Can we avoid maladaptation at all?

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The impact of climate change especially in developing economies has called for heightened global attention to tackle climate change. Yet, amidst the urgency to address climate change, emerging literature shows that existing climate change adaptation strategies have the potential to be counterproductive, further worsening the vulnerability of already fragile and vulnerable communities. Indeed, maladaptation cannot to completely avoided, but it can be substantially minimized. Achieving this requires a strong collaboration between science, policy, and practice interface.

Climate change adaptation has gained heightened attention in contemporary global development discourse. This is commendable, given that until recently, global climate change governance mechanisms, particularly the United Nations Framework Convention on Climate Change (UNFCCC) and its associated Conference of Parties (COP), were biased against adaptation while favouring mitigation as the most effective approach to addressing climate change. The Paris Agreement signed in 2015 set the stage for a paradigm shift in climate change response. It recognized that adaptation is crucial for tackling climate change and minimize its adverse negative impacts. Undoubtedly, adaptation is crucial for developing economies in the Global South, given that they bear the brunt of climate change yet contribute less to its anthropogenic causes. Africa, for instance, contributes approximately 4% to global greenhouse gas emissions. However, the continent experiences some of the worst climate change impacts, such as floods, prolonged droughts, and the spread of invasive pests, coupled with rising temperatures and erratic rainfall patterns, leading to drastic reductions in agricultural yields and worsening food security and poverty (IPCC, 2022). Intuitively, adaptation is essential if climate change adverse impacts are to be minimized in vulnerable and fragile regions.

Adaptation refers to adjustments in human systems to minimize the adverse impacts of current and anticipated climate change while exploring beneficial opportunities (IPCC, 2022). Given the vulnerability of smallholder agricultural systems and the crucial role agriculture plays as a driver of socioeconomic development in many developing African economies (AGRA, 2023), many adaptation interventions have focused largely on building capacities and resilience in agricultural systems to minimize both vulnerability and impacts. Crop diversification, planting improved crop varieties and integrated soil and water management practices, are some examples of adaptation strategies adopted in smallholder agricultural systems (Asare-Nuamah & Amungwa, 2021). Others, such as agroforestry, tree planting, and coastal infrastructure, have been implemented as both adaptation and mitigation measures. These are necessary to demonstrate and enhance developing countries' contributions to the UNFCCC's nationally determined contributions (NDCs).

Notwithstanding the potential of adaptation strategies to address climate change, scholars have been alarmed by the intended consequences associated with many adaptation interventions. The evidence indicates that adaptation could further enhance vulnerability, and be maladaptive (Antwi-Agyei et al., 2018; Asare-Nuamah et al., 2021). But how do we address maladaptation? My past and ongoing research focuses largely on

promoting adaptation in smallholder agricultural systems in Ghana and Africa broadly, making maladaptation critical to my research. Maladaptation refers to the negative and intended consequences of adaptation (IPCC, 2014). Adaptation interventions are planned and implemented with the notion of addressing climate-related problems. However, the outcomes could further worsen exposure and susceptibility to climate change. For instance, in Kenya, large-scale solar farms have increased reliable and renewable energy access while minimizing carbon emissions. However, the acquisition of lands for large-scale solar projects has rendered smallholder farmers and indigenous communities landless, depriving them of their access to land for agriculture, which serves as the main source of their livelihood strategies (International Work Group for Indigenous Affairs, 2020). In Ghana, government support for farmers under the Planting for Food and Jobs flagship program increases access to subsidized agrochemicals necessary for agriculture. While farmers' increased access to agrochemicals increasingly improves their yields and productivity, the results from our study show that poor use of agrochemicals in rural farming communities significantly affects farmers' health and biodiversity by polluting water bodies, killing microorganisms and aquatic species (Asare-Nuamah et al., 2021). Reduced soil microorganism activities negatively affect soil fertility and yields, thereby facilitating more use of agrochemicals and repeating the lock-in negative effect vicious cycle.

Given that adaptation interventions can result in maladaptive outcomes, it is imperative for adaptation planning to critically evaluate adaptation strategies to identify possible and unintended outcomes. Yet, one major challenge facing policymakers, adaptation intervention planners, and practitioners is how best to avoid the negative consequences of adaptation. This is because many of the negative consequences are observed after the actual implementation of adaptation. Hence, it is difficult to confidently say that a particular adaptation intervention is completely free from negative consequences. Also, some of the negative consequences of adaptation occur in the medium to long term. Even more troubling is the fact that local communities' priorities and needs change with changing socioeconomic and environmental conditions. In Ghana, for instance, high unemployment in rural communities has pushed many people into illegal small-scale gold mining as an alternative means to meet their daily livelihood needs. While illegal small-scale gold mining has had adverse environmental and health consequences, those engaged in it care more about meeting their daily needs and less about the negative impact of their activities on water, biodiversity and the environment (Barenblitt et al., 2021). The same applies to farmers, who tend to focus more on increasing yields through any available means without necessarily considering their negative consequences.

A recent study shows that there is 'no innately good or bad response' to climate change (Reckien et al., 2023). Implicitly, the outcome of adaptation determines whether it's a good or a bad response. This is quite problematic and challenging for policymakers because almost all adaptation interventions are planned and implemented with the aim of achieving positive (good) outcomes for society and/or the environment. However, as indicated in the adaptation-maladaptation continuum, maladaptation differs from failed or unsuccessful adaptation. Failed or unsuccessful adaptation can be classified as a bad response to climate change. To further advance an understanding of maladaptation, Reckien et al. (2023) tested adaptation options and concluded that

adaptation-maladaptation operates on a continuum, implying that a single adaptation intervention could have both positive and negative outcomes. Given the nonlinear pattern of adaptation, how do we ensure that each intervention increasingly increases positive outcomes while minimizing negative consequences. Reckien et al. (2023) argue that adaptation interventions targeting diets/food waste including food security, nature restoration and ecosystem services, and social safety nets, are likely to have the highest positive outcomes and the lowest negative consequences. Conversely, adaptation options focusing on coastal infrastructure, coastal accommodation, insurance and water use exhibit the highest negative outcomes. Yet, no single adaptation intervention is immune to negative outcomes. Thus, maladaptation cannot be completely avoided, but it can be substantially minimized, and increasing this awareness among policymakers, development agencies and practitioners, is imperative. The responsibility lies with development agencies, policymakers and practitioners to critically evaluate adaptation interventions prior to implementing them, effectively engage local stakeholders in adaptation planning and implementation, and rigorously monitor and evaluate implemented adaptation interventions.

Data availability statement

The data that support the findings of this study were derived from resources available in the public domain.

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