

Remote sensing innovations for index insurance

