RESEARCH PROGRAM ON Water, Land and Ecosystems

CGIAR

Evidences

Study #2796

Contributing Projects:

- P453 - New approaches to monitoring and managing floods and droughts in India

Part I: Public communications

Type: OICR: Outcome Impact Case Report

Status: On-going

Year: 2018

Title: Making the leap from drought monitoring to managing agricultural drought risks in India (WLE-IWMI)

Short outcome/impact statement:
The South Asia Drought Monitoring System (SADMS), created by the CGIAR Research Program on Water, Land and Ecosystems (WLE) and partners, provided real-time drought severity data at micro-level to three Indian districts. The crop yields and incomes in these areas were significantly higher than in the control areas. As a result, the Indian government and World Bank plan to scale out the model.

Outcome story for communications use:
Indian governments make the leap to drought relief for farmers using real-time data

Governments in India are using satellite data combined with ground measurements to assess and mitigate drought damage to crops. The data improved drought response in three districts and fed into development of 620 district level drought plans.

Throughout 2017-2018, the South Asia Drought Monitoring System (SADMS) provided an index that integrates rainfall data along with data on vegetation, soil moisture and temperature. Every eight days, the system publishes drought bulletins with detailed maps showing drought severity across Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka.

The index was applied to drought affected states across India, producing maps showing widespread agricultural drought across multiple states. SADMS supplied the periodic bulletins to authorities, along with briefings to Members of Parliament and state level Principal Secretaries, enabling them to better target and inform drought relief efforts.

In three Indian districts Kurnool (Andhra Pradesh), Amravati (Maharashtra) and Aurangabad (Maharashtra), SADMS provided real-time drought severity data along with briefings to high-level officials, farmer groups and agricultural extension officers. At the village level, the project helped implement real-time contingency planning capacity measures including attaining drought tolerant seed varieties, supplementary irrigation, rainwater harvesting, and spraying of Potassium Nitrate to enhance drought stress.

As a result, the crop yields and incomes in these areas were significantly higher than in the control areas, indicating the vital role the approach can play in food and livelihood security.

Over one billion people in South Asia depend on agriculture related livelihoods – most of them poor and vulnerable to drought impacts. With incidents of serious drought on the rise partly due changing weather patterns, governments need to improve their response, including by providing faster and better targeted relief, staple grains and monetary support.

But for local and national authorities to implement such measures and avoid major food or social disruptions, they need to know the extent and nature of damage. SADMS provides this data as part of wider WLE efforts to enhance the resilience of agriculture in the face of natural resource-related risks – including through data and digital technology.

In 2019, the concept will be scaled-up in other drought prone regions, particularly in Karnataka. Further, we understand the World Bank has decided to use the SADMS approach for a new drought insurance project in Asia and Africa. Other scaling efforts are underway to bring this solution to Southern Africa, the Middle East and Southeast Asia.

Photo 1: https://www.flickr.com/photos/iwmi/15231377177/ Dried up field in India. Hamish John Appleby/IWMI (no consent necessary)
Photo 2: https://www.flickr.com/photos/iwmi/15417919735/ A pump sits next to an empty crop field. Hamish John Appleby/IWMI (no consent on file)

Options for satellite images available on the drought monitoring website http://dms.iwmi.org/

For related links please see “Communications Materials” in the field below. For a version of this story with embedded links, please contact WLE: a.hunt@cgiar.org

Links to any communications materials relating to this outcome:

- https://tinyurl.com/y3amzfkh
- http://www.iwmi.cgiar.org/resources/drought-monitoring-system/drought-bulletin/
- http://dms.iwmi.org
- https://wle.cgiar.org/thrive/2018/12/12/can-resilience-go-digital
- https://tinyurl.com/wgvwvks
- https://tinyurl.com/y2r4rkav
- https://wle.cgiar.org/topics/climate-and-resilience

Part II: CGIAR system level reporting

Link to Common Results Reporting Indicator of Policies : Yes

Policies contribution:

- 233 - Supported by WLE and CCAFS, the South Asia Drought Monitoring System is being used by the Indian government to make cropping recommendations to farmers, target drought relief efforts and develop district contingency plans (https://tinyurl.com/2fjkfljy)

Stage of maturity of change reported: Stage 1

Links to the Strategic Results Framework:

Sub-IDOs:

- Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)
- Enhanced adaptive capacity to climate risks (More sustainably managed agro-ecosystems)

Is this OICR linked to some SRF 2022/2030 target?: Yes

SRF 2022/2030 targets:

- # of people, of which 50% are women, assisted to exit poverty

Description of activity / study: <Not Defined>

Geographic scope:

- National

Country(ies):

- India

Comments: <Not Defined>

Key Contributors:

Contributing CRPs/Platforms:

- WLE - Water, Land and Ecosystems
- CCAFS - Climate Change, Agriculture and Food Security

Contributing Flagships:

- F4: Managing Resource Variability, Risks and Competing Uses for Increased Resilience (VCR)

Contributing Regional programs: <Not Defined>

Contributing external partners:

- MoA - Ministry of Agriculture (India)
- ICAR - Indian Council of Agricultural Research
- USAID - U.S. Agency for International Development

CGIAR innovation(s) or findings that have resulted in this outcome or impact:

With WLE and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) support, the International Water Management Institute (IWMI) and other partners created the South Asia Drought Monitoring System (SADMS, http://dms.iwmi.org/) and developed new algorithms and satellite-based methods for measuring the severity of drought in real time (1-4). They have tested and improved the approach over time, and it is now being rolled out as a practical tool for providing advice to farmers in South Asia on the likelihood of drought and ways to maintain agricultural production.

Innovations: <Not Defined>

Elaboration of Outcome/Impact Statement:
The South Asia Drought Monitoring System (SADMS, http://dms.iwmi.org/), created by WLE/IWMI in conjunction with CCAFS, has developed an innovative multi-criteria drought severity index that integrates a range of remote sensing data to move beyond simply determining rainfall deficit. By incorporating the condition of vegetation, soil moisture and temperature, the index is designed to better determine the impact of drought on agriculture (1-4). In 2017 and 2018, we applied the SADMS framework to drought affected states across India and produced maps showing widespread agricultural drought across multiple states. Periodic drought bulletins were shared with drought and water resources authorities and various officials. Briefings on the state of drought in different districts were provided to Members of Parliament and State level Principal Secretaries. They used the information to better target and inform drought relief efforts (5-9).

In 2017 and 2018, the Indian Council of Agricultural Research (ICAR) and WLE/IWMI provided real-time information to support implementation of agricultural contingency plans to cope with weather aberrations in two southern States. The Ministry of Agriculture prepared more than 620 district level agricultural plans (http://agricoop.nic.in/agriculture-contingency-plan-listing) with detailed micro-level contingency measures for sustaining agriculture production.. The three main steps adopted in three districts i.e. Kurnool (Andhra Pradesh), Amravati (Maharashtra) and Aurangabad (Maharashtra) are as follows:
● State level consultation with high-level officials to brief them on drought conditions and identify partners including farmer groups, agricultural extension officer line departments, district officials to implement real-time contingencies.
● Dissemination of science-based knowledge products, i.e. drought forecasts with a 16-day lead time.
● Close coordination at the village level to implement real-time contingency planning capacity (RTCP) measures including drought tolerant seed varieties, supplementary irrigation, rainwater harvesting, and spraying of Potassium Nitrate to enhance drought stress.

A comparison of yields with and without RTCP demonstrated significantly higher yields and financial returns in the RTCP areas. In 2019, the concept and framework will be scaled-up in other drought prone regions, particularly by the Karnataka State Natural Disaster Monitoring Centre (3). Further, we understand the World Bank has decided to use the SADMS approach for a new drought insurance project in Asia and Africa. Other donors are expanding the program to the Middle East, Thailand and Sri Lanka.

