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Title: A simulation game-based approach to assessing food security and climate resilience among rural farmers in Southern Mali



Persistent droughts, dependence on rainfed agriculture, high levels of poverty, population growth, political and social conflicts have rendered the West African Sahel extremely vulnerable to food and livelihood insecurities. Further, future climate projections of a hotter Sahel with higher uncertainty in rainfall trends have made anticipatory adaptation increasingly difficult. Most adaptation policies continue to focus on technological despite an extensive body of literature that points to the importance of various social, institutional, psychological, environmental factors that determine the adaptive capacities of vulnerable populations. This research explores the relationship between climate, agriculture, food and human agency to explore the structural causes and socio-ecological processes which create climate vulnerability and food security in the region.

A role-playing simulation board game called 'Food and Farm' is designed and implemented as a participatory modelling tool where farmers co-create and co-design an interactive gaming environment for decision-making under climate stressors. The decision-making heuristics obtained from the board games are then used to develop an agent-based model (ABM) which will enable an exploratory assessment of how specific agricultural policies interact with integrated social and ecological processes and influence the long-term resilience of farmers in the future.

This research contributes to the growing literature on adaptation and resilience in the following ways; First, using a performative game-based approach, I assess the various factors that influence farmers decisions to cultivate food and adapt to a rapidly changing and unpredictable climate. The study also explores the pathways through which such factors act as 'barriers' and inhibit farmers from achieving desired food security for their families. Second, apart from serving as a policy and decision-support tool, the analytical framework of using role-playing games to agent-based models offer significant methodological advances to study human decision-making. Third, the research is strongly grounded in the socio-ecological systems framework while applying the resilience theory to study the long-term resilience of farmers in the Malian agricultural landscape. Measuring resilience has been difficult and it's only recently that researchers are utilizing the strengths of agent-based models to measure it. This work is a contribution to the ongoing effort.