which aimed to contribute to the debate on the implementation of the 2030 Agenda for Sustainable Development (UNDESA 2016). Chapter 2, on the “Climate change and inequality nexus” explored the relationship between climate change hazards and inequality...
by developing a conceptual framework to address the various disproportionate impacts of climate hazards borne by vulnerable populations and disadvantaged groups (UNDESA 2016). The chapter would then be adapted into a subsequent UNDESA working paper by its authors and published a year later (see Islam and Winkel 2017).

The framework recognizes three impacts. First, initial inequality generates differentiated exposure to climate hazards. Second, this unequal exposure then translates into increased susceptibility to damages caused by climate hazards. Third, greater susceptibility to damages decreases these vulnerable groups’ ability to cope and recover. All three impacts lead to disproportionate loss of assets and income and generates even more inequality (ibid., p.6). Moreover, the studies note that recovery from a climate hazard can either maintain the pre-hazard levels of inequality or widen inequality between the wealthy and the poor, by either speeding up the rate of recovery of the rich, or by slowing down that of the poor (UNDESA 2016, p. 39; Islam and Winkel 2017, p. 18). The studies call for further research into the nexus to understand how climate change hazards bear on all forms of inequality (ibid., p.24).

This perspective paper argues that while these studies have made an important contribution to understanding within-country inequality in the context of climate change, more can be done. First, their seemingly narrow focus on climate hazards might neglect the relationship between inequality and other climate change-related but not climate change-exclusive environmental degradations and damages. Employing the planetary boundaries framework towards a broader understanding of the climate change – inequality nexus can be useful to this end. Second, use of the concepts of inequalities of opportunities and outcomes under the guise of the human capabilities framework, can further expand our understanding of the climate change – inequality nexus.

**Climate change within planetary boundaries**

According to the influential Stockholm Resilience Centre, climate change constitutes one of nine planetary boundaries (PBs) in the Earth system (ES), the overpassing of which can lead to the system’s destabilization (Steffen et al. 2015, p. 736). PBs – also consisting of change in biosphere integrity, stratospheric ozone depletion, ocean acidification, biogeochemical flows, land-system change, freshwater use, atmospheric aerosol loading and introduction of novel entities – delineate the thresholds for the “safe operating space for global societal development” (Steffen et al. 2015, p. 736; Rockström et al. 2009). Both climate change – captured in SDG 13 on “Climate action”- and biosphere integrity – best captured in SDG 15 on “Life at Land” – are cited as “core” PB’s given their “fundamental importance for the ES” (Steffen et al. 2015, p. 736; ibid., p.1). Just as the Sustainable Development Goals (SDGs) are complex and broad and require synergic and integrated action to reduce trade-offs (Nilsson et al. 2016; Miola et al. 2019), planetary boundaries are also complex and interconnected. (Galaz et al. 2012, 2015; Biemann and Kim 2020). For example, climate change and ocean acidification (in SDG 14 on “Life Below Water”) are mutually reinforcing; one cannot be addressed without the other (see Kim 2012; Singh et al. 2019). Similarly, land-system change due to industrialized agriculture and farming (in SDG 15) is one of the main drivers of climate change, while climate change generates land-system change by affecting crop production (Thapa 2021). This may compromise agricultural productivity
of small–scale food producers (in SDG 2 on “Zero Hunger”). Moreover, air and soil pollution are key drivers of climate change; soil is both a source and a sink of carbon, while dark carbon and ozone contribute to warming the planet (Law 2010). These examples elucidate that climate change is only one piece – although admittedly a crucial one – of the wider pie, one that cannot be addressed separately from other planetary boundary overshoots and wider ecological and environmental degradation and damages resulting from unsustainable development (IPBES 2018). Moreover, human flourishing and survival – and sustainable development at-large – depend not just on a stable climate, but also on a host of other variables such as the quantity and quality of productive land, stratospheric ozone thickness and clean water (Agyeman 2013, p. 49). Indeed, sustainable development needs must be met within all planetary boundaries. This is perhaps best visualized in the doughnut model of NGO Oxfam and of University of Oxford economist Kate Raworth (2017). The model delineates the “safe and just [my emphasis] operating space” for humanity (ibid.), bringing an (in)equality dimension to the otherwise apolitical planetary boundaries framework (Biermann and Kim 2020).

