

# Climate Change Mitigation and Adaptation

Sujata Visaria  
SPIA Panel Member



## The Challenges of Climate Change in Global South

**rising temperatures**

**increasingly variable rainfall**

**salinity risk**

### Climate Smart Agriculture

- Mitigation
- Adaptation

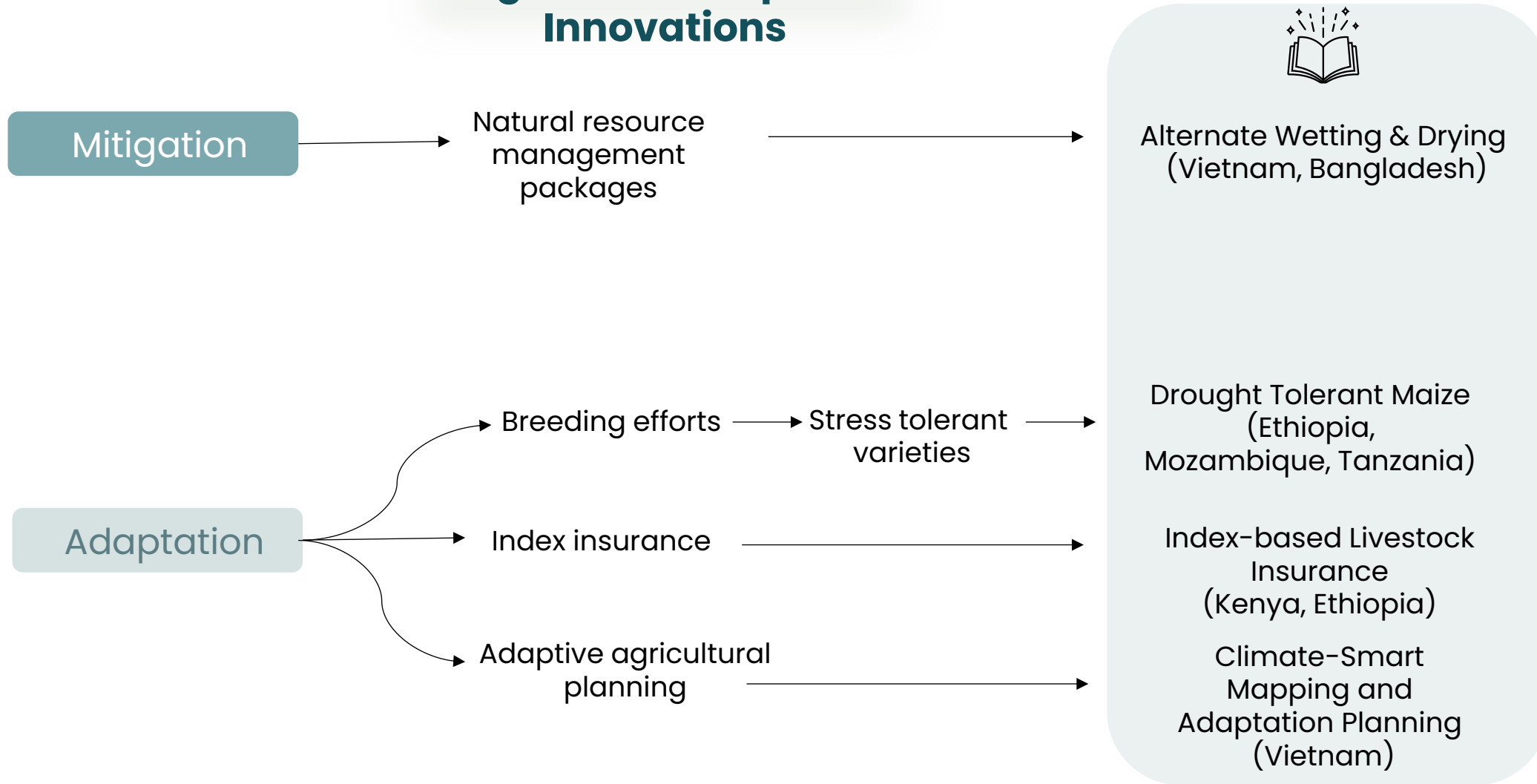
### Focus

- Innovations addressing these challenges
- Impact & adoption in short & long term (SPIA & SPIA-funded research)

