Mapping the spatial and temporal dynamics in vulnerability of smallholder farming systems in Ethiopia

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Background

- The impacts of climate change disproportionately affect the livelihood and food security of smallholder subsistence farmers, especially in developing countries like Ethiopia.
- Vulnerability is dynamic over space and time.
- Therefore, it is important to understand the distribution of vulnerability at appropriate scales to reduce the expected impacts of climatic risks.
Methodology

- Vulnerability = \( f \) (Exposure, Sensitivity, Adaptive capacity)

- Vulnerability for 64 zones of Ethiopia for
  - past (1996-2005),
  - current (2006-2015), and
  - future (2036-2045) (RCP 6.0) scenario from four global GCMs

- Indicator based approach

- Approach combines climate, biophysical, and socio-economic data
Temporal changes in indicators

- Increase in CV_MeanTemp (+0.33) and CV_MeanPr (+0.18) from current to future scenario
- Increase is seen in F_Crop_Holder (+0.36) from past to future scenario
- Mean_NDVI and Mean_SM, show a declining trend (-0.02 to -0.06)
- Irrigated_Area and Credit_Holder remained nearly constant

Note: The values for sensitivity and adaptive capacity indicators for current and future scenario remain the same
Temporal changes in vulnerability components

As we move from past to future:
- Narrow unimodal distribution of exposure index changes to broad bi-modal
- Marginal increase in adaptive capacity index
- Positively skewed distribution in past to near-normal distribution in current period
‘Where’ have the temporal changes occurred?
Spatial-temporal dynamics in vulnerability

Vulnerability index was categorized into five classes namely, very low (0-0.2), low (0.2-0.4), middle (0.4-0.6), high (0.6-0.8), and very high (0.8-1)
Conclusion

• The results of the study help to identify ‘what’ and ‘where’ the changes in vulnerability and its components occur

• Results will aid in climate change adaptation planning

• Adaptation planning shall be tailored to the needs and hence sources of vulnerability in different zones

Thank you!