

Enhancing capacity for practising climate-resilient agriculture: a two-pronged approach



This policy brief highlights the need to enhance the capacity of both government and farmers for implementing the practices of climate-resilient agriculture. It looks at the common but different requirements of implementers (farmers) and enablers (government workers) in Odisha, India for adopting such practices in a replicable and sustainable manner. The findings outlined in this brief are applicable not only in states throughout India, but also in other regions in the developing world.

Issues

Understanding of climate change and adaptive measures is inadequate for both farmers and within government agriculture departments

The level of understanding on climate change and adaptive measures is different for implementers and policy makers

Capacity building should not be a one-off or *ad hoc* event

Farmers trust and listen to fellow farmers more than experts

Existing transfer and translation of academic knowledge to farmers' fields is inadequate

Recommendations

Identify existing capacity gaps of government officials and farmers separately

Based on the different training needs of implementers and policy makers, develop independent modules and curriculums

Integrate capacity building into existing systems using a holistic approach

Establish 'train the trainer' modules, selecting master trainers and progressive farmers for sustainable uptake

Establish knowledge-based district hubs to facilitate networking between farmers and research agencies

Climate change impacts in India

Agriculture in India is heavily dependent on the vagaries of climate change, especially changes in temperature and rainfall. Mean temperatures in India are projected to increase by 0.4–2.0°C during *kharif* (the rainy season) and by 1.1–4.5°C during *rabi* (the winter season) by 2070. Mean rainfall is projected to increase by up to 10% during *kharif* and *rabi* by 2070. At the same time, there is an increased possibility of climate extremes, which could affect the timing of the monsoon, and the intensities and frequencies of drought and floods. A study on the impact of temperature increases on the productivity of rice in Punjab has shown that, with all other climatic variables remaining constant, temperature increases of 1°C, 2°C and 3°C could reduce the grain yield of rice by 5.4%, 7.4% and 25.1% respectively.

Climate change impacts in Odisha

The Indian state of Odisha is primarily agrarian, with more than 70% of people dependent on agriculture for their livelihoods. The impact of climate change on agriculture is often underestimated and only realised *ex post*.

In a survey carried out by Water Initiatives Odisha, almost all respondents (farmers, farm labourers, and landless rural people dependent on agriculture or natural resources) reported growing numbers of hot days and reduced rainfall. About 30% of respondents indicated changes in local biodiversity, and 20% cited how traditional methods of forecasting climate and weather are failing due to behavioural deviations in birds, animals and plants, and changes in the environment. Many respondents also cited the disappearance of particular local species (of pests, insects and plants, etc.).

Over the long term, the impacts of climate change in Odisha agriculture could be:

- Reduced crop yields due to warmer days and nights
- Substantial yield losses in winter crops
- Increased crop water requirements due to accelerated evapotranspiration
- Decreased efficiency of nitrogenous fertilisers
- A higher incidence of pests.

Needless to say, it is marginal and smallholder farmers who are the most vulnerable to the impacts of climate change. Most of these smaller farmers depend on rain-fed agriculture, are risk averse and have less flexibility than large-scale farmers for diversifying into cash crops or vegetable cultivation.

Rice crops in Odisha – probable climate change impacts

- A 9% decrease in grain yield by 2020 due to accelerated senescence, higher chaff content and reduced elongation
- Higher infestations of swarming caterpillar, hispa, stem borer and bacterial leaf blight.

Building climate resilience in Odisha

In Odisha, there is inadequate clarity on how to build resilience against climate change. This applies to both the agriculture and allied government departments and the agrarian population.

For this reason, climate change planning has not been mainstreamed fully in Odisha. While measures are available, their adoption has been slow: it is an evolving process requiring the prioritisation of limited resources. Climate-resilient agricultural practices in Odisha could begin with simple adaptation strategies such as changes in sowing dates and the use of different crop varieties. In addition, improved crop management and better risk management through effective early warning weather information systems and innovative crop insurance policies, can reduce the vulnerability of rural communities. Such climate-resilient approaches can complement one another, ultimately benefiting farmers through higher incomes, better resilience and sustainable practices.

