RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

Info Note

Towards climate-smart agricultural policies and investments in Telangana

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Key messages

- Rainfed farming systems in Telangana State, India are increasingly affected by high climate variability, yet current efforts to address this challenge are not unified
- Targeting climate-smart interventions has proven difficult, due to a lack of information on climate risk at a mandal (sub-district) level, as well as investments needed and possible benefits
- ICRISAT has developed and piloted an evidence-based scientific framework for guiding investments and policymaking decisions on scaling up climate-smart agriculture (CSA) in Telangana State
- This consisted of a mandal-level climate risk analysis, a multi-stakeholder participatory prioritization of CSA practices and an ex-ante impact assessment to determine the investments needed and potential benefits of priority CSA practices at a local level
- This approach has the potential to be replicated across India and beyond

This briefing note summarizes the key findings of the **"Scaling up climate-smart agriculture in the Telangana State"** project, carried out by the International Crops Research Institute for the Semi-Arid Tropics and partners, between 1st January 2016 and 31st December 2017.

Climatic challenges to farming in Telangana State

Rainfed farming systems, representing 54% of the net sown area in Telangana State in India, have become increasingly affected by recurring drought and high climatic variability, adversely affecting the livelihoods of millions of smallholder farm families. About 55% of the State's population is dependent on farm activity. In 2014-15, the gross state domestic product (GSDP) in the agriculture sector declined by 10.3%, attributed mainly to adverse seasonal conditions. The crop sector alone declined by 21.3%. Building the capacity of smallholder farmers to adapt to these conditions is a State priority, given agriculture's contribution to employment generation, food security, inclusiveness and sustainable growth. A number of government institutions, NGOs and research groups are working to tackle this issue, and there are a variety of practices that could increase the climate-smartness of the agriculture sector if taken to scale. However, these practices are often implemented unsystematically. Little information is available on: climate risks by region; trade-offs and impacts of interventions at district and sub-district levels; prioritization and cost of adaptation options; capacity needs and viability of investments.

Fig. 1. Scientists and policy-makers discuss climate-smart decision-making during stakeholder workshop.

In order to construct a unifying approach to implementing climate-smart agriculture policies and produce an evidence based framework for guiding investments and policymaking decisions in climate-smart agriculture, ICRISAT has led the **"Scaling up climate-smart agriculture in the Telangana State"** project, with support from the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and Ministry of Environment, Forests & Climate Change, Government of India (Fig 1).

1. Venkateswarlu, B, Kumar Shalander, Dixit S, Rao, S Ch., Kokate, KD and Singh, AK 2012. Demonstration of Climate Resilient Technologies on Farmers' Fields-Action Plan for 100 Vulnerable Districts. CRIDA, Hyderabad, India. 163p
2. Aggarwal, PK, Jarvis AJ, Campbell BM, Zougmore R, Khatri-Chhetri A, et al., The climate-smart village approach: Framework of an integrative strategy for scaling up adaptation options in agriculture. Ecology and Society (in press)

Taking the Climate-Smart Village concept to scale

To equip rural communities with the capacity to cope with climate change, CCAFS, in collaboration with national programs such as NICRA-National Initiative on Climate Resilient Agriculture[1], have used the concept of a Climate-Smart Village (CSV)[2] to build resilience to present and future climate stresses. A CSV approach aims to increase agricultural production sustainably by adapting to and building resilience to climate change. In a broad sense this includes selecting locally-appropriate practices, technologies, climate information services, insurance, institutions, policies and finance options[2,3]. The key steps of CSV approach implementation are as follows:

1. **Baseline assessments:** Assessment of: goals; climate risks and vulnerabilities; local knowledge; resources technologies and services; markets
2. **Co-design CSVs:** Participatory prioritization exercises to form a strategic portfolio of technologies, tactical support, and institutional innovations needed, through stakeholder engagements
3. **Creating evidence:** Implementation of highly suitable CSA interventions in an integrated manner, assessing benefits, synergies, and the trade-offs of the technologies as well as barriers and incentives for adoption of CSA.
4. **Scaling up and out:** The proven CSA options are scaled up and out from farmers to farmers, and via business models, influencing policies, programs and financial institutions.

