Climate Change and Agriculture: Moving Towards Resilience for Small Holder Producers

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Introduction

Agriculture is an important sector in India’s economy accounting for 14% of the nation’s GDP and 11% of its exports\(^1\). According to the National Rainfed Area Authority, almost 46% of India’s geographical area is under agriculture. Rainfed areas constitute 55 per cent of the net sown area of the country\(^2\).

Agriculture is heavily monsoon dependent. Any variation in the climatic conditions significantly affects agriculture production and subsequently increases farmers’ vulnerability. With over 60 percent of Indian agriculture being rain-fed and more than 80 percent of farmers being small-holder producers\(^3\), the need for a climate smart approach to agriculture is critical. Adaptation measures must not only build the response capacity of small-holder producers, but crucially maintain the resilience of the ecosystem from which they derive a living.

This policy brief is an outcome of the project “Promotion of Climate Change Adaptation in Semi-arid and Rainfed Regions of Maharashtra, Madhya Pradesh, Telangana and Andhra Pradesh” supported by the SDC and NABARD. Lessons drawn are from the experiences in the states of Maharashtra, Telangana and Madhya Pradesh.

In focus

- Watershed Development Programmes being implemented across the country, on a large scale, form an excellent base to integrate climate resilient agriculture practices.

- To better equip farmers to respond appropriately to climate variations and minimise risks, installation of local automated weather stations within a cluster of villages is necessary. Based on the weather parameters, localized crop-specific agro-advisories should be communicated to farmers and villages.

- Contingent Crop Plans specific to the agro-climatic subzone, would help farmers to select suitable crops along with the appropriate management practices to minimise potential losses.

- Low external input sustainable agriculture methods (such as System of Crop Intensification) that enhance soil health, while increasing crop productivity are essential.

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2. NRAA.2012, Prioritization of Rainfed Areas in India, Study Report 4, NRAA, New Delhi, India.
Key Issues

In the recent past, a shift has been observed from low input food crops to market driven high external input cash crops. However, with unanticipated climatic variations, farmers are prone to an increasing risk of crop losses.

In this regard, the purpose of weather-based advisories is to reduce the risks that confront farmers and to provide them information to take timely decisions and prevent/reduce potential losses. The present advisories provided by the India Meteorological Department (IMD) are at district level. However, since agriculture is highly dependent on local meteorological conditions, the advisories must be tailored to address local conditions. Even within the same village, different crops are grown. Hence, it is essential to provide farmers with advisories specific to their farm conditions and the crops grown. There is need to downscale weather forecasts to the cluster level and crop advisories to the farm level (crop, locale and situation specific).

The current contingent crop plans being provided by the agriculture universities are at district level. However, cropping patterns and agricultural practices vary even within a block. Hence, it is essential that crop plans be prepared at the block level, taking into consideration the local geographic and climatic conditions.

At present, the various components of climate smart agriculture are being implemented as independent and stand-alone activities. These however, should be treated as a package of practices that include locale-specific crop advisories, contingent crop planning, promotion of low external input technology, water budgeting and livelihood diversification.

An Approach towards Climate Smart (Resilient) Agriculture

Climate resilient agriculture does not necessarily mean inventing/adopting new methodologies. It is about applying appropriate strategies/approaches that address climate change. WOTR has implemented a set of interventions that builds the adaptive capacity of farmers. These climate change and adaptation concerns are integrated into the wider framework of watershed development projects being implemented by WOTR.

Locale-specific Crop Weather Advisories

WOTR has installed a network of 72 Automated Weather Stations (AWS) in its project villages in Maharashtra, Madhya Pradesh (MP), Telangana and Andhra Pradesh (AP). Weather data from most of these stations are sent to the IMD, which in turn generates 3 day weather forecasts for these areas. Information on unseasonal

Facts

A few observations from WOTR project villages:

• In Maharashtra’s Akole block of Ahmednagar district, in February 2012, small ice crystals gripped the tender crop leaves resulting in losses of summer millet, maize, beans and groundnut.