References cited:

Evidence:
1. Amarnath G.; Clarke J. 2016. Drought monitoring system helps strengthen resiliency to climate change. World Water 39(1): Jan/Feb Issues 14-15. https://cgspace.cgiar.org/handle/10568/78189.
2. Amarnath, G.; Alahacoon, N.; Pani, P.; Chockalingam, J.; Mondal, S.; Matheswaran, K.; Sikka, A.; Rao, K.V.; Smakhtin, V. 2019. Development of South Asia Drought Monitoring System. In Drought challenges: Livelihood implications in developing countries. Elsevier Publisher. 35 pages In Press (April 2019).
3. Amarnath, G.; Rao, K.V.; Alahacoon, N. 2019. Integrating satellite drought monitoring and information to support real-time implementation of agricultural contingency plans to mitigate drought risks in Southern India. Water Resource Management Journal. In Review
4. Amarnath G.; Alahacoon N.; Bhatpuria D. 2019. Monitoring spatio-temporal pattern of drought stress using integrated drought severity index over South Asia region, India. Natural Hazards Journal. In Review
5. http://www.iwmi.cgiar.org/resources/drought-monitoring-system/drought-bulletin/
6. http://agricoop.nic.in/sites/default/files/MH12%20-%20Amravati.pdf
7. http://agricoop.nic.in/sites/default/files/Maharashtra%2026-Aurangabad-3%201-12-2011.pdf
8. http://agricoop.nic.in/sites/default/files/AP7-%20Kurnool%2031.1.2011.pdf
Promotional material:
9. https://wle.cgiar.org/thrive/2018/01/22/surveying-soil-sky-can-satellites-predict-droughts-and-floods
10. http://epaper.dailynews.lk/PaperArticle.aspx?imageId=pg42_0&&ndate=2019/01/22
11. https://wle.cgiar.org/wle-iwmi-and-partners-amp-experts%E2%80%99-drought-preparedness-arsenal
12. https://wle.cgiar.org/getting-handle-drought-surveillance
13. https://impakter.com/can-resilience-go-digital/

Quantification: <Not Defined>

Gender, Youth, Capacity Development and Climate Change:
Gender relevance: 0 - Not Targeted
Youth relevance: 0 - Not Targeted
CapDev relevance: 2 - Principal
Main achievements with specific **CapDev** relevance: Indian Council of Agricultural Research (ICAR) joint workshop (March 14-14), 2018 Drought monitoring, planning and management: improving food security and resilience of the drought affected states in India
http://www.icar-crida.res.in/CRIDA/Annual%20Report/AR17-18.pdf

Regional workshop on building drought resilience in agriculture partnerships and outreach 4-8 Dec 2017
http://artsa.gistda.or.th/moving-from-drought-monitoring-system-to-management-2017/
https://wle.cgiar.org/wle-iwmi-and-partners-amp-experts%E2%80%99-drought-preparedness-arsenal

Climate Change relevance: 2 - Principal
Describe main achievements with specific **Climate Change** relevance: The incidence and severity of severe drought is likely to worsen as a result of the effects of climate change. This drought monitoring tool will become increasingly important to South Asian and other farmers.

Other cross-cutting dimensions: Yes

Other cross-cutting dimensions description: WLE/IWMI has developed a decentralized approach in which WLE and CCAFS partners manage their own data and data storage. Through the SADMS portal, WLE is working on aggregating and harvesting data from these existing data sources, using a simple and easily accessible system.
WLE/IWMI has been developing a data platform, meant to allow access through one portal, while sharing data across partner centers and the CGIAR platform. WLE has begun collecting metadata and datasets from researchers to populate the platform and will be aligning strategies with partners.
WLE/IWMI are promoting use of Google Earth Engine to operationalize drought products across partners and are available in near real-time including visualization tool and discussing the strategy with Big Data Platform.

Outcome Impact Case Report link: Study #2796

Contact person:
Giriraj Amarnath, IWMI Research Group Leader – Water Risks and Disasters (WRD); WLE-IWMI; a.giriraj@cgiar.org