### Bigger Picture

- Key learnings

## Mitigation & Adaptation Innovations



# Framework

Measuring  
**Impact** of the  
innovations

Requires  
**Adoption**

## Demand for innovation

- Expected Impact
- Information
- Incentives

## Supply of innovation

- Access



## Alternate Wetting and Drying (AWD)

Cyclical pattern of flooding & drying rice fields:

- Reduces water use & methane emissions
- Maintains yields

### Bangladesh

Chakravorty, Dar and Emerick (2023)

- On average AWD is not taken up.
- But if pricing is volumetric, training farmers in AWD reduces water use by 19% & lowers farmer costs

#### How to encourage adoption?

Institutionally difficult to change pricing  
Different incentives for different farmers  
Fairness concerns

### Vietnam

SPIA Vietnam Report (2024)

- Irrigation is controlled by cooperatives
- So might expect faster adoption
- Yet, SPIA (2023) finds low adoption rates:
  - 14.7% of EAs  $\geq$  1 farmer
  - 5.4% farmers

#### What limits adoption?

Need to investigate at community level

## Drought-Tolerant Maize

Stress-tolerant variety, protects against moderate mid-season drought

### Ethiopia

SPIA Ethiopia Reports (2020, 2024)

Household-level adoption rates  
**23.7% (2018) → 39.6% (2022)**

Government is the **central player** fostering  
agricultural development

Both government and private sector suppliers

Rapid diffusion largely supply-driven.

### Mozambique & Tanzania

Boucher et al. (2024)

Government not a central player

Farmers likely choose based on  
perceived benefits and costs.

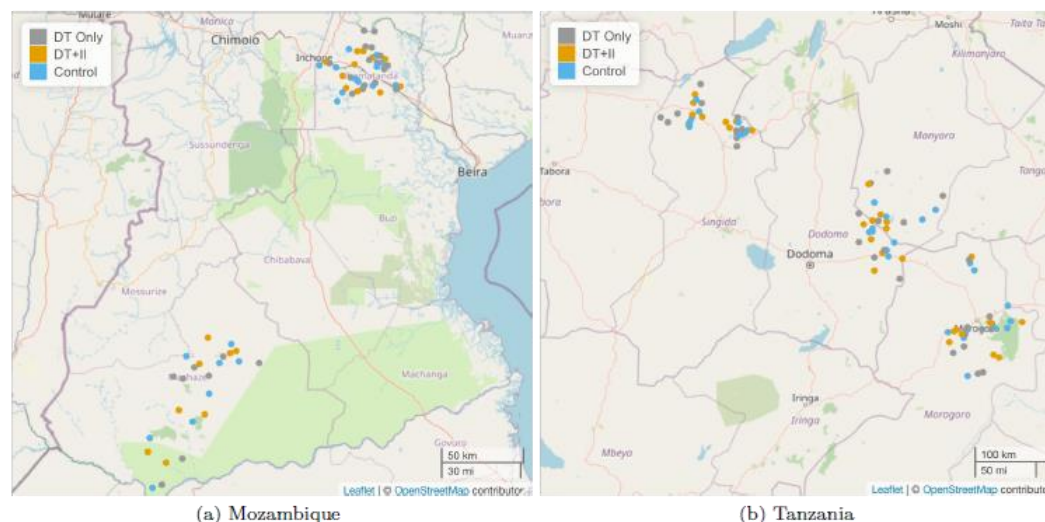
Technology **bundling**  
(DT Maize + Index-based insurance)

## Bundle: Drought-Tolerant Maize + Insurance

### Mozambique & Tanzania

Boucher et al. (2024)

Figure 1: Geographic Diversification and Matched Triplet Randomisation



Base map and data are from OpenStreetMap and OpenStreetMap Foundation.