• In Amangal block of Mahabubnagar district, Andhra Pradesh, the drought of 2011 and 2012 majorly impacted dual-purpose crops such as maize.

• In January 2011, a continuous frost of 3-4 days resulted in chickpea and wheat crop losses in Mandla district of Madhya Pradesh.

• A 272 mm rain on 4th December 2010 in Darewadi village of Maharashtra led to re-sowing of rabi crop and poor quality wheat harvest.
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This helps alert farmers on any likely problems that may arise for crop management.

Based on the weather forecasts, crop advisories prepared by WOTR with the support from the State Agriculture University (Mahatma Phule Krishi Vidyapeeth) and Central Research Institute for Dryland Agriculture (CRIDA) are disseminated through multiple channels. Advisories are farmer, crop and locale specific. They include information on appropriate nutrient, pest and diseases, irrigation and soil health management practices.

Contingency Crop Planning

Contingency Crop Plans (CCPs) help farmers cope with different weather events (delayed onset of monsoons, drought, dry spells, heat waves, floods etc.) by providing various crop management options that help reduce risk, mitigate losses and secure crop production. CCPs help farmers prepare for the challenges of weather aberrations and build a measure of resilience to nature’s vagaries.

WOTR has prepared a Contingency Crop Plan for the Sangamner block of Ahmednagar district. The crop plan for the kharif season provides alternatives for delay in the onset of the monsoon (by 2 weeks, 4 weeks, 6 weeks and 8 weeks); early withdrawal of monsoons, dry spells of more than 2 weeks and unseasonal rainfall during harvesting. Accordingly, farmers are provided appropriate advice on crop selection and management practices.

Promotion of low external input technology

Low external input sustainable agriculture is a crop production methodology that enhances productivity, uses inputs more efficiently, while maintaining the resource base. The System of Crop Intensification (SCI) is one such methodology with a four pronged approach that involves soil preparation and management, crop spacing, systematic application of locally available organic inputs supported by micro-nutrient foliar spray and basal applications. SCI is derived from the now successful System of Rice Intensification (SRI) and has been adapted to various crops. WOTR's SCI experiences with various crops namely maize, groundnut, sunflower, turmeric, wheat and a variety of vegetables have shown increased agricultural productivity, while reducing the cost of production.

These practices are further strengthened by exposing farmers to water budgeting, diversification for livelihood security and by conserving and promoting indigenous crop varieties.

Promotion of organic agriculture on field

Key Recommendations

- Increasing the density of weather stations within a sub-agro climatic region would help generate more accurate location specific advisories.
- Weather forecast should be downscaled to the block and eventually cluster level.
- Apart from routine advisories, unusual events like irregular rainfall and cold waves need to be communicated in advance to farmers so that they take timely precautions and prevent potential losses.
- Crop advisories should be farmer, crop and locale-specific. This would require the development of highly localized Crop Weather Calendars and acquisition of updated farm level information.
- Contingent Crops Plans need to be prepared for the block level taking into account local conditions and natural resources.
- In order to make agriculture climate resilient, sustained/campaigns and programs involving all key stakeholders (across sectors and scale) should be launched that promote nature friendly practices, improves soil health and increase the use efficiency of water.
- The various components of climate smart agriculture need to be integrated within the existing National Watershed Development Programmes such as the IWMP and the WDP of NABARD.
About Watershed Organisation Trust, (WOTR)

Watershed Organisation Trust, (WOTR) is a non-profit organisation that engages at the intersection of practice, knowledge and policy across scales, sectors, institutions and communities. Its main area of focus is participatory and integrated eco-systems based management and adaptation to climate risks. The lessons drawn are from projects funded by the Swiss Agency for Development and Cooperation (SDC), NABARD, the Governments of Andhra Pradesh and Telangana (through the Integrated Watershed Development Program) and other donors.

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