

Climate Justice through the Capability Approach: Addressing Gender Inequality and Human Development in the Era of Climate Change

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Abstract:

This paper explores the intersection of climate change, gender inequality, and human development through the lens of Amartya Sen's Capability Approach, offering a comprehensive analysis of how these interconnected challenges exacerbate existing systemic inequalities. Climate change, as a multidimensional crisis, disproportionately impacts women, particularly in low- and middle-income countries, due to their limited access to resources, essential social services, and decision-making opportunities.

The study highlights how systemic patriarchal structures contribute to women's increased vulnerability to environmental degradation, manifesting in challenges such as energy poverty, food insecurity, unpaid care work, and restricted agency. Using Sen's Capability Approach, the paper argues for a shift in focus from mere resource allocation to enhancing individuals' and community freedoms and opportunities, emphasizing the need to develop capabilities that empower women and marginalized groups. This approach offers a deeper understanding of structural inequalities, illustrating how conversion factors - personal, social, and environmental - shape individuals' abilities to achieve well-being and resilience in the face of climate challenges.

Keywords: women, climate change, human development, unpaid care, gender inequality.

JEL Classification: B54, I31, O11, O15, Q54

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Introduction

The intertwined crises of environmental degradation and social inequality amplify each other's effects, both originating from the deficiencies inherent in the same flawed systemic structures (Solomonian & Di Ruggiero, 2021). Climate change, the most evident among the environmental damages of the current capitalist system (Elisha, 2020), exacerbates global inequalities, disproportionately affecting “poorer countries and the most vulnerable humans due to factors such as geography, socioeconomic status, and limited access to rights and justice” (Grazini & Guarini, 2024)². The relationship between climate change and gender inequality has often been underexplored in academic discourse. In low- and middle-income countries, the impacts of climate change vary significantly between genders. Women are disproportionately affected in terms of health, livelihoods, and security due to deeply rooted gender disparities and the persistence of patriarchal social structure. Their unequal access to essential social services, natural and financial assets, heightened risk of food insecurity, and limited decision-making power pose further challenges in developing resilience to extreme weather events (Sorensen et al., 2018).

The capability approach provides a valuable framework for understanding the intersection of gender and climate change. This approach emphasizes the importance of individual and community capabilities - defined as the freedoms or opportunities to achieve well-being - over mere access to resources. Thus, the Capability Approach offers a new perspective on the effects of climate change by examining structural inequalities. These inequalities, reflected in unequal access to vital resources, shape the extent to which individuals and social groups are exposed to and affected by climate change's impacts (Wasito, 2023). Within the context of climate change, this framework provides valuable insights into how women, particularly in developing regions, face disproportionate impacts due to entrenched gender inequalities. It also highlights how strengthening their capabilities can play a pivotal role in advancing more effective strategies for climate adaptation and mitigation.

The article is structured in four sections. Firstly, we will present the theoretical framework of the capability approach by illustrating the fundamentals of the human development process and the potential conceptual links with gender inequalities and environmental issues. Secondly, we will describe the effects of climate change on women's human development process in Section 2, as well as the impact of mitigation and adaptation strategies and ecological policies in Section 3. In the final section, we will conclude with some relevant policy implications.

1. Research Background

In presenting the capability approach, Sen (1999) argues that we should shift our focus from “means of living” to the “actual opportunities a person has”, thereby moving beyond the hegemony of economic growth, which has been identified as the main contributor to climate change. From this perspective, human development should be understood as a process of expanding individuals' (and community) capabilities, starting with economic, financial, and natural resources (see Figure 1). *Capabilities* represent the real freedoms/opportunities to do or be what human beings value, concerning actions and states such as meeting basic needs (e.g., food and water) or accessing education, healthcare, and political participation. Moreover, capabilities are achieved (and thus transformed in *functionings*) according to the choice of individual/collective factors concerning personal and social preferences and attitudes (*choice factors*). Therefore, the Capability Approach operates on two different levels: achieved well-being, measured through functionings, and potential well-being, assessed through capabilities (Kuklys & Robeyns, 2005).

