

## Multi-criteria analysis and ex-ante assessment to prioritize and scale up climate smart agriculture in semi-arid tropics, India

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### Abstract

The strategies that integrate food security, adaptation and mitigation options in agriculture are of high importance to manage the increasing risk of climate change in vulnerable semi-arid regions for the livelihood security of poor agriculture-dependent people. To address the growing problems of food security and climate change, multiple institutions and programs have demonstrated evidences for developing Climate-Smart Villages (CSVs) across regions which can act as a sustainable model for adapting to changing climate and improve farmers' welfare. However, it remain a major challenge to upscale CSV approach. This paper presents a framework and evidence based designing of a strategy for scaling up Climate Smart Agriculture (CSA) in Telangana State of India. Climate risk and vulnerability mapping at disaggregate level; Inventory of CSA practices and respective technical coefficients; multi-criteria analysis for participatory prioritization of location specific CSA practices and identification of barriers and incentives; ex-ante impact analysis of potential adoption and investment and infrastructure needs to implement CSA practices at local level and strategy for CSA integration into district level plans have been the key steps of this CSV approach. Local level vulnerability assessments and participatory prioritization based on index calculated for climate smartness and ease of adoption for each proposed practice, formed the basis of prioritizing CSA interventions suitable for particular location. Further the ex-ante impact analysis of selected climate smart interventions in different regions of Telangana was the next step. We also generated relevant geospatial maps for irrigated as well as rainfed major crops under vertisols and light soils. These maps helped in identifying context specificity of CSA interventions. Based on participatory prioritization, five CSA practices such as Ridges and Furrows, Broad bed and furrow for soil and moisture conservation and drainage, Farm pond for critical/supplemental irrigation, Crop residue management (cotton) and drip irrigation system were considered for ex-ante assessment considering district wise actual area and yields of major crops and rainfall level for 5 years from 2010-11 to 2014-15. The proposed framework and different tools help to understand the district wise potential for promotion of CSA practices/technologies, public and private investment needs, economic impacts of the interventions to enable informed decision making for climate smart agriculture. Stakeholders' consultations during different stages of this process was very important for integrating their perspective and creating ownership. Piloting of evidence based scientific framework guides investments and policy making decisions on scaling up CSA in Telangana state.

**Key Words:** Climate risk, multi-criteria analysis, ex-ante assessment, prioritization, climate smart agriculture