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Risks of Maladaptation: Climate Insurance in Agriculture

Summary

Weather risk is an issue of extraordinary concern in the face of climate change, not least for rural agricultural households in developing countries. Governments and international donors currently promote 'climate insurance', financial mechanisms that make payouts following extreme weather events. Technologically innovative insurance programmes are heralded as promising strategies for decreasing poverty and improving resilience in countries that are heavily dependent on smallholder agriculture. New subsidies will amount to hundreds of millions of dollars, yet funders and advocates have thus far neglected the social and ecological ramifications of these policies. Reviews have focused largely on near-term economic effects and practical challenges.

This briefing draws on an initial inventory of potential adverse effects of insurance programmes on local agricultural systems that we have recently assembled. Our review shows that farmers with insurance may alter their land-use strategies or their involvement in social networks previously used to mitigate climate risk. Both processes constitute crucial feedbacks on the environmental and the social systems respectively.

Based on our study, we suggest preliminary principles for avoiding maladaptive outcomes, including recommendations for designing appropriate impact studies and insurance programmes. Before implementation, pilot projects should assess existing local risk-management strategies, financial instruments, and extant state agricultural and social protection policies. Participatory processes should be designed to anticipate and appraise potential effects of insurance – including those resulting from changing land use – and interactions with existing public policies.

Several recommendations for improvements to the elaboration and design of future agricultural insurance programmes follow from our analysis:

1. Evaluate priorities
2. Encourage diversity
3. Adapt policies
4. Choose the right scale
5. Limit coverage to extremes
6. Tie insurance to ecologically sound strategies

Current and future 'climate insurance' projects should be combined with consciously designed programmes to invest in and foster farmer-led learning on sustainable agricultural techniques. Policies linking insurance coverage and subsidies to diversified and ecologically sensitive cultivation may provide new frameworks for the design of insurance programmes in developing countries. This also requires rethinking the accepted wisdom on bundling insurance with inputs, which may make social-ecological systems and smallholders more fragile and vulnerable in the face of a changing climate.

'Climate insurance' in agriculture

Weather risk is an issue of extraordinary concern in the face of climate change, not least for rural agricultural households in developing countries. Governments and international donors currently promote 'climate insurance', which has emerged as an umbrella term for a host of financial mechanisms that make payouts following extreme weather events. For instance, the G7 'InsuResilience' initiative, launched in 2015, has committed USD 550 million for insurance against climate hazards (InsuResilience, 2016).

Technologically innovative insurance programmes, particularly 'index insurance' that links payouts to environmental proxy variables rather than measured losses, are heralded as promising strategies for decreasing poverty and improving climate-risk management and resilience in countries that are heavily dependent on smallholder agriculture. New subsidies will amount to hundreds of millions of dollars, yet funders and advocates have thus far neglected the social and ecological ramifications of these policies.

Reviews have focused largely on near-term economic effects and practical challenges accompanying the introduction of insurance products in developing countries. Our recently published study (Müller et al., 2017) provides an initial inventory of potential adverse effects of insurance programmes on the social-ecological dimensions of local agricultural systems. The study compiles scientific knowledge gained in both developing and developed countries, using various methodological approaches, including empirical observations, surveys, and analytical and simulation models.

In this briefing paper, we suggest preliminary principles for avoiding maladaptive outcomes, including recommendations for designing appropriate impact studies and insurance programmes.

Potential adverse effects of insurance in social-ecological systems

The introduction of insurance may trigger changes in land-use practices. Although the benefits people obtain from ecosystems may be positively affected in the short term (high yield from monoculture of insured cash crops), they may be negatively affected in the long term (lower pest control and disease resistance). Furthermore, land users with insurance may reconsider their engagement in social institutions and networks.

The following discussion of possible effects of agricultural 'climate insurance' focuses on adverse consequences, which can arise alongside productivity gains or welfare improvements. Further potential effects, both beneficial and adverse, are highlighted in our study.

New insurance options can lead to increased cultivation of cash crops (Cole et al., 2017); though this transformation has been consistently celebrated by economists, it comes at the expense of drought-resistant subsistence crops. Additionally, the financial security provided by insurance may disincentivise households from maintaining traditional drought-mitigation practices – such as intercropping species with different drought tolerances or application of moisture conservation techniques. The loss of the positive effects of intercropping, such as improved soil fertility, reduced pest incidence, and increased agrobiodiversity may reduce the overall resilience of the ecological system.