While hundreds of villages across India, Bangladesh and Nepal have benefitted from the CSV approach[4], the need of the hour is to reach several thousands of villages with CSA practices that improve resilience. A costed and prioritized strategy was therefore piloted for scaling climate-smart agriculture in Telangana State (Fig 2).

Barriers to scaling up climate-smart agriculture in Telangana State

- Lack of information on climate stresses at the mandal level
- Lack of information on the investment requirements and potential benefits of CSA interventions at farm and regional level
- Poor integration of the perspectives of stakeholders while prioritizing CSA interventions
- Poor access to inputs including farm machinery, climate information and credit
- Lack of convergence among government departments working on similar issues
- Lack of capacity in farmers, extension agents, bankers and agro-dealers of context specific technical solutions and investment priorities (Fig 3).

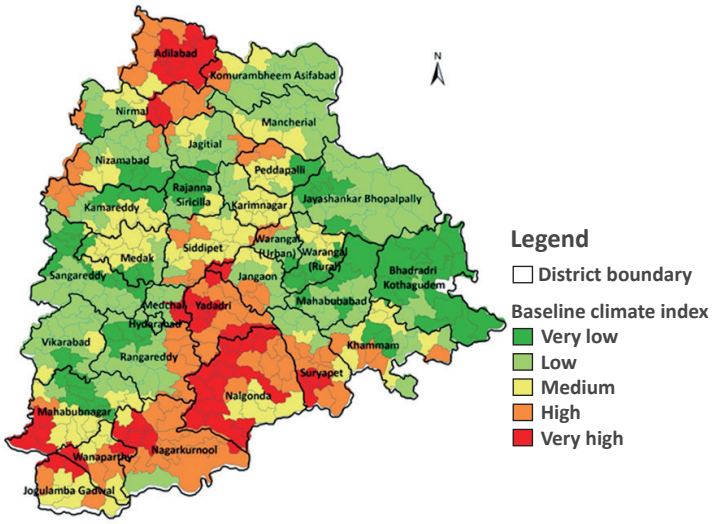

Fig. 2. Mandal wise climate exposure index, Telangana

A mandal-level map of climate risks

To improve the targeting of climate-smart agriculture practices, a climate exposure (or climate risk) assessment for baseline and mid-century climate conditions was carried out.

Telangana state was divided into 350 grids representing mandals. Indicators such as temperature changes, heat & cold wave events, rainfall variability, and changes in the frequency or intensity of consecutive dry and wet days were analysed. Based on stakeholder and expert knowledge, and weighted total of the indicators was used to calculate a climate exposure index. The resulting maps indicate the 'hotspots' or mandals at higher climate risk, highlighting the need for locally-specific interventions.