Adoption **only** of DT Maize Seeds

- Reduces yield loss from mid-season drought
- Removes longer-term effects of drought in future years: yields higher by **145 kg/ha**.



DT Maize Seeds **and** Insurance

- Even larger reductions of long-term effects: yields higher by **335 kg/ha**.
- Longer-term:
  - Farmers who saw the positive impact of technology in field **intensified** their use.
  - But those who did not experience shocks reverted to baseline.

## Index-Based Livestock Insurance

Commercial insurance product to protect pastoralists against drought



### Short Term

Jensen, Barrett & Mude (2017)

Reduces exposure to widespread risk events by 63%  
Although policyholders still face 69% of their initial risk (individual risk)



### Long-Term

Jensen et al. (2023)

Positive effects persist for adopters:

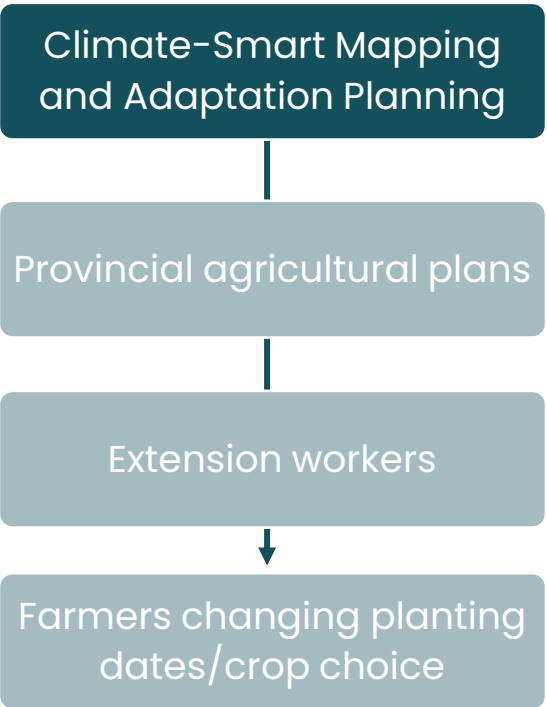
Fewer small animals; more large animals  
Children's education increases

**But:** IBLI sales did not continue long term

Marketing & distribution constraints:  
Private insurance providers lack skilled agents



# Climate-Smart Mapping and Adaptation Planning (CS-MAP)

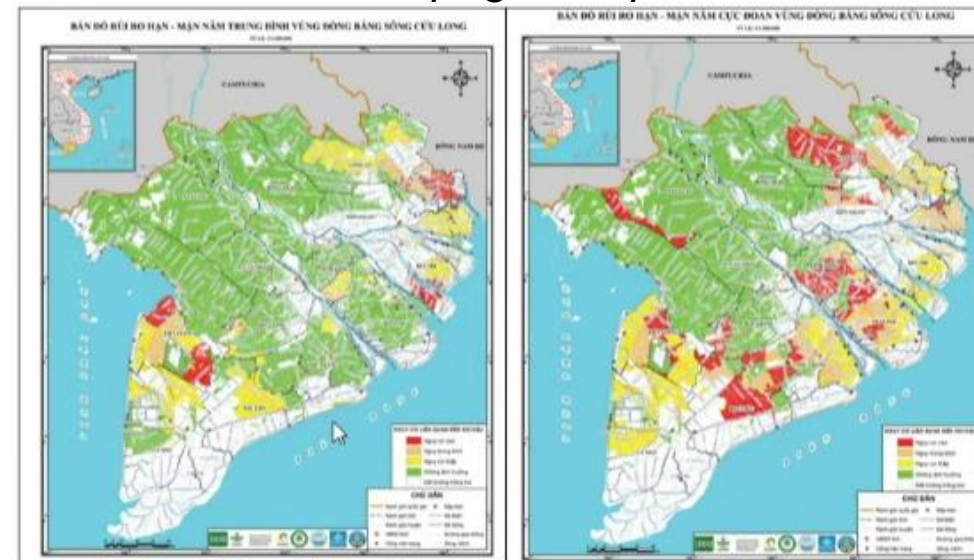


Participatory approach to develop & implement adaptation solutions

Anticipate climate risks

Recommend locally-appropriate adaptive behaviours

Risk of salinity (green, yellow, red)



