

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

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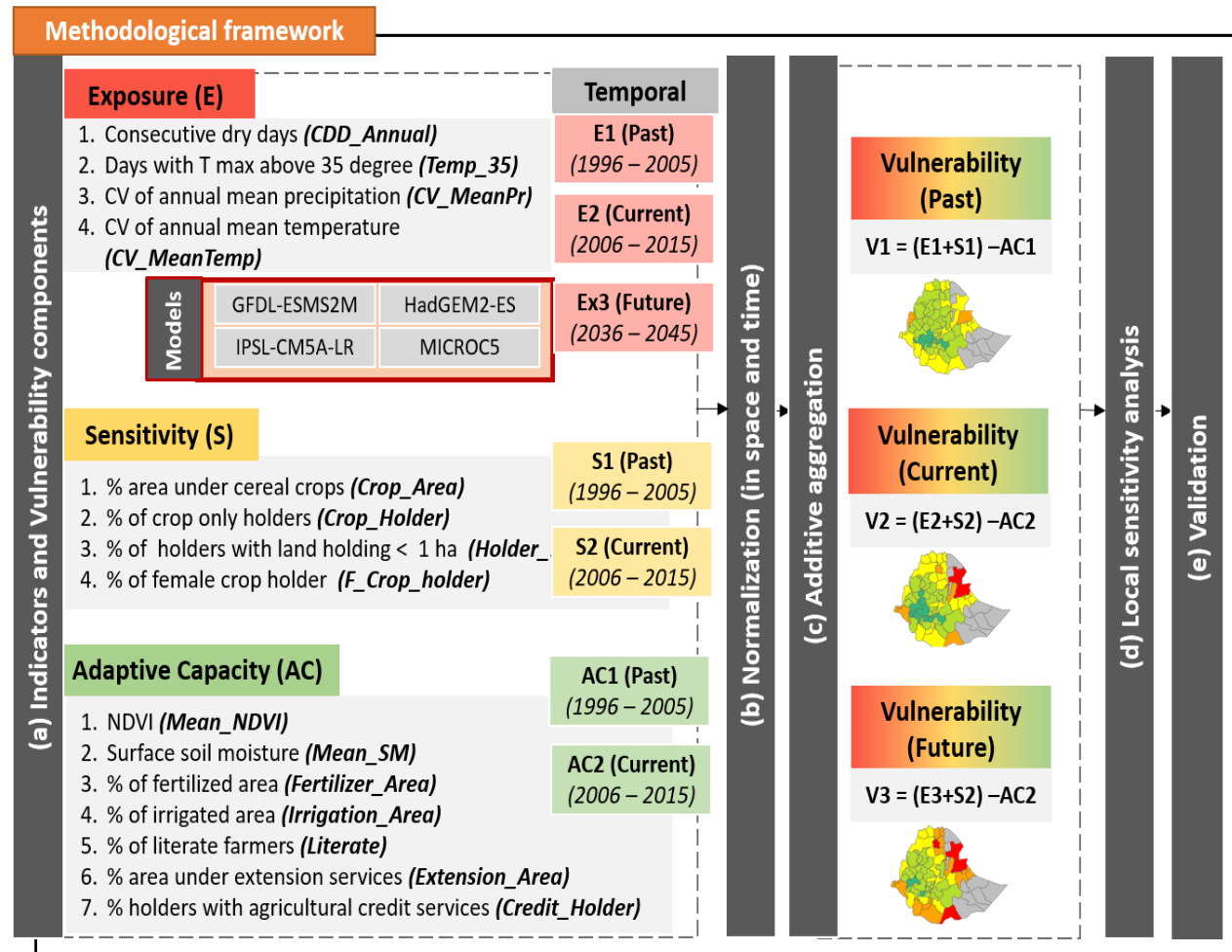
Working group: Adaptation in Agricultural Systems, RD II, Potsdam Institute for Climate Impact Research