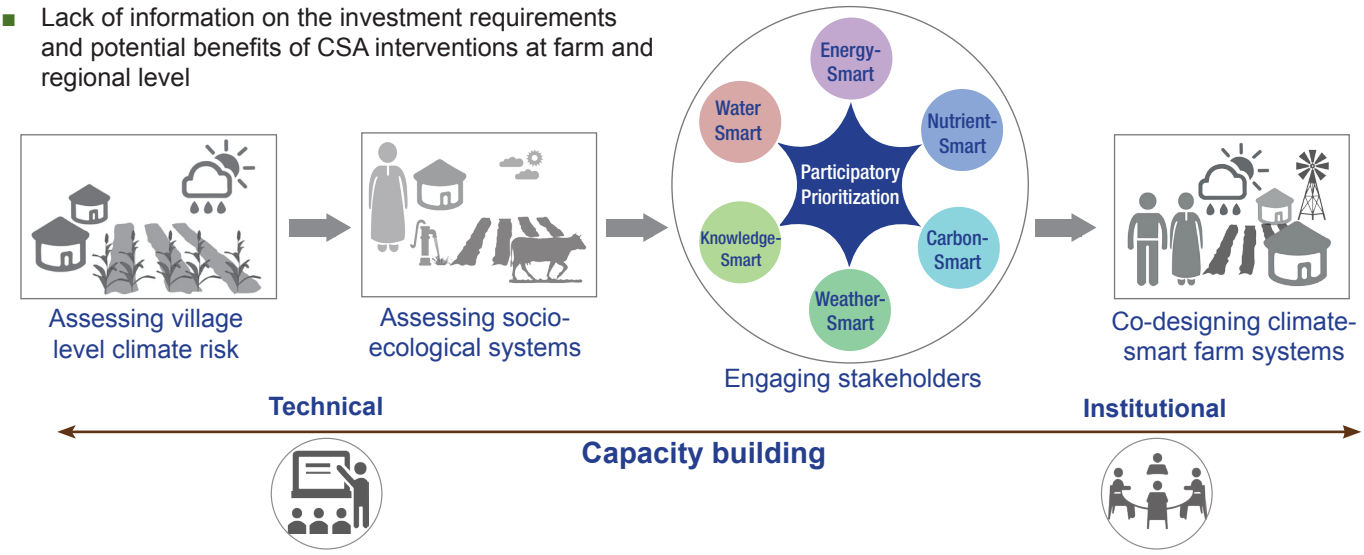

Fig. 3. Climate-Smart village approach

3. Building Climate-Smart Villages: Five approaches for helping farmers adapt to climate change. 2016. ICRISAT. Patancheru 502 324, Telangana, India: 28 pp
4. https://ccafs.cgiar.org/climate-smart-villages

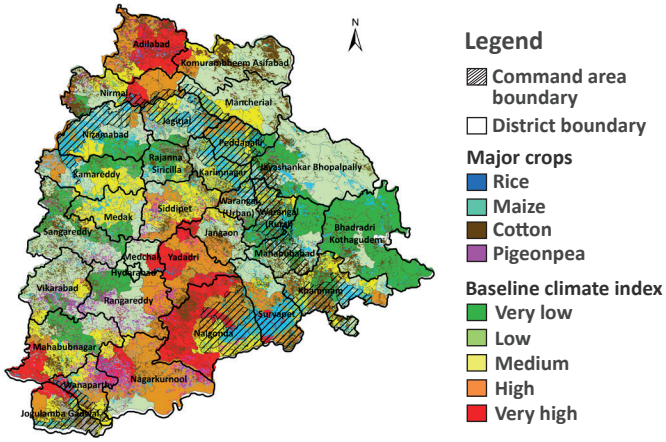

Fig 4. Mandal wise climate exposure index with major crop type and command areas (2015-16)

This long-term climate analysis indicates high to very high climate risk in almost all the mandals in **Nalgonda, Adilabad, Yadadri** and **Nagarkurnool** districts. The other major districts facing high climate risk were **Mahbubnagar**, **Gadwal**, **Wanaparthy**, **Rangareddy**, **Nirmal** and **Suryapet**. Crops such as cotton, pigeon pea and maize are common in the mandals with highest climate risks (Fig 4). This clearly indicates the need to promote CSA practices that enhance resilience of these cropping systems in the short run and to assess alternative farming systems strategies for the long run if needed.

Participatory prioritization of CSA options

With a greater understanding of the level of climate risk and the crops under threat in each region, multi-stakeholder workshops (bringing together district level extension and development officers, researchers, bankers, industry and farmers) assessed and prioritized suitable CSA interventions for the Southern, Central and Northern regions of Telangana State. Through analysis and discussions, a ranking of CSA options took place, using the following criteria:

- **Climate-smartness** - the potential to contribute to productivity, climate risk reduction, mitigation and resource sustainability
- **Ease of adoption** - based on technical feasibility, cost of technology, inclusivity and synergy with state plans or existing development programs