A second concern is the effect of insurance on the extensive margin – the expansion of cultivated areas into environmentally sensitive lands of lower agricultural value. Partly in response to this debate, the 2014 US Farm Bill re-linked crop insurance to conservation compliance for wetlands.

Recent studies in developing countries reveal that access to insurance increases riskier production choices, such as agrochemical input use (e.g. purchase of fertilisers in Ghana: Karlan et al., 2014). Randomised trials suggest that the promise of insurance security can prompt farmers to forego more conservative cultivation choices and allocate resources to cultivars and inputs they believe to be yield-enhancing. The intended effects of intensification are greater yields and incomes; yet intensive agrochemical use can have adverse consequences on groundwater, biodiversity, and human health. The effect of insurance on the use of fertilisers and pesticides needs further investigation, since studies from the US disagree in this regard.

Contradictory results have also emerged from econometric studies investigating the effect of index insurance purchase on informal insurance mechanisms. Where informal networks (such as Ethiopian *iddirs* – burial societies) cover individual risks, formal weather insurance for covariate drought risk may make informal arrangements more secure and effective. But where a single well-defined risk is already the target of informal arrangements, a formal insurance product for the same risk may fragment existing networks.

Another series of possible effects derives from the recent trend towards bundling insurance with 'value-adding' agricultural inputs or credit, driven by the ambition to use insurance programmes to actively intensify agricultural development. Probably the most common bundled inputs to date are hybrid seed varieties, which are bred for particular qualities such as yield. One often-cited and favoured model is the ACRE 'Kilimo Salama' rainfall index insurance product, which compensates East African farmers' purchase of hybrid seeds in the event of adverse weather as recorded by a rainfall index. However, the drought tolerance of some hybrid varieties is lower than traditional varieties, the timing of water requirements less flexible, and hybrid seeds typically cannot be saved from one season to the next. Especially in an uncertain and changing climate, such a transition will jeopardise agrobiodiversity, a key component of small farmers' adaptive capacities.

Our review shows that farmers with insurance may alter both traditional land-use strategies and involvement in social networks previously used to mitigate climate risk. Both processes constitute crucial feedbacks on the environmental and the social systems respectively. It is therefore vital to conceptualise households within coupled social-

ecological systems (Figure 1) rather than as just producers and consumers.

Policy recommendations

We advance the following principles for the design of holistic impact evaluations and better-adapted insurance programmes. As difficult as monitoring non-economic, cross-scalar, and long-term effects may be, this data will become even more challenging to collect as products are initiated through the private sector rather than through development programming. We are at a critical moment when funders can still mandate the collection of a minimal set of indicators to develop an empirical knowledge base on socioeconomic and ecological impacts.

Before implementing a pilot study, existing local risk-management strategies, financial instruments, and agricultural and social protection policies should be assessed. Participatory processes should be designed to anticipate and appraise potential effects of insurance, including those resulting from changing land use, and interactions with existing public policies. This includes an evaluation of contradictory effects of insurance and environmental protection, and potential financial tradeoffs between premium subsidies and other spending.

We suggest the following indicators as a working set. The relevance, feasibility, and sampling scale of each will vary, depending on local context and sources of vulnerability. These indicators include biophysical and socioeconomic characteristics:

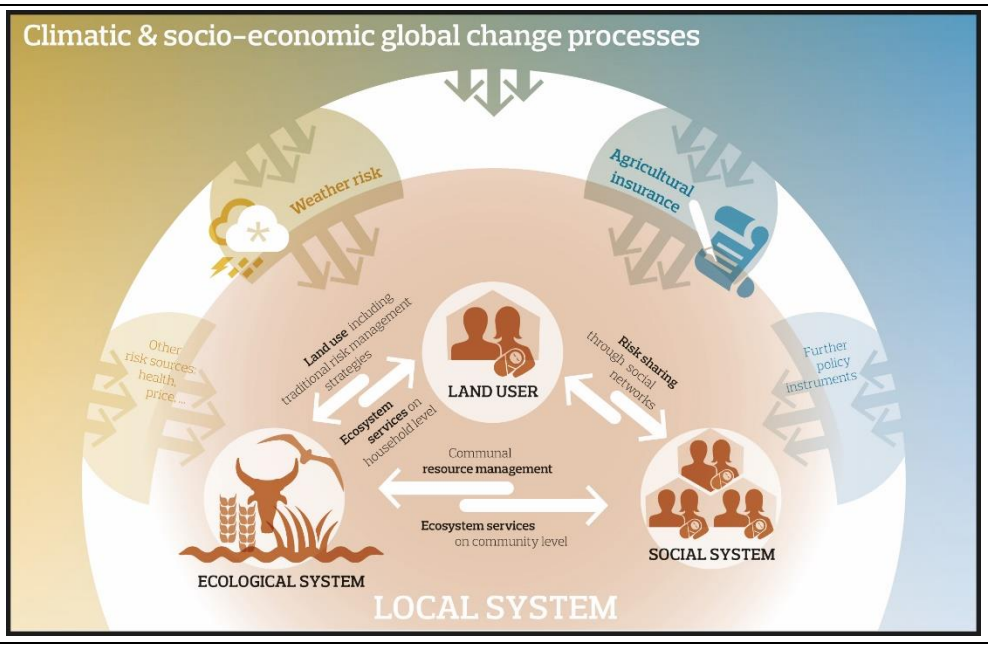
1. Rapid biodiversity assessment, including agrobiodiversity
2. Surface water nutrient loads, quantity, and turbidity; groundwater levels
3. Soil organic carbon, porosity, water content
4. Land-use conversion
5. Vegetation status of rangelands
6. Intensification (inputs per ha)
7. Household access to productive resources, including water, animals, land, and labour
8. Seed sharing
9. Household indebtedness, income diversity
10. Child health status, dietary diversity
11. Use of and access to formal and informal networks for assistance
12. Maintenance or loss of existing agricultural risk-management strategies
13. Community socio-economic inequality

Evaluations must also consider how impacts are distributed, as insurance programmes will likely have differential impacts, depending on wealth, gender, and other dimensions of difference.

Several recommendations for improvements to the elaboration and design of future agricultural insurance programmes follow from this analysis:

1. Evaluate priorities in an inclusive, participatory manner. Insurance is not necessarily the most appropriate tool to reduce vulnerability; strengthening existing risk-management strategies may be more appropriate. Take the social-ecological context and local knowledge, needs, and ideas seriously.

Figure 1: Role of insurance intertwined with other processes in the social-ecological system



Source: Müller et al., 2017; design by zebraluchs

2. Encourage diversity. Insurance should be designed to maintain diversity of crops, seeds, and strategies. For instance, the Whole Farm Revenue Program, operating in the US since 2015, offers premium discounts and higher coverage for greater crop diversification. Avoid inconsistency in the types of agriculture promoted by insurance, agricultural subsidies, and food security policies.
3. Adapt policies. Policy effects will typically differ from one location to another according to specific features of local environments.
4. Choose the right scale. To avoid a crowding out of social networks, offer insurance at the community rather than household scale.
5. Limit coverage to extremes. Contracts triggered only by more extreme events may encourage the maintenance of sustainable local risk-coping strategies to overcome small and medium shocks.
6. Tie insurance to ecologically sound strategies. Premium subsidies could be granted on the condition that ecologically beneficial land-use strategies are adopted, such as practices promoting sustainable agriculture (e.g. 2014 US Farm Bill on wetlands). However, conditional programmes that incentivise particular kinds of ecological transformation risk imposing interventions that are poorly suited to the local social or ecological context.

Conclusion

The design of agricultural insurance programmes requires more reflection on potential social-ecological side effects. Otherwise, these increasingly popular interventions run the risk of generating climate-maladaptive outcomes over the long term.

Design and evaluation frameworks should include an impact assessment of existing forms of 'natural' and informal insurance, such as agricultural biodiversity and social norms of redistribution. Since impacts on these systems may be cumulative or emerge only at some threshold, time frames for evaluation must be longer than is usual for economic impact studies – five to ten years is probably the minimum period required for such observations.

Current and future 'climate insurance' projects should be combined with consciously designed programmes to invest in and foster farmer-led learning to educate about sustainable agricultural techniques. Policies linking insurance coverage and subsidies to diversified and ecologically sensitive cultivation may provide new frameworks for the design of insurance programmes in developing countries. This also requires rethinking the accepted wisdom on bundling insurance with inputs, which may make social-ecological systems and smallholders more fragile and vulnerable in the face of a changing climate.

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