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## Projecting the future: What will climate change mean to farmers in Zimbabwe?



Small group discussions on targeting appropriate stakeholders with AgMIP research messages and providing visualizations useful for decision making. *Photo: Glory Media*

While adaptation to climate change brings benefits in terms of reducing vulnerability, it does not always translate into substantial monetary gains. Key messages such as this were shared at a workshop organized as part of the Agricultural Model Inter-comparison and Improvement Project (AgMIP) in Zimbabwe.

According to Mr Dumisani Nyoni, Provincial Agricultural Extension Officer, Department of Agricultural Technical and Extension Services, "In Zimbabwe, close to 80% of the population sustains its livelihood from rainfed agriculture, and we have been witnessing an increase in the number of mid-season dry spells, shortening of seasons, increase in crop failure rates and in the number of droughts as well, resulting in complete crop failures and livestock losses." In order to come up with appropriate options for the farmers, there is a need to understand the science of prediction and be aware of concrete adaptation packages. This will help develop feasible options to enable farmers cope

with climate change.

The project brings together a number of models for crop, livestock, climate and economics to generate more realistic projected impacts of climate change on agriculture, in countries across Africa and Asia. "AgMIP is dedicated to building the capacity of researchers and institutions to project how climate change will affect agricultural productivity and farmer livelihoods around the world," said Dr Cynthia Rosenzweig, Co-Principal Investigator, AgMIP.

In his inaugural address, Dr Kizito Mazvimavi, ICRISAT- Zimbabwe Country Representative, said, "AgMIP is an important initiative that places research at the priorities of national and local specific interests. We know that partners in Zimbabwe and other countries are very receptive of this type of work, as it promises to contribute to evidence-based decision making at continent, region, country and local levels by generating more relevant and robust projections of climate impacts on agricultural systems."

## Key findings of AgMIP Phase 1

### Sub-Saharan Africa

**Climate:** Temperature increases are projected to affect agricultural production with regional precipitation changes exacerbating risk in some regions (particularly the western Sahel and southern Africa), and alleviating detrimental outcomes in others (eastern Sahel and northern portions of eastern Africa).

**Impact:** Climate changes lead to reduced incomes and increased poverty in many study regions of sub-Saharan Africa, although others are positively affected by increased carbon dioxide concentrations and wetter conditions. Impacts are varied even within a given region, as different farming systems and household types demonstrate yield and income changes of different magnitudes and even signs. Livestock in Zimbabwe and Botswana projected to benefit from increased forage and grassland production.

**Adaptation:** Adaptation packages including varieties targeted for warmer climates, shifted planting dates, and irrigation improvements can reduce the negative impacts of climate change.

### South Asia

**Climate:** Projected intensification of the South Asian monsoon provides an increased supply of rainfall, however agriculture is detrimentally impacted by temperature changes across the region.

**Impact:** Climate changes lead to reduced incomes and increased poverty in most study regions of South Asia, although some farm systems and household types are more affected than others.

**Adaptation:** Identified adaptation packages designed to take advantage of warmer and wetter mean conditions can raise yields and income levels.

At the field day, scientists visited Dibangombe Ranch that promotes holistic climate smart agricultural practices. Welcoming the visitors, Mr Bishop Matata, acting Chief Mvuthu, emphasized the need to adapt agricultural practices to overcome the hazards of changing climate. He shared his adaptation approach, wherein he has diversified his farm from a maize dominant cropping to a mix, with sorghum for food security, groundnut for cash income and livestock feed. As groundnut seed is not available locally, he buys seeds from the neighboring country, Zambia. He incurs huge expenditure on commercial feed to sustain his cattle over the dry season. He prefers growing drought tolerant dual-purpose crop varieties, so as to obtain forage and save money spent on purchase of feed. He emphasized the need for improved seed and better crop-livestock integration,

which could involve new partnerships with research organizations such as ICRISAT.