Normal year

Extreme year

# Climate-Smart Mapping and Adaptation Planning (CS-MAP)

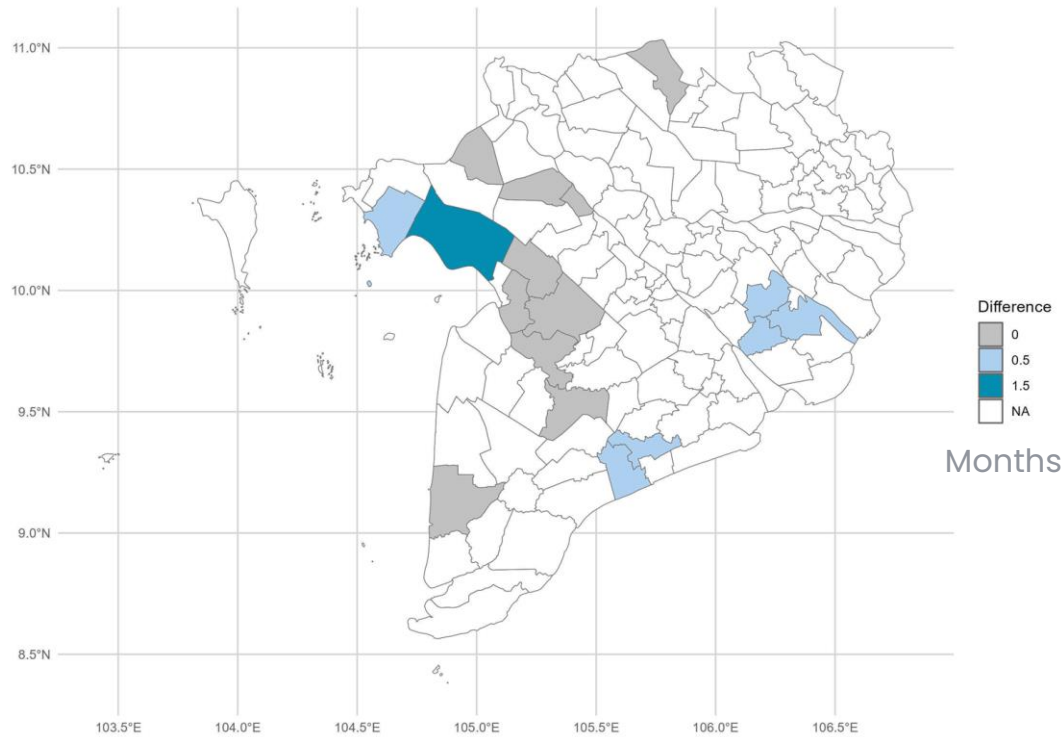


Analysing agricultural plans:  
How do CS-MAPs influence the recommendations made to farmers?