However, closing this 'adaptation gap' **requires a holistic effort, especially in building adaptive capacity across the value chain in order to address both climatic and non-climatic stressors together**. This process essentially involves building the capacities of policy makers (senior government bureaucrats) and enablers (agriculture extension officers) as well as that of implementers (farmers).

Current adaptation gaps – government officials

The agriculture department of the Government of Odisha has been implementing various schemes to improve agriculture and allied activities in the state. However, most of these schemes do not consider the effects of climate change in either the short term or the long term. But small changes focused on climate concerns in these existing schemes could make a huge difference in their successful implementation under climate stress. To help with this process, government officials in Odisha have outlined knowledge and implementation gaps that hinder their progress on building climate resilience in agriculture (see Figure 1).

Current adaptation gaps – farmers

The study showed that although farmers in Odisha are aware of changing climate patterns and immediate effects on their livelihoods, their knowledge on how to build climate resilience is lacking.

In most cases, farmers equate climate change with disasters and are unaware of the other subtler, but nevertheless adverse, effects of climate change. Although farmers cultivate different crops during both *kharif* and *rabi*, they are unequipped for maintaining reasonable production levels during times of climatic stress. Natural calamities, severe pest attacks and loan burdens are the main reasons for farmers moving out of agriculture. Farmers also have inadequate access to climate-resilient crop varieties and have poor knowledge about new technologies.

To help address this situation, farmers have outlined knowledge and implementation gaps that hinder their ability to take up climate-resilient agricultural practices (see Figure 2).

Figure 1: Knowledge and implementation gaps relating to climate-resilient agriculture, as identified by government officials in Odisha