Participants set up crop and livestock models to assess climate change impacts and adaptation options for smallholder farms. Photo: Glory Media

**Donor:** UK aid, USDA

**CGIAR Research Program:** [Climate Change, Agriculture and Food Security \(CCAFS\)](#)

**Partners:** USAID, Bill & Melinda Gates Foundation, The International Life Sciences Institute/The Center for Integrated Modeling of Sustainable Agriculture & Nutrition Security, Monsanto, University of Florida, National Oceanic and Atmospheric Administration, iPlant, and Columbia University/Earth Institute. For complete list of partners <http://www.agmip.org/support-and-partners/>

The AgMIP Regional Fundamentals workshop was designed to link the lessons from Phase I to new research that will be conducted in Phase II. During the workshop, participants gained insights in trans-disciplinary modeling skills. They also had the opportunity to work with their regional teams and stakeholder liaisons to develop workplans and research questions that will be answered in Phase II. The workshop was designed to encourage teams to think about communicating messages and developing innovative ways to discuss their research results and project implications with their national partners.

AgMIP stakeholders, representing the Department of Climate Change, University of Zimbabwe, Agricultural Extension, UNDP/GEF, Econet telecommunications, farmers as well as representatives of the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN) interacted with AgMIP scientists.

The workshop was held at Victoria Falls, Zimbabwe, during 24-30 June. Over 80 participants from 24 countries participated in the workshop.

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## Fortnightly column Village Dynamics Insights

### Flexibility for profit in Gujarat

While farmers in Gujarat are opting to grow high-value spices such as cumin and coriander, tribal farmers are taking up seasonal off-farm work to increase their income.

These trends were observed across 160 households in Karmadichingatiya and Makhiyala villages in Junagadh district, and Babrol and Chatha villages in tribal Panchmahal district.

Gujarat has a population of 60 million, with more than half living in rural areas, and 3.4 million from the tribal groups. With much of the state falling in the arid or semi-arid region,

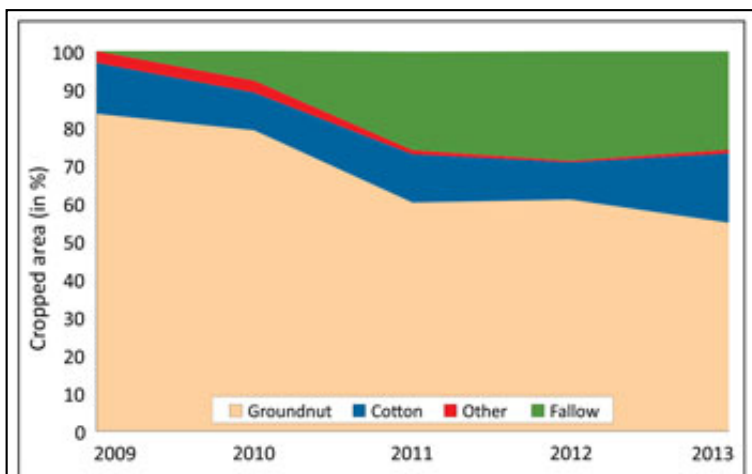


Figure 1. Cropping pattern in Junagadh villages.

irrigation has expanded from 3.3 m ha to 5.3 m ha between 2009 and 2013, with an additional 0.2 m ha under micro-irrigation. Agricultural production grew 11.1% annually from 2001 to 2011-12, led by cotton, wheat, fruit crops and dairy.

### VDSA insights

In the two villages of Junagadh, the average farm size is 1.58 ha. In 2013-14, half the farmers grew coriander and cumin in the postrainy season rather than cotton and other crops, making a profit of ` 100,000-125,000 per ha (US\$ 1,666-2,083 per ha) from cumin. They have reduced the area under groundnut, coarse grains and pulses (Figure 1). Land is increasingly left fallow due to scarce labor, water-logging or scanty rainfall.



Farmer inspects his cotton crop in Makhiyala village of Junagadh district. Photo: D Rajesh, ICRISAT

In the two Panchmahal villages, where 80% of sample households are tribals, the average farm size is 1 ha. The cropping pattern is more stable and staple crops such as maize and paddy dominate. Crop productivity in these two villages was 30% lower than in Junagadh district in 2012-13, with a greater emphasis on livestock production in the tribal villages.