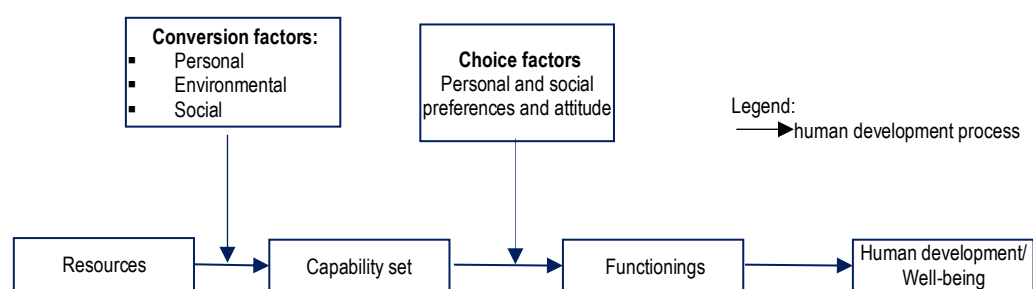
Personal freedoms can play both a constitutive and an instrumental role in the human development process (Sen, 1999). The latter aims to expand the substantive freedoms of human beings and to eliminate all forms of unfreedom. At the same time, some of these freedoms can serve as a resource to achieve this goal. Specifically, Sen (1999) identifies five categories of *instrumental freedoms*:

² <https://theconversation.com/climate-change-is-hitting-women-the-hardest-what-to-do-about-it-economists-242305>

- Political freedoms, referring to opportunities to choose rulers and principles to follow, as well as freedom of the press, criticism, and voting;
- Economic facilities, defined as the opportunities to utilize available economic resources;
- Social opportunities, which relate to societal arrangements concerning, for instance, education and health;
- Transparency guarantees, represented by the need for sincerity, openness, and clarity;
- Protective security, that is a social protection network, consisting of fixed institutional arrangements and ad hoc measures, which helps vulnerable people not to fall into a state of misery.

Shifting focus from resources to individuals' functioning and capabilities does not mean that resources are excluded from the capability approach. It highlights the instrumental role of resources in enhancing well-being by converting them into real opportunities through the *conversion factors* (Robeyns, 2003). Indeed, this relationship is not fixed, but it varies from person to person, as individuals have different abilities to convert resources into capabilities due to what the author refers to as conversion factors, which are divided into three categories: 1- personal, such as physical and mental characteristics (age, gender, metabolism, health conditions, etc.); 2- social, including institutions and social norms, traditions, gender roles, and social relationships; 3- environmental, such as climatic conditions and geographical location (Comim et al., 2008).

Figure 1. The human development process



Source: Authors' elaboration.

Sen (1999) defines agency as the ability to pursue goals that are considered valuable, emphasizing that one of the aims of human development is to enable individuals to transition from passive beneficiaries to active agents of change, responsible for their well-being and the use of their capabilities. In this perspective, the increase of agency is defined as empowerment. Therefore, gender equality and the empowerment of women are essential components of human development. Indeed, several studies, such as Kenchaigol (2012) and Razzaq et al. (2024), highlight that significant gender disparities persist in various domains, including financial inclusion, education, and health, which directly impact women's capabilities. Gender inequality can be viewed through the lens of how societal structures limit women's capabilities, thereby restricting their choices and opportunities. In particular, Robeyns (2003) argues for a procedural approach to selecting capabilities that consider the unique circumstances of women, emphasizing the need for a nuanced understanding of gender inequality. Indeed, she observes how, while women have higher life expectancy, they experience poorer health, including higher rates of anxiety and depression. Women hold fewer political positions but benefit from stronger social networks. Gender norms hinder girls' education and degree attainment. Women disproportionately bear unpaid caregiving and household work burdens, while men enjoy higher-quality, uninterrupted leisure time.