# Background

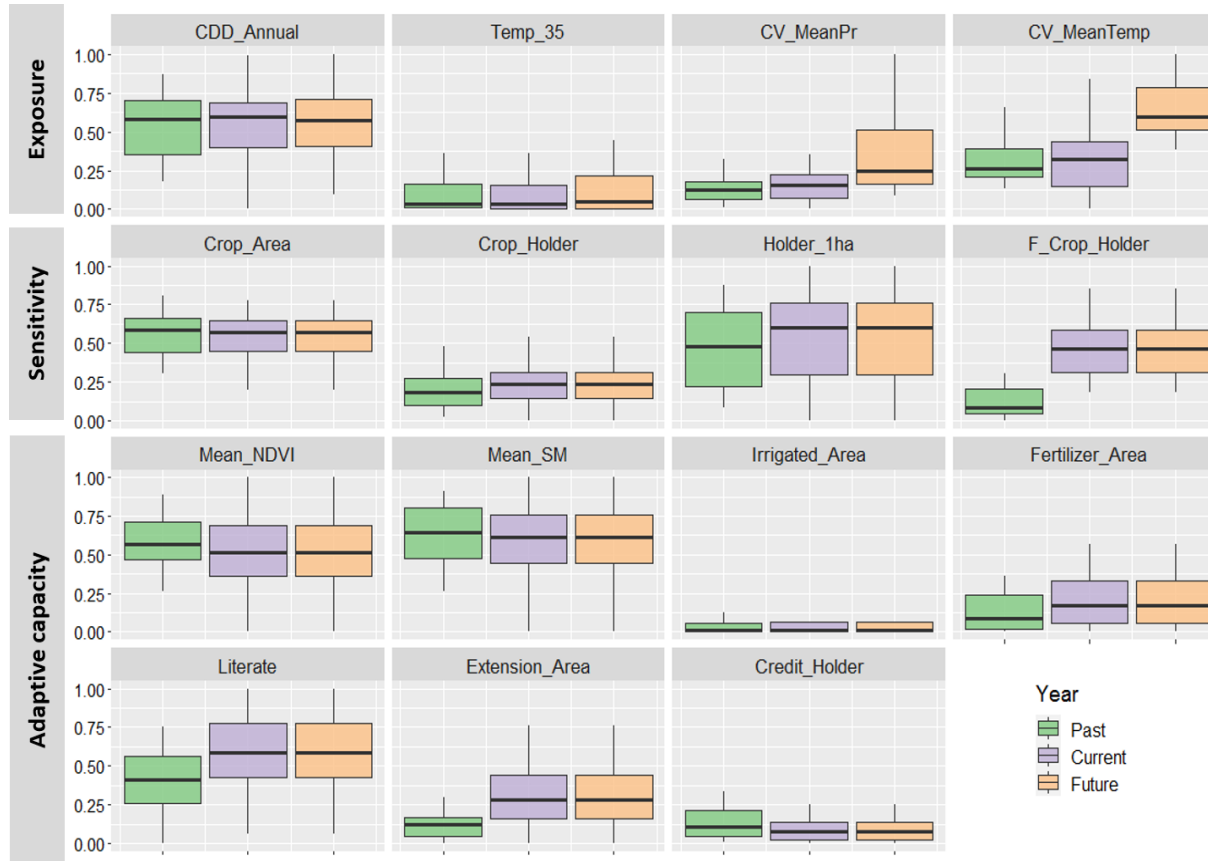
- The impacts of climate change disproportionately affect the livelihood and food security of smallholder subsistence farmers, especially in developing countries like Ethiopia
- Vulnerability is dynamic over space and time
- Therefore, it is important to understand the distribution of vulnerability at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