Farmers in both districts are switching from animal power to machine power for ploughing. In 2013 about 83% of farmers in the tribal areas used tractors to prepare land in the *rabi* (postrainy) season, up from about 58% in 2009.

Only 10% of farmers used bullocks for ploughing in 2013, down from 40% in 2009.

### Income trends

In Panchmahal district, between 2009 and 2013, households with medium-large farms doubled their off-farm income as men took up seasonal work, such as in construction, and women did more farm work (Figure 2). Income from livestock was down in 2013.

In Junagadh district, families with medium-large farms rely more heavily on cropping income, earning only about 20% of their income from off-farm activities in 2013. Unlike other areas, average wages are similar for men and women, although they are higher in Junagadh (` 160-180 per day) compared to Panchmahal (` 110 per day).

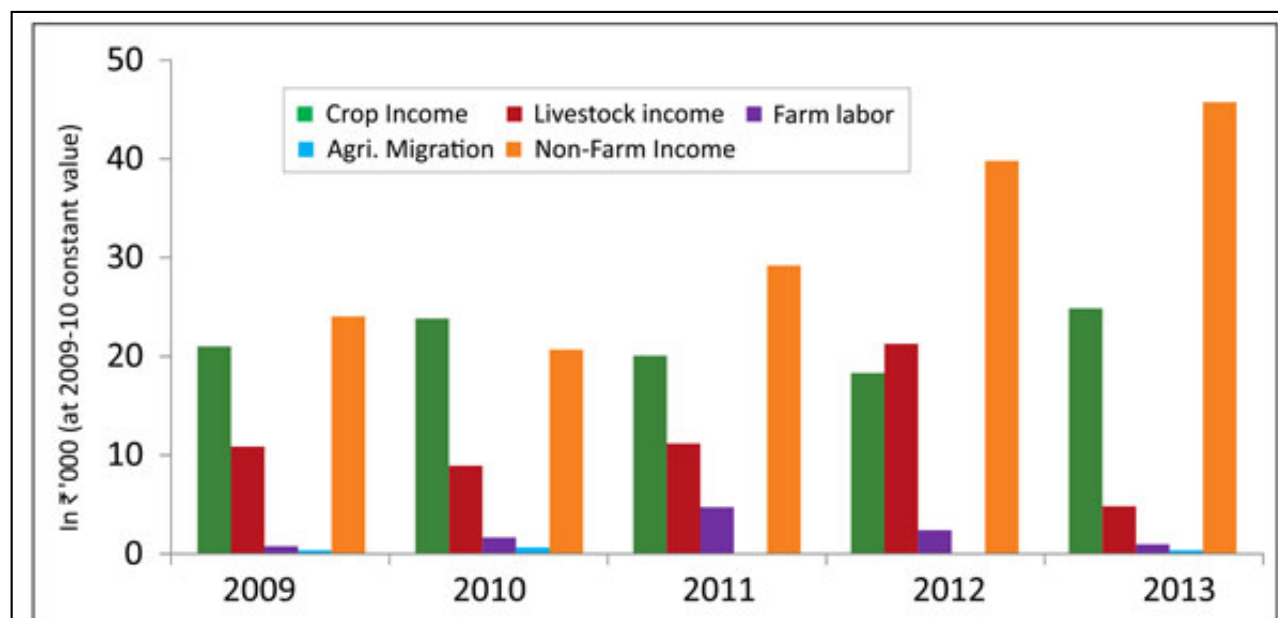


Figure 2. Household income of large and medium farmers in Panchmahal villages. Photo: ICRISAT



**Project:**  
Village Dynamics  
in South Asia

This work is  
now incorporated  
as part of the



RESEARCH PROGRAM ON  
Policies,  
Institutions  
and Markets

**Investor:**  
Bill & Melinda  
Gates Foundation

**Partners:**  
IRRI & Socio-Consult, Bangladesh,  
ICAR-RCER, IIWM, NIAP and ICRISAT, India

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## Strengthening capacity on resilience

A training session to build the capacity of partner agencies on resilience related issues was organized by World Food Program (WFP) in partnership with ICRISAT.

