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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Cross-geography adaptation to climate change in coffee-growing regions: Is it risk-specific or generalised?

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Abstract

Climate change adaptation assessments are often undertaken from local to regional scale. On-farm decision-making in the face of a changing climate is driven by multiple factors and local contexts. Yet, we see parallels between implementation of certain adaptation strategies, in regions on opposite sides of the world. This can be due to global connections, information exchange, and the parallel evolvement of similar agricultural adaptation responses. Some of these agriculture adaptation responses are risk-specific, e.g. irrigation systems (risk of low precipitation events). Other adaptation responses, such as agroforestry, address general risk (including non-climatic risks). In a recent systematic review covering empirical literature on adaptation responses, the majority (~ 58 %) of adaptation responses address the non-specific risk of "general climate change". To date, there are very few empirical cross- or multiple geography assessments of adaptation. To our knowledge none that look at the relationship between adaptation uptake and present risks. We explore the link between parallel adaptation uptake and parallel climatic risk (or hazard). Is adaptation occurring risk-specific or generalised? Is there a pattern between specific/generalised adaptation strategies and single/multi-hazard climatic trends? Looking at the case study of coffee smallholders, we analyse the relationship between regional climatic trends and adaptation measures undertaken, exemplified by coffee agroforestry or intercropping (generalised), and improved seed varieties (specific). Coffee makes an interesting case study because of the need to plan for the long-term, with a tree crop that produces for 20–30 years. We use a harmonised dataset of ~ 3000 coffee smallholder households, as part of the rural household multi-Indicator survey available for coffee growing regions in 10 countries in South and Central America, Africa, and Asia. We further use a range of climate indices derived from daily, gridded observational and reanalysis datasets including for example the fifth generation ECMWF atmospheric reanalysis (ERA5) starting in 1950 aggregated to spatial scales relevant for comparison with the survey data. Our results offer a multi-geography analysis of the interlinkages between climate signals and adaptation patterns across coffee growing regions and conceptualise discussion on the implications for designing and evaluating effective adaptation addressing generalised v. specified risk.

Keywords: Agroforestry, coffee, cross geography, generalised adaptation

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