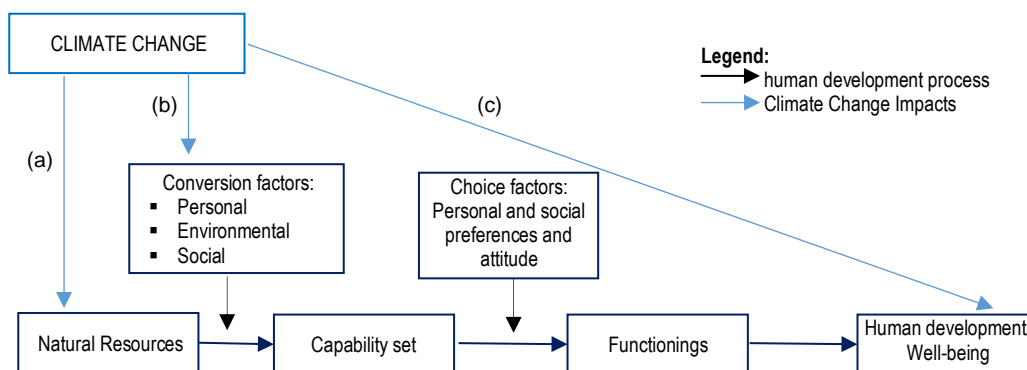
Among the environmental conversion factors, environmental quality is an essential dimension of well-being, and pollution is an important environmental conversion factor (Robeyns, 2017). Climate change profoundly influences all aspects of society, including health, food security, biodiversity, migration, urban planning, and social structures (Muluneh, 2021). Therefore, climate change can significantly exacerbate gender inequality, creating a complex interplay between environmental degradation and social structures. The women and girls' previous

capability deprivations caused by climate change exacerbate existing gender inequalities and present distinct challenges to their livelihoods, health, and safety. According to the Capability Approach, without targeted interventions, women may continue to face systemic barriers that limit their empowerment.

2. Climate Change and Human Development Process from Gender Perspective

Climate change poses a significant challenge that impacts both human lives and livelihoods, with the capacity to hinder women's progress in development processes, as represented in Figure 2, and exacerbate disparities in human well-being, as they depend on natural resources and have limited access to livelihood opportunities (OECD, 2016).

Figure 2: The impacts of climate change on women's human development process



Source: Authors' elaboration

All the consequences of the ecological crises negatively affect the natural resources and economic means of women, as expressed by the relationship (a) in Figure 2. In the context of the Global South, economies continue to depend heavily on agriculture and forestry, sectors in which women constitute most of the workforce. During events such as droughts or floods, young men often migrate to urban areas in search of employment, leaving women predominantly in rural areas to shoulder the primary responsibility for agricultural activities (Patel et al., 2023). Climate change is adversely affecting agricultural productivity, diminishing both the availability and quality of food and compromising women's financial resources and household income, which reduces the range of women's opportunities, such as being healthy or being able to prepare meals, and their consequent material well-being.

The capabilities to preserve food quality, prepare meals and purify water are closely tied to the energy resources' availability and affordability, and the ability to access clean energy services emerges as a critical environmental conversion factor for enhancing human capabilities (Frigo et al., 2021). Approximately one-third of the global population, primarily in the Global South, remains without access to electricity and relies on solid fuels, such as wood and crop waste, for cooking and heating. Women are regarded as being predominantly impacted by energy poverty³, given their unique role in securing energy for their households in developing countries (Acheampong et al., 2024); indeed, in rural areas, women spend productive time collecting firewood reducing their opportunities to engage in productive economic activities to improve their condition and are exposed to dangerous air pollution from indoor biomass stoves while cooking (Ssenono et al., 2023).

³ Within the capability approach, energy poverty can be defined as a "an inability to realise essential capabilities as a direct or indirect result of insufficient access to affordable, reliable and safe energy services, and taking into account available reasonable alternative means of realising these capabilities" (Day et al., 2016, p. 260).

