



How will 13 million global farming households respond to coastal flooding and salt intrusion under sea level rise? DYNAMO-M

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Coastal flooding and sea level rise (SLR) will affect farmers in coastal areas, as increasing salinity levels will reduce crop yields. These impacts will lead to net income loss for farming communities. In response, farmers can take various actions. To assess such responses under SLR at the global scale, we applied DYNAMO-M, a global agent-based model (ABM), to simulate the actions of 13 million farming households in global coastal areas, focusing on those living in 1-in-100-year floodplains and growing 23 major crops. The decision rules in the model (DYNAMO-M) for simulating migration and adaptation are based on the economic theory of subjective expected utility. This theory posits that households can maximize their welfare by deciding whether to (a) stay and face losses from salinization and flooding, (b) stay and adapt (e.g., switching to salt-tolerant crops and enhancing physical resilience such as elevating houses), or (c) migrate to safer inland areas. In our model, current and future coastal flood risk is assessed by combining flood hazard data (with- and without SLR and climate change), the exposure of farmers to flooding and crops to salinization. Vulnerability curves connect hazard and exposure data to estimate (future-) risk. We simulate flood and salinization risk for the period 2020-2080 at a yearly timestep. For each time step, the adaptive response of each individual farming household is simulated as well. Results show that major hotspots of coastal migration are coastal areas of Florida, New York, Oregon in USA, coasts of Japan, China, Philippines and Italy. We further run insurance and policy scenarios to show how government policies like damage coverage and aid in adaptation can help in offsetting the impact of flood risk.