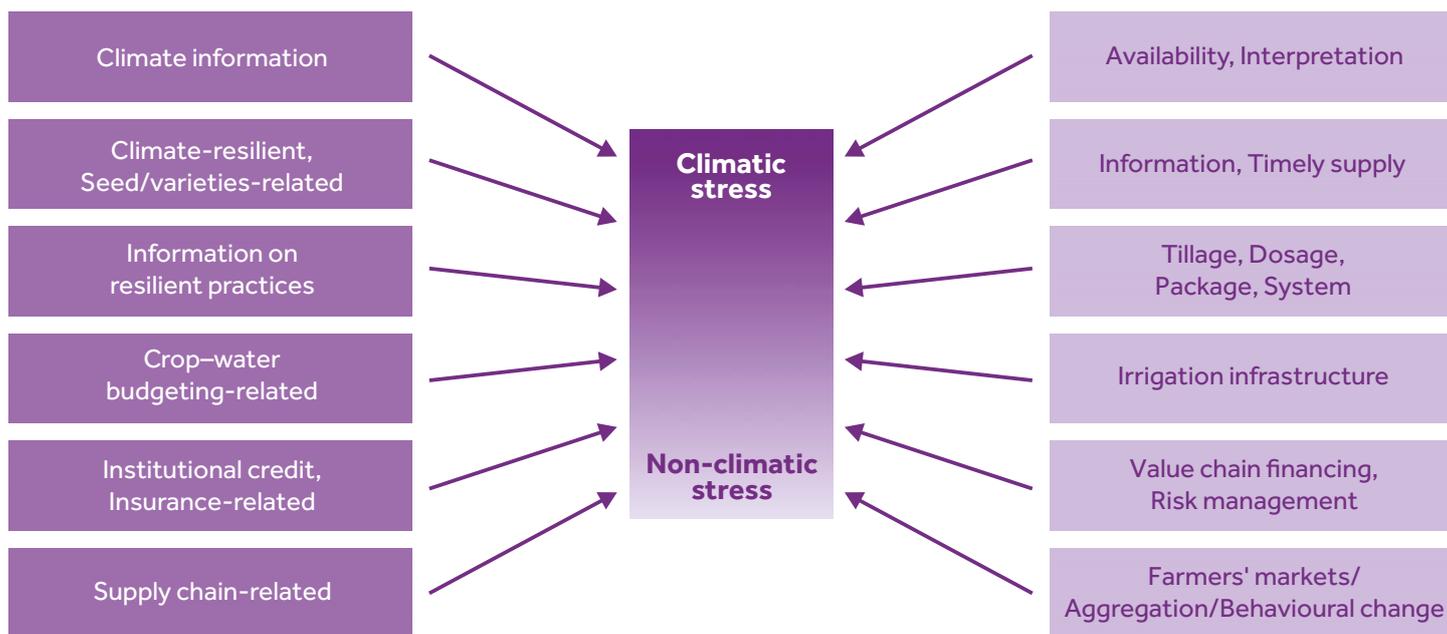
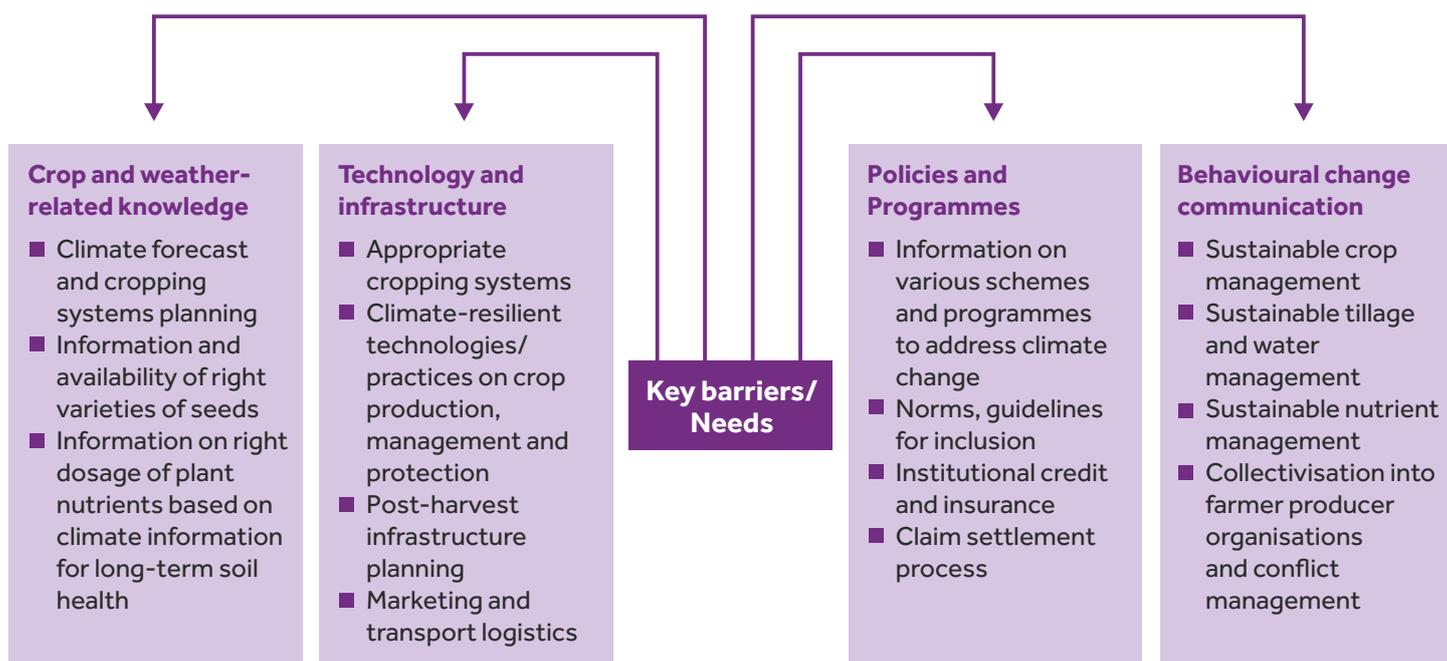


Figure 2: Knowledge and implementation gaps relating to climate-resilient agriculture, as identified by farmers in Odisha



Conclusions

Climate-resilient agriculture offers some unique opportunities for tackling food security and alleviating poverty. However, government officials and farmers in Odisha both recognise that capacity building is required to enable them to adopt climate-resilient practices.