Heat, droughts, and extreme temperatures deplete energy and water sources through the relationship (a) compromising means under women's control, but at the same time, the reduction of local biomass fuels forces women to travel long distances in search of fuels and water for cooking, bathing, cleaning, and other household needs, effecting women's capabilities of being healthy, preparing meals and being well-nourished and compromising the human development process.

Relationship (b) suggests that climate change negatively affects their ability to convert resources into capabilities, narrowing their range of opportunities and hindering the process of human development. Indeed, for instance, being healthy is not only an essential capability, but it is also a personal conversion factor for educational capabilities. Climate-related disasters that lead to displacement and migration can accelerate the distribution of disease vectors and disrupt access to health services, tending to make women's health worse than men's. The deterioration of health status can impair learning abilities or the opportunity to access school buildings. At the same time, rising sea levels and desertification degrade the local ecosystems and trap women in dangerous environments (Dimitrov, 2019).

The social conversion factors include social norms and culture. Patriarchal norms restrict women's access to employment, relegating them to low-paying jobs and increasing their vulnerability to violence and poverty. Furthermore, these norms assign women the primary responsibility for unpaid care work (Aloè et al., 2024), a burden exacerbated by male migration to urban areas in search of employment, adverse health effects from extreme weather events, and demographic changes that disrupt social services (MacGregor et al., 2022). This means that, due to the relationship (b), climate change reinforces gendered structural constraints and compromises the already limited women's social conversion factors.

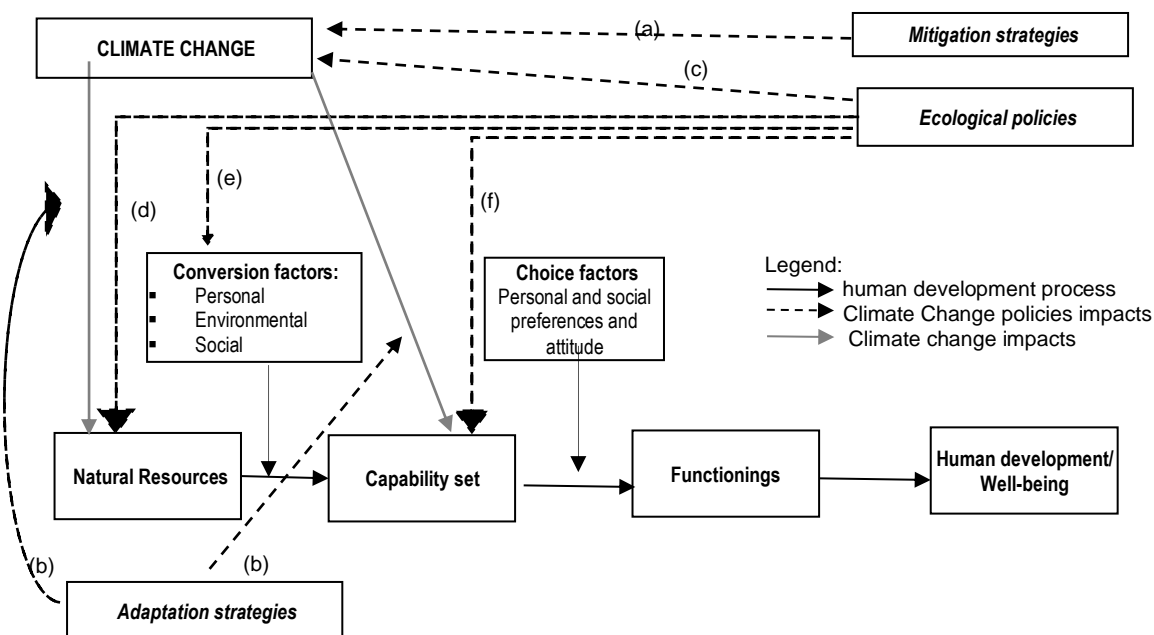
For instance, poor harvests, altered growing seasons, and the proliferation of parasites generated by climate change affect food security and availability, increasing the women's efforts required, who are responsible for managing household food resources and securing clean water. So, climate change aggravates the burden of unpaid care on their own at the expense of time to be devoted to one's education, generating a vicious cycle that obstacles the human development process. Moreover, by increasing their dependency on traditional fossil fuels, climate change increases the unpaid care work burden, reducing time for self-care activities not only for women but also for girls, who are often forced to leave school and help their mothers collect biomass fuels and manage the household care responsibility, depriving them of personal and collective capabilities related to education, healthcare, information, and political participation (Grazini, 2023).