In short, in the context of the climate change – inequality nexus, it may not suffice to address climate hazards only. Rather, policies on both SDGs 10 and 13 might require interconnected and synergic action to tackle broader environmental and ecological damages that are intimately – but not exclusively – linked to climate change. This is all the more important given that there is no specific SDG focused on broader environment-human interlinkages, even though these affect almost all SDG interactions (Scharlemann et al. 2020). Other studies calling for an inequalities-environment nexus (OECD 2021) and a socio-ecological nexus (Laurent 2015) demonstrate the strengths of an integrative, multidimensional approach. Hamman et al. (2018), for example, identified six paths of interactions between inequality and the entire biosphere in applying a socio-ecological systems perspective, “specifically recognizing cross-scale feedbacks and the multidimensional nature of inequality” (ibid., p.62).

**Inequalities of outcome and of opportunities**

UNDESA (2016) and Islam and Winkel (2017) also recognize the multidimensional nature of inequality. Indeed, “the state of not being equal, especially in status, rights and opportunities” (Alfonso et al. 2015, p. 1), can be experienced in many different ways, owing to demographic characteristics such as race or gender, disadvantages vis-à-vis political power and access to public resources, and inequality of income and assets. These all affect different groups’ experiences of inequalities, as well as those that result from climate hazards (Islam and Winkel 2017, p. 2). For example, poor women are more at-risk of climate hazards than poor men given that their livelihoods tend to depend more on natural resources even though they have fewer rights to land than men (GGCA and UNDP 2016, p. 5).

Increasingly, multidimensional inequality is also being understood as a process, (Lamont and Person, 2019; Roy 2019), one in which some people have more valuable goods and opportunities than others. These result in a series of social advantages or disadvantages (Hoffman 2008, p. 29), which can constitute inequalities of outcome and of opportunity. The former are often measured by individuals’ or households’ material wealth or a group’s wider economic conditions (Alfonso et al. 2015, p. 1). In
turn, the inequalities of opportunity concept draws much from Amartya Sen’s well-known Capabilities Approach, or the human capabilities framework, which urges development policy to focus on the states of “doing” and “being” that individuals have reason to value (called “functionings”) such as “being” well-nourished, or “doing” something for one’s family.

Importantly, the aim of such policy should be to expand individuals’ freedom to choose these functionings (these various freedoms are what Sen and colleagues call capabilities) (Jacobson and Chang 2019). These constitute “the actual opportunities of living that give people the freedom to pursue a life of their own choosing” (Alfonso et al. 2015, p. 2). Such a focus on real capabilities broadly underpins the human development approach, which was integrated into the 2030 Agenda for Sustainable Development during the latter’s inception.

Environmental and socio-ecological inequalities

The environmental justice and environmental racism literature, particularly in the United States, continues to demonstrate that the poor, minority communities and people of colour are disproportionately affected by environmental (though note, not exclusively climate) hazards like pollution (see Brandt et al. 2020; Henderson and Wells 2021; Tessum et al. 2021). Several “definitions” have become especially salient in this literature. These include inequality in exposure to environmental hazards, inequality in health impacts resulting from that exposure – highlighted in SDG 3 on “Good Health”, and compounded with the Covid-19 pandemic (Brandt et al. 2020; Njoku 2021) -, inequality in social impacts resulting from that exposure, and inequality in assuming the social costs of environmental damage and degradation (see Poussard et al. 2021; Henderson and Wells 2021; Shao et al. 2021; Downey 2005 for further studies).

These various forms of inequality may be read as inequalities of outcome (social, economic and health) resulting from environmental hazards that are linked, but not exclusively so, to climate change. They may also be viewed as inequalities of opportunity freedoms because these hazards can put people in precarious situations that may compromise their capabilities to choose subsequent functionings. The inequalities are also multidimensional and intrinsically linked. A poor person affected by an environmental hazard may be unequally compromised in health, unequally socially compromised, or both, and hence automatically assume greater social and economic costs than a wealthy person. In all cases, some people’s capabilities are shrunk, while others’ are not. This compromise of capabilities can, in turn, be deepened by policies that are inherently unjust (see Billings et al. 2019; Domingue and Emrich 2019, for examples of how discriminatory and racialized policies prevent Black, Hispanic and Native Americans to recover from climate hazards on equal footing as White Americans in the United States).

