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# Transitioning from swidden to agroforestry: the role of risks and uncertainties for adaptation to Climate Change in Yucatan

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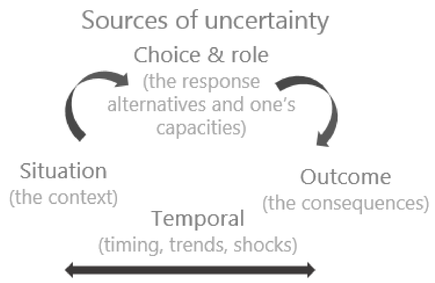
## Background

Agroforestry has been posited as a tool for climate change adaptation, but despite its promise, many efforts worldwide have struggled to engage the target groups. The introduction of an agroforestry program in Mexico provided a good opportunity to compare the perceptions of traditional swidden smallholders who switched to agroforestry against those who did not. We examine:

- Their **perceptions** of agroforestry as a potentially **more climate-adaptive practice** than the traditional swidden agriculture system (*milpa*)
- Differences in **risk perceptions** and understandings of **cause-effect** linked to hazards
- The **role of uncertainty** in explaining differences.

## Motivation

Why some people adapt to climate change risks and others in similar situations do not, is still a matter of much academic debate. Factors likely to play a role are risk perception and the saliency of uncertainty sources (see framework to the right).




There is evidence that in some cases uncertainty can motivate and in others hinder action. However, few studies analyze the role of sources of uncertainty in explaining differences in the mental models of people who actually adapted their livelihoods and those who did not.

## Methods

People make sense of the world through working models in their minds, which weave into cause-effect narratives using scattered pieces of knowledge, sensorial experiences, and beliefs. Mental model mapping techniques illustrate such constructs through influence diagrams.

We created aggregated mental models of swidden and agroforestry based on 20 in-depth interview transcripts with smallholders from three sites in the Yucatan Peninsula, Mexico. The mental models reflect perceived causality, uncertain connections and delayed effects.

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## Main findings

- The agroforestry program was perceived as more adaptive than the traditional milpa. It is thought to reduce the risk of hazards by mitigating the drivers of hazards, and reducing exposure and vulnerability. However, most of the adaptation gains of the agroforestry program are not unique to agroforestry but standard co-benefits of development programs that could, for example, be generated through investments to improve the milpa system.

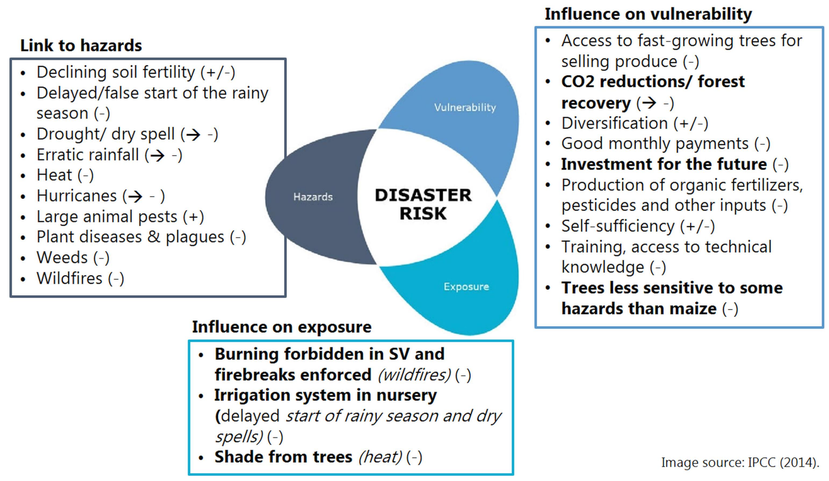



Image source: IPCC (2014).

- Negative spill-over effects: despite adaptation benefits for those enrolled in the agroforestry program, the agroforestry program is perceived to create new economic, environmental and social risks for non beneficiaries in the communities.

### Example. Spillover effects from increased biodiversity

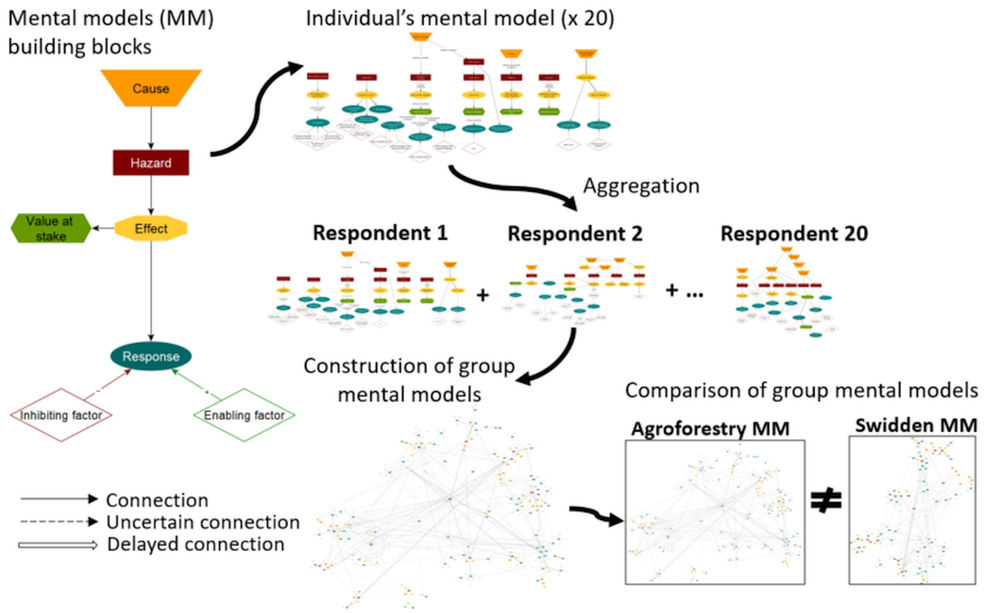
Respondents linked the hundreds of hectares converted to agroforestry and the reduction slash-and-burn to an increase in animal pests. Previously rare animals, like deer, coatis and peccaries have ravaged swidden fields, targeting maize and squash. More animals concentrate on fewer milpas. Agroforesters are not affected, as young trees are mostly left alone.

- The mental model of new agroforesters is 30% larger and more elaborate (longer cause-effect paths) than that of swidden smallholders. Most differences lie in the perception of hazard causes and the number and nature of responses.

Summary of differences between mental models

| | AGROFORESTRY | SWIDDEN |
|---|---|---|
| Causes of hazards | Anthropogenic causes (e.g. deforestation) | Natural phenomena (e.g. rain quotas) |
| Responses to hazards | More anticipatory responses | More reactive responses |
| Uncertainty sources | More concerned with outcomes over time | More concerned with situation uncertainty and their own choices |

- Smallholders responses against hazards reflected preferences in uncertainty sources. Their actions often reduced one type of uncertainty (e.g. about the climate) but increase another (e.g. about the yield outcome).




## Conclusions

Comparing the mental models revealed **trade-offs in the source and timescales of uncertainties**. **Smallholders** that adapt and who do not **perceive risks and benefits of adaptation differently**.

While agroforestry was perceived as more climate adaptive than traditional farming, most **benefits** were **not unique to agroforestry** and came alongside **new risks**. This case serves to identify **unintended consequences of interventions** by looking at community dynamics rather than just at the direct beneficiaries of the program, and can be informative for actors in this field as well as in impact assessment and M&E.

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