However, a reduced opportunity to learn for women may be a symptom of reduced human development. Therefore, relationship (c) suggests that reduced human development can contribute to ecological crises: populations with lower levels of human development often lack the resources and infrastructure necessary to adapt to climate change impacts, perpetuating environmentally damaging practices. Moreover, lower human development is frequently associated with limited access to education, technology, and financial resources and the failure to adopt sustainable practices, thereby exacerbating environmental degradation and climate change (UNDP, 2013).

3. Climate Change and Coping Strategies

Climate change policies are typically classified into two categories: climate change adaptation and climate change mitigation. Figure 3 shows their impacts on climate change and the human development process.

Figure 3. The impact of mitigation and adaptation strategies, as well as of ecological policies



Source: Authors' elaboration

Mitigation strategies. Mitigation policies encompass efforts to reduce greenhouse gas emissions resulting from human activities, such as those from fossil fuels and deforestation, aiming to stabilize greenhouse gas concentrations at a safe level; this means that they produce a long-term positive effect on climate change, as expressed by the relationship (a) in Figure 3, but they could do not modify the economic structure perpetuating gender inequalities, maintaining unchanged the women’s resources, conversion factors and capabilities and their influence in household and community decision-making and mitigation policy formulation and monitoring (UN Women, 2022).

Adaptation strategies. Women’s responsibilities in managing household and natural resources within their families and communities place them in a unique position to create and implement livelihood strategies that address evolving environmental challenges effectively (Rajagopalan, 2021). Indeed, adaptation strategies, such as livelihood diversification, shifts in livestock grazing regimes, and changes in herd composition, contribute to curbing the negative impacts of climate change by preserving natural resources, improving women’s initial endowment, improving agricultural productivity and capabilities set, as expressed by the links (b) in Figure 3. For example, women are the primary producers of essential foodstuffs and have consequently engaged in efforts to conserve soil and water, so women’s expertise and activism have contributed to controlling erosion, preventing flood damage, and enhancing access to water, implementing adaption strategies. However, negative social conversion factors can limit this positive effect by disempowering them and reducing their capability to adapt to climate-related challenges or implement adaptation strategies.

Moreover, according to UN Women (2009), climate change adaptation often incorporates technology, encompassing both “soft” measures, such as insurance programs and traditional knowledge, and “hard” technologies, like irrigation systems. These approaches can enhance women’s adaptive capabilities, enabling them to seize opportunities better or respond effectively to the consequences of climate change. However, technology is inherently gender-biased, especially in developing countries, because women have a limited set of opportunities due to social biases, inadequate infrastructure, lower education levels, and financial constraints, reducing the effectiveness of adaptation policies. In particular, social conversion factors include institutional arrangements, which can minimise adaptive capacity by limiting insurance and resources to a few, forcing poorer populations to rely on less effective traditional adaptation measures to confront climatic shocks, or extending the necessary time for responding to climate shock (Cappelli, 2023). In particular, financial services included microfinance schemes

targeting women, which could enhance skills and capabilities. However, analysing Typhoon Yolanda's rebuilding in the Philippines, Sovacool et al. (2018) observe that the aid distribution was biased; rural coconut farmers and women, despite being most affected, received less funding than men, particularly fishermen.