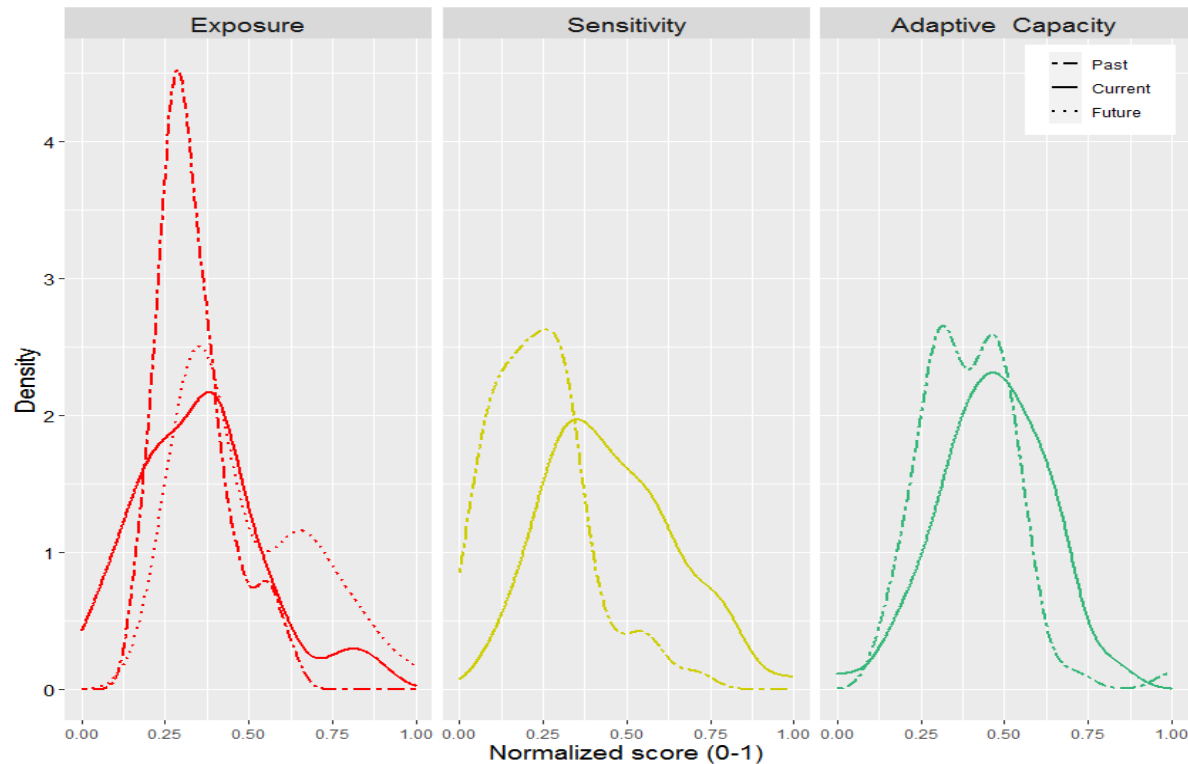
# Temporal changes in indicators



- 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

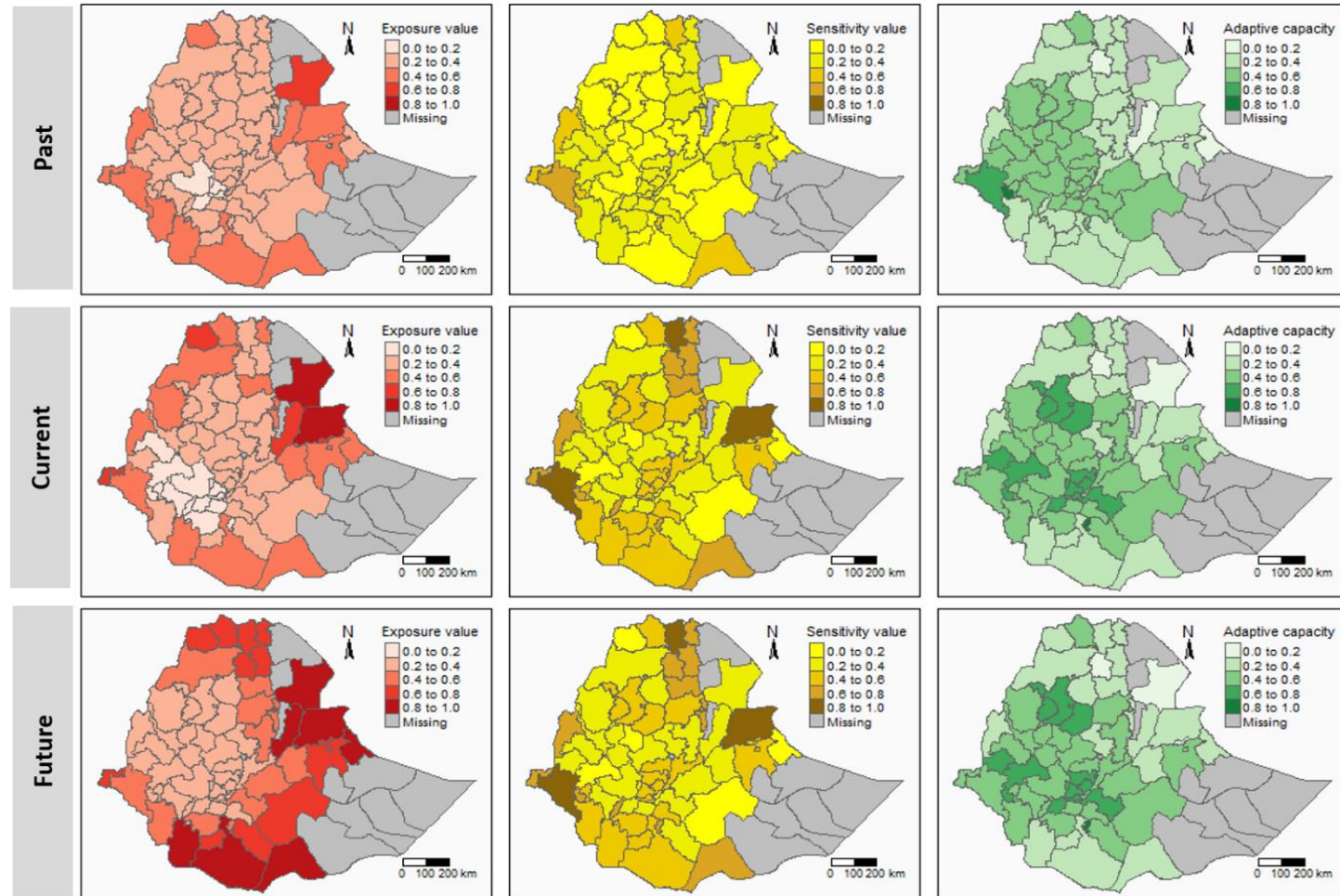
# Temporal changes in vulnerability components