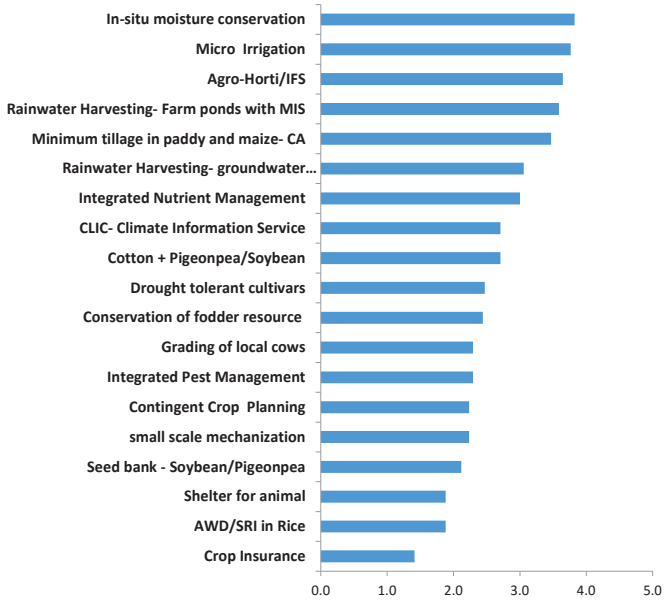

Fig. 5. Index for climate-smartness for Northern Telangana

As a result, a number of promising solutions that scored highly in both the climate-smartness and ease of adoption indices have been identified (Fig 5).

Incentives related to financing, machinery, capacity building, market linkages and improved infrastructure were also analysed to identify ways to facilitate adoption of these practices. Building stakeholders' capacity was revealed to be the most important incentive to facilitate the adoption of almost all CSA practices. Mechanization was considered of maximum importance as an incentive for six of the 19 CSA practices listed, including in-situ moisture conservation, residue incorporation and conservation of fodder resources. Financing was considered of maximum importance as an incentive to encourage the practices, such as rainwater harvesting, micro irrigation and shelters for animals (Fig 6).

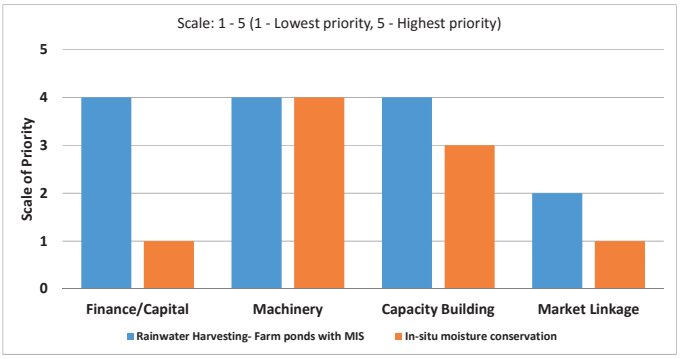

Fig. 6. Stakeholders priority for incentives to promote CSA

Potential impact of selected CSA practices

Using highly ranking CSA options identified at the participatory workshops, the potential impact of these interventions both in terms of productivity and economic return on investment were analysed for each district of Telangana.

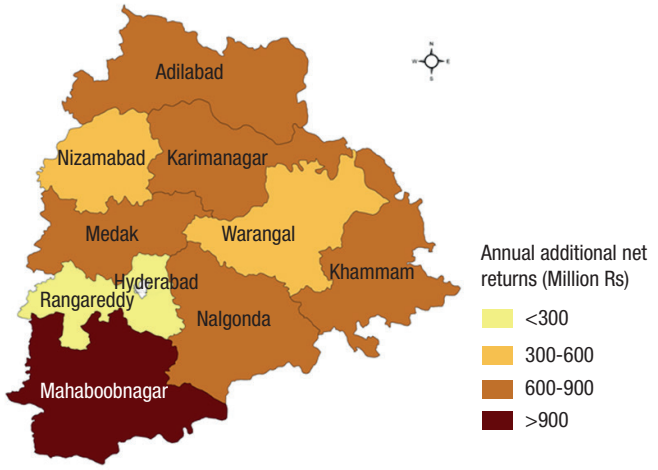

Fig. 7. Potential Additional Net Returns due to Farm Pond with Sprinkler Irrigation System in Major Crops (Current Prices)

Fig. 8. Farmers adopted farm pond for supplemental irrigation

Considering the actual area and yields of major crops, as well as rainfall amounts over the last five years, net additional returns due to adoption of CSA practices were estimated. Practices analysed were: **Drip irrigation system, broad bed and furrow, ridges and furrow, farm ponds, crop residue incorporation and climate information services**.