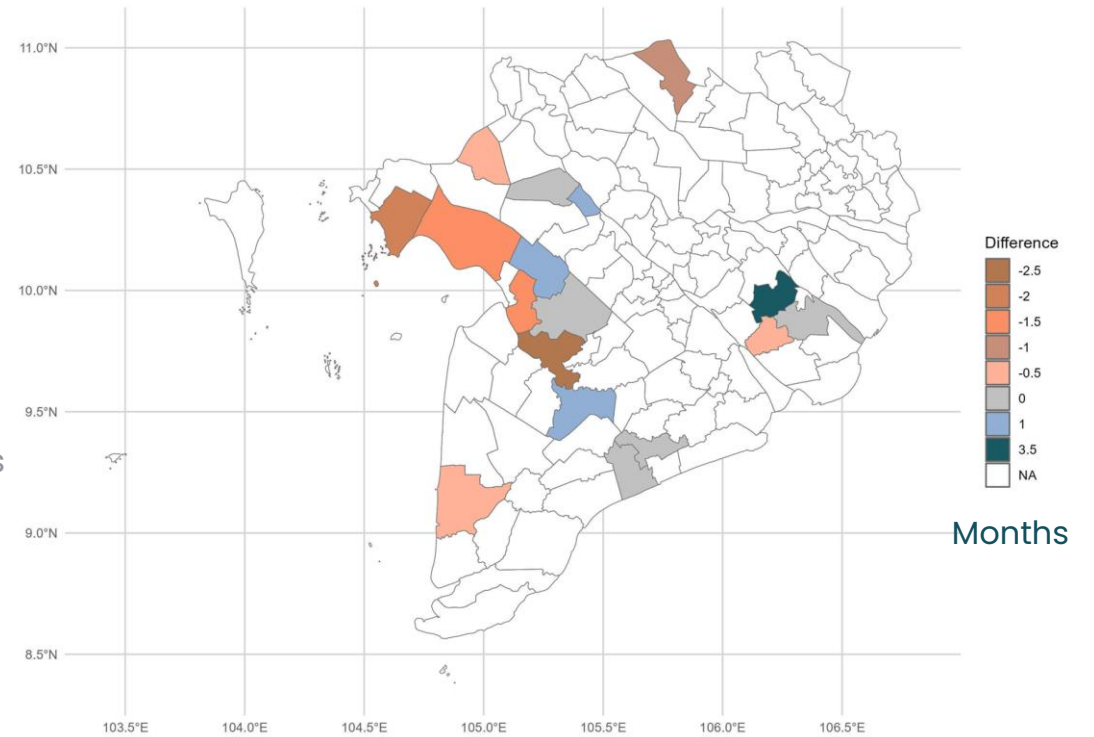
# Climate-Smart Mapping and Adaptation Planning (CS-MAP)