Sustainability and inequality specialist Lucas Chancel (2020, p. 66) identifies three other types of what he terms “environmental inequalities”: inequality in access to natural resources (including energy, potable water, nourishing foods and land), inequality in responsibility for natural resources degradation, and inequality in decisions concerning the management of natural resources. These three types should not be treated in silos. For example, inequalities in access to natural resources and in responsibility for natural resources degradation appear to be two sides of the same
coin when it comes to carbon emissions. In one landmark study, Chancel and Piketty (2015, p. 9) used data on i) emissions per capita per country, ii) within income inequality, and iii) environmental input-output data, from 1998 (the Kyoto Protocol) to 2013 (lead up to the Paris Agreement), covering 90% of the world’s GDP, population and emissions. In addition to finding that emissions inequality between countries had decreased but increased within countries, they found that those who had increased their emissions the most were middle income and upper income groups in emerging economies. They also found that emissions were unequally distributed across countries (ibid.). These inequalities are mostly the result of inequalities in direct energy consumption (to heat a home, for instance) and indirect energy consumption (for example, in buying goods that require transportation) (Chancel 2020, pp. 68–71).

Unequal energy consumption patterns, are, in turn, mediated by unequal consumption trends. Not only do the wealthy consume much more, but as millions of people move out of poverty, their purchasing power, as well as their consumption and carbon footprint, is expected to increase (Bruckner et al. 2022). Inequalities in income, in general consumption, in energy consumption and finally in carbon emissions, translate into an “unequal ability to pollute” as Kenner (2019, p. 6) puts it, both within and between countries. This further translates into unequal responsibility for climate change and hence of climate hazards. In short, the inequalities that drive carbon emissions and that are perpetuated by them are multidimensional – they are of income, of lobbying and investment capacity, of general consumption and of energy consumption. These are interconnected, embodying inequalities of opportunity freedoms and of outcomes.

Furthermore, while these are labelled as “environmental inequalities” they could also be termed “socio-ecological inequalities”, a concept that, as Hackfort (2012) argues, “critically acknowledges that nature has always been transformed, (re)produced and manufactured throughout history and that environmental problems are never socially neutral …”. Indeed, political ecology scholarship has long studied the ways in which inequality has unfolded, and continues to unfold though humans’ (and some humans’ in particular) appropriations of nature (see Dietz 2014; Moore 2015). Questions on who extracts what resources, for what, and for whom, can also elucidate inequalities that do not directly result from climate change but that are indirectly related to it. For example, the polluting activities of infrastructural “mega-projects” – timber companies, gas pipelines, oil drills and mines – have a disproportionate effect on women and indigenous communities (Tapias Torrado 2022). This perpetuates existing group-based inequalities and inequalities of outcome, and generates inequalities in the re-distribution of ecological risks and environmental costs (ibid.), a question that is insufficiently addressed in the SDGs.

**Conclusion**

This perspective paper has contended that the climate change – inequality nexus encompasses much more than climate hazards and their resulting inequalities through three arguments. First, employing the planetary boundaries framework can help make sense of climate change’s embeddedness in all other planetary boundaries. As such, the climate change – inequality nexus can and should broaden its analysis to include wider environmental and ecological challenges.
Second, employing a human capabilities lens can help widen our understanding of inequality as a multidimensional process that embodies a plethora of inequalities of opportunities and of outcomes.

Third, and in the context of climate change and broader environmental and ecological degradations, such inequalities of opportunities and of outcomes can be read as socio-ecological and environmental inequalities.

Indeed, and in response to Islam and Winkel’s (2017, p. 5) observation that the climate change – inequality nexus suffers from a “scattershot” understanding of the relationship between both components, it would appear that a complementary framework capturing the full multidimensionality of this nexus is required. Such a framework may also contribute to synergic action on SDGs 10 and 13 by way of addressing the inherent complexity of the climate change – inequality nexus. Research in this direction is therefore encouraged.

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ORCID

Alexia Faus Onbargi http://orcid.org/0000-0002-7731-875X

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