The training covered topics such as, agricultural production technologies, soil and water management options, agriculture and nutrition linkages, supporting farm organizations, domestic energy saving options, processing cereal grains for increased mineral content, seed production, variety testing and general principles of farm-managed experimentation.

The methodology followed was participatory and included watching videos. Participants felt that the video approach greatly facilitated their understanding of the topics, and this would make the training of farmer groups much easier. They received a copy of the video series 'Fighting Striga', and were registered on the agriculture website, so as to receive information on new video releases.



A working group watches a video to develop learning around the core technology presented in it.  
Photo: O Traore, ICRISAT

The agriculture and nutrition sessions of the workshop were facilitated by ICRISAT scientists, while other sessions were facilitated by WFP.

The training program was inaugurated by Dr Ramadjita Tabo, Regional Director, ICRISAT-Mali, accompanied by Dr Moustapha Amadou, WFP Resilience project, Dr Modibo Coulibaly, in-charge for nutrition issues at the Ministry of Agriculture, and Dr Eva Weltzien, Principal Scientist - Sorghum Breeding and Genetic Resources, ICRISAT-Mali.

The training was held from 23-25 June, at Samanko. Thirty participants from local NGOs and agricultural extension officers from different districts in Mali (Nara, Bandiagara, Koro, Nioro, San Kita, Yelimani, Tominian, Bla, Kolokani, Diema and Bamako) attended the training.

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## Call for Papers

The National Bank for Agriculture and Rural Development and International Food Policy Research Institute, New Delhi, invite papers on the following broad themes:

- Re-visiting the provisions under model APMC Act 2003 and identifying factors hindering the growth of agricultural markets in India
- Structure and regulatory framework for the proposed National Common Agricultural Market
- Critical gaps in storages/warehouses in India and implementable models to bridge the gaps
- Institutional support required to integrate small farmers to a given agri-commodity value chain
- Ways to co-integrate issues of finance into the value chain framework to improve efficiency

Papers will be presented at the 'National Seminar on Financing of Agriculture Value Chains: Challenges and Opportunities' at BIRD, Lucknow on 27-28 November, 2015.

Last Date for Submission: **31 September 2015**

Submit papers to: [nabard.valuechain@gmail.com](mailto:nabard.valuechain@gmail.com)

For more details: [www.nabard.org](http://www.nabard.org)

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## New publications

### **Groundwater Extraction for Use Efficiency in Crop Production under Different Water Market Regimes: A Case Study of Uttar Pradesh State (India)**

**Authors:** SK Srivastava and Ranjit Kumar

**Published:** 2015. Pages 125–139 *in* Water Management in Agriculture, (MS Meena, KM Singh and BP Bhatt, eds.). Jaya Publishing House, New Delhi.

**Abstract:** The present study is an attempt to examine the groundwater extraction and water use efficiency under different water market regimes (buyer, self-user, self-user + buyer and self-user + seller) in Central Plain Zone (CPZ) of Uttar Pradesh, which has well developed water market and water-intensive cropping pattern. <http://oar.icrisat.org/8772/>

### **Economic Growth and Rural Transformation in Eastern India: Strategies for Inclusive Growth**

**Authors:** Ranjit Kumar, Uttam Deb, Cynthia Bantilan, N Nagaraj and M Bhattarai

**Published:** 2015. Indian Journal of Economics and Development, Volume 11(3):779-797. Society of Economics and Development, PAU, Ludhiana

**Abstract:** This paper delves into multiple dimensions of rural transformation with focus on selected eastern states of India. Considering the very small landholding of the farmers and thereby negligible employment elasticity to agricultural growth, creation of non-agricultural opportunities, diversification, expanding rural non-farm employment are important strategies for managing vulnerabilities. <http://oar.icrisat.org/8774/>

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International Crops Research Institute for the Semi-Arid Tropics