Summer – Autumn (SA) season 

Changes recommended in CS-MAPS



Changes implemented by farmers

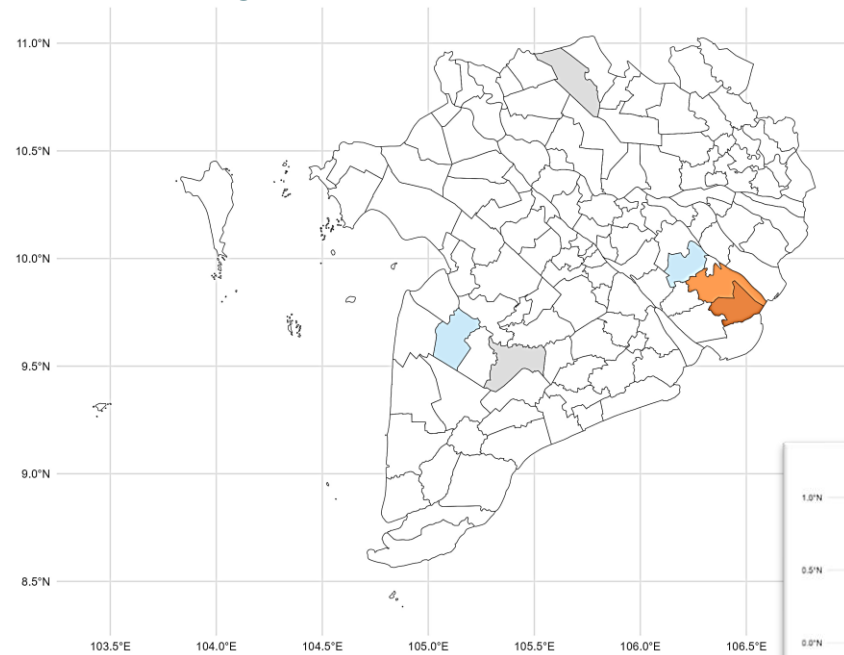


# Climate-Smart Mapping and Adaptation Planning (CS-MAP)

## Recommendations

❄️ Winter – Spring (WS) season

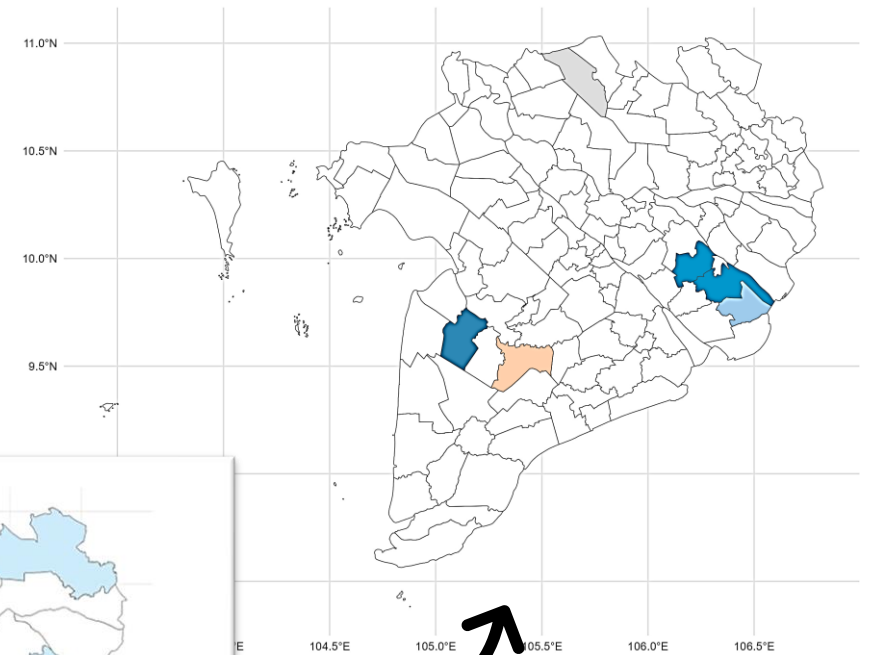
Changes recommended in CS-MAPS



Months Difference

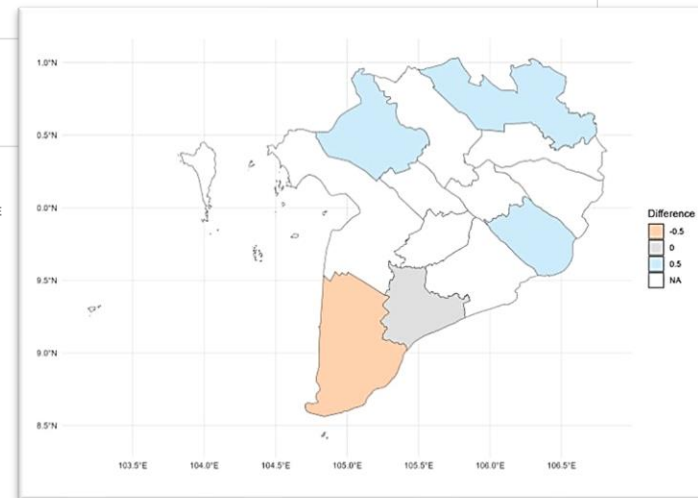
- 2
- 1.5
- 0
- 0.5
- NA

Changes implemented by farmers



Months Difference

- 0.5
- 0
- 1
- 1.5
- 2
- NA



Changes recommended in agricultural plans



# Framework

What is the **Impact** of the innovations?

Requires **Adoption**

## Demand for innovation

- Information & Incentives

**Learning through experience**

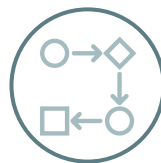
## Supply of innovation

- Incentives & Infrastructure
- Competing objectives

**Lower cost roll-out approaches?**  
**CS-MAPs may be 1 input among many**



## Key Take-aways



Adoption at scale depends on both demand and supply-side factors.



Important to understand factors behind both scaling success and failure.

Case for empirical research on innovation dissemination & scale-up.





Standing  
Panel on  
Impact  
Assessment

# Thank you



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