In the case of adopting the farm ponds for major crops, for example, annual total additional net returns were estimated to be as high as 987 million INR (~US$ 16m) in Mahabubnagar giving an internal rate of return of 14% on investments in infrastructure and capacity development (Fig 7 & Fig 8).

This ex-ante analysis has a solid and scientific base for guiding future investments in climate-smart agriculture in Telangana State.

Scaling Climate-Smart Agriculture in Telangana State via CSV approach

The project helped prioritize CSA practices for 8,000 farm households in Mahabubnagar district and has proposed a framework to apply the climate-smart village approach to a state level, and therefore reach millions more farmers. These findings were presented and discussed to key agricultural policy decision makers at a State Credit Policy Seminar, at the Telangana regional office of the National Bank for Agriculture and Rural Development in India (NABARD). NABARD and Ministry officials seek to use this framework to guide district-level credit plans and future investments in climate-smart agriculture in Telangana. The Environment Protection Training and Research Institute (EPTRI), Nodal agency for climate change research in Telangana state, will use project's findings to develop the State Action Plan on Climate Change for agriculture sector. This science based CSA policy process outlined in this briefing note could easily be replicated in other states of India, and in other countries facing climate threats all over the world (Fig 9).

Acknowledgements

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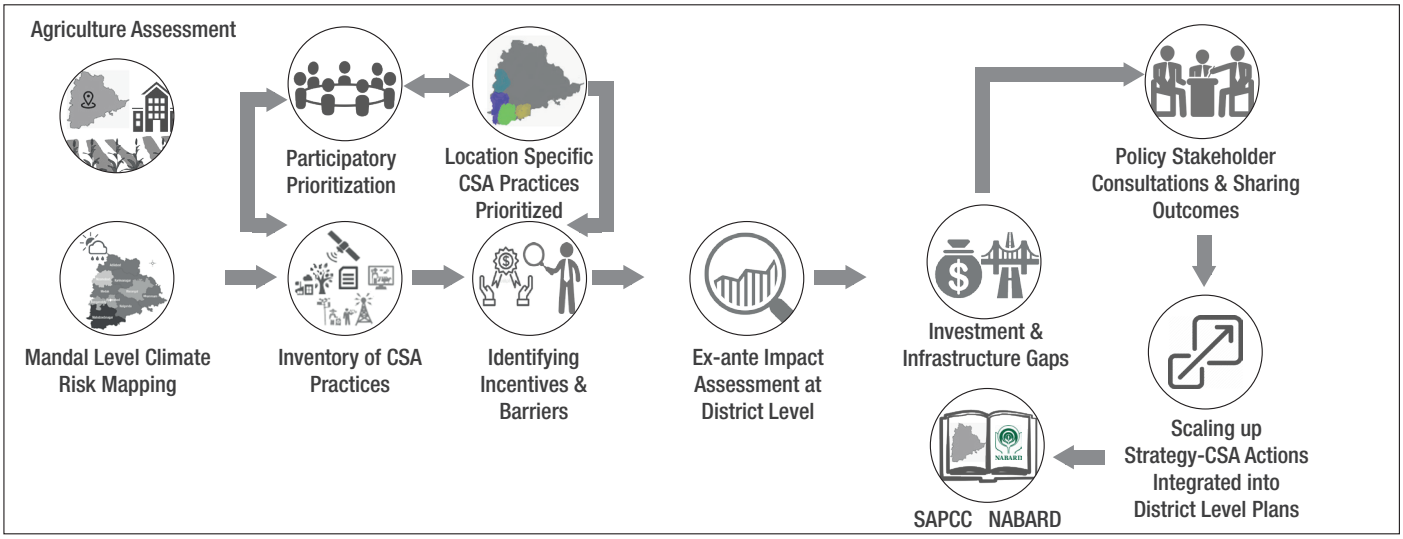

Fig. 9. Framework for scaling up climate-smart agriculture in Telangana State

Partners:

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CCAFS and Info Notes

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