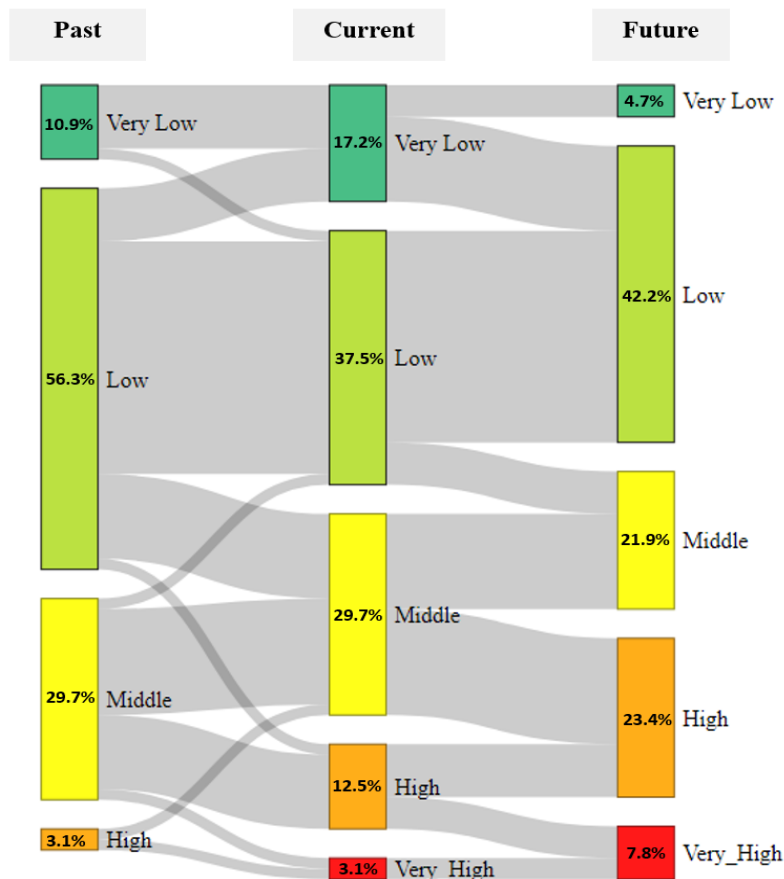
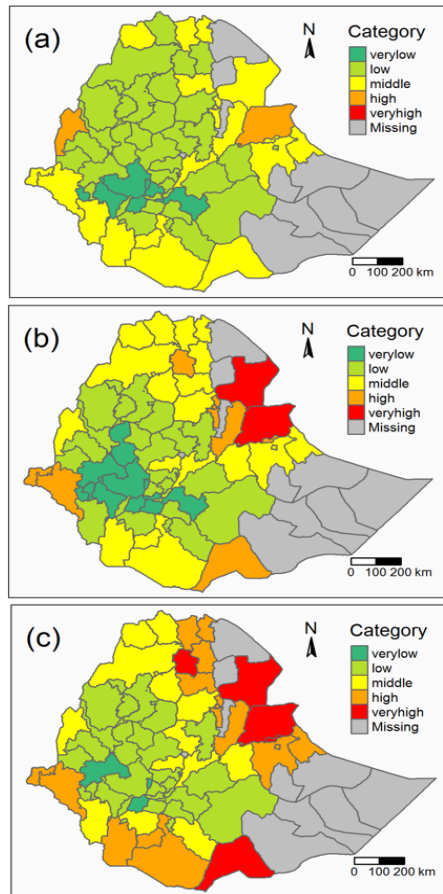
As we move from past to future:

- 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!