Ecological policies. Addressing climate change and ongoing ecological crises, Guarini & Oreiro (2023) propose *Ecological Structural Change* as an effective solution to environmental and social issues. This approach advocates for the reallocation of labour and resources from conventional ("brown") sectors to modern ("green") ones, which is essential for improving the environmental sustainability of production outputs as well as advocates for a just transition by connecting green and social goals and generating new social opportunities. Therefore, it is necessary to promote smart ecological policies supporting an ecological structural change that decouples economic growth from environmental degradation and reduces the level of greenhouse emissions, which will address the roots of climate change, as represented by the positive impact (c) in Figure 3.

The positive link (d), instead, suggests that by enhancing green productivity and reducing environmental pressures, ecological policies preserve women's natural and economic resources, improving their living standards (Dialga & Ouoba, 2022). The means available to women may result in greater capability set and well-being if personal, social and environmental conversion factors are favoured by a "Big Push for Sustainability", fostering economic growth, job creation, and reduced structural disparities (ECLAC, 2020), as expressed by the relationship (e). Moreover, it can act on the roots of gender inequalities by involving women in productivity-enhancing agricultural innovations, explicitly incorporating them into high-productivity manufacturing through policy decisions, promoting investment and the growth of quality employment in care sectors, and establishing a dynamic macroeconomic policy framework that supports employment opportunities (ILO, 2019), extending directly the set of work, education and leisure opportunities/capabilities of women, as expressed by the positive impact (f), supporting the virtuous human development process.

Conclusion

Focusing on the ecological crises, as Pope Francis reminds us in the encyclical *Laudato Si'*, "*Today, we cannot fail to acknowledge that a true ecological approach always becomes a social approach, which must integrate justice into discussions on the environment*" (Pope Francis, *Laudato Si'*, No. 51). State, national, and international institutions must support and expand just transitions and broader transformational change. Nevertheless, despite its environmental and economic benefits, the ecological transition may lead to the "emergence of winners and losers," potentially exacerbating vulnerabilities and inequalities if considerations of justice are not adequately integrated (Akinyemi et al., 2021; Sovacool et al., 2021; Grazini et al., 2024) because men and women are affected differently by the anticipated effects of low-carbon transitions. The low-carbon transition must include adaptation and resilience measures, social protection and welfare requirements, as well as livelihood protection and support. Therefore, it is imperative to intervene through an "*equitable structural change*" (ECLAC, 2012) in those social and economic structures that can influence the link between inequalities and environmental protection.

The global discourse on development is at a pivotal juncture, which intersects with global instability, social unrest, prolonged recessions, and significant growth, alongside increasing economic concentration. It is essential to furnish stakeholders and policymakers with a more profound comprehension of development processes. At the same time, human development is a place-based process; therefore, more comprehensive approaches are required to integrate economic, social, and environmental objectives within the frameworks of political economy discourses to promote sustainable human development. Addressing economic competitiveness, social inclusion, environmental protection, and poverty reduction demands the recognition of the interaction between local development systems and the enhancement of personal and collective capabilities. The most effective strategy involves inclusive, cross-sectoral participation by a diverse range of local stakeholders who can engage in both competition and collaboration.

This approach fosters investment in cutting-edge technologies, research, and development while utilizing skilled workers to achieve systemic efficiency, strengthen innovation capacity, and enhance competitiveness (Biggeri & Ferrannini, 2014). Focusing on the nexus between climate change and women's development process, integrating gender perspectives into climate change policies is essential for addressing the unique challenges women face (Kironde et al., 2022). This includes ensuring women's meaningful participation in climate projects and programs, which can enhance their effectiveness and sustainability. By focusing on improving women's capabilities, it is possible to address the disproportionate impacts they face and contribute to more equitable and effective climate adaptation and mitigation strategies. This necessitates a coordinated effort to incorporate gender perspectives into all levels of climate policy and implementation, ensuring that women are not only safeguarded from the impacts of climate change but are also empowered to take an active and central role in addressing the climate crisis.

Credit Authorship Contribution Statement

Both authors contributed to: conceptualization; formal analysis; investigation; validation; visualization; writing - original draft; writing- review & editing.

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The authors declare that there are no patents or copyrights to be asserted that are relevant to the work in the manuscript.

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