It is interesting to note that even though the gaps in capacity for both government officials and farmers revolve around certain common themes, specific requirements within those themes are quite different. For example, the officials cited difficulty in accessing relevant climate-related information,

and their inability to properly interpret information and disseminate this to farmers in a simple way. On the same theme, the farmers expressed a need for specific action points based on weather information provided by government and awareness on specific adaptive technologies.

More importantly, the requirements of policy makers (i.e., the topmost and mid-senior level in government) and the enablers (ground level and extension workers) are totally different. So, while the top level officials are more interested in adaptive techniques and incentive schemes, the lower level

extension workers grapple with the problem of raising farmer awareness and encouraging farmers to adopt climate-resilient techniques in a sustainable way.

By contrast, most farmers, though limited in knowledge, tend to have a similar understanding of climate-resilient cropping practices. Generally, they take up climate-adaptive practices either based on past experience or on a trial basis. Systematic training on these aspects is a requirement for the farmers, which means that measures tend to be part of a short-term contingency plan rather than a more effective and sustainable long-term strategy like changing cropping systems and technology use, developing post-harvest infrastructure, improving soil health-based nutrition, and preventing plant infections by managing pests that act as vectors for disease.

"It is imperative for government officials to move away from a perspective of disaster management and towards long-term planning."

Aside from these agricultural shortcomings in Odisha, it should be noted that some of the gaps identified are being addressed by the state government. Corrective measures include e-pest surveillance, promotion of farmer producer organisations, water management using *pani panchayats* (collective groups of farms managing a common water supply), training on the 'system of rice intensification', which uses improved soil and irrigation methods, and line transplanting. However, these measures are discreet initiatives taken up on an *ad hoc* basis, whereas what farmers really need is advice on what to do in real life scenarios.

In particular, it is important to prepare farmers for future vulnerability. To do this requires measures like adapting cropping systems to cope with changes in climate, implementing a soil reclamation plan, building storage infrastructure, and providing transport chain and warehouse linkages. In other words, it requires addressing climate change concerns at each and every stage of the agriculture value chain, and therefore also greater awareness of this chain on the part of government.

In addition, training modules should be developed for farmers and officials and delivered in the mode of 'training the trainer'. At the farmer level, lead farmers could be selected as master trainers who then train the next group of stakeholders. Training modules should also be integrated into the regular training programmes of the state, and include training on climate-resilient practices and agricultural planning relevant to Odisha.

"Hubs can demonstrate how climate-resilient research relates to the value chains of selected crops."

At the government level, although training is provided to district level officials, this has not been sensitised for climate change. Only disaster management training includes a section on climate events. Hence, the orientation of government officials towards climate change has always been from the viewpoint of disasters, completely ignoring the value chain and planning perspective. It is imperative for government officials to move away from this perspective of disaster management towards long-term planning.

At each level of government, long-term planning requirements are different; the needs of these different levels should be analysed to ensure that knowledge percolates to the ground level. All the field workers, technicians and officials who are directly involved with farmers need to be familiar with climate-resilient agricultural practices. All block- and district-level officials should also be involved in the process. In addition, officials should be able to network with research institutions and climate change agencies through knowledge-based district hubs. These hubs could demonstrate how climate-resilient research relates to the value chains of selected crops and thereby promote better uptake.



ACT Policy Briefs provide an overview and some background on a climate change issue that needs to be addressed. They identify the issues and present possible recommendations, along with a conclusion. More information on climate change issues can be found on the ACT website: www.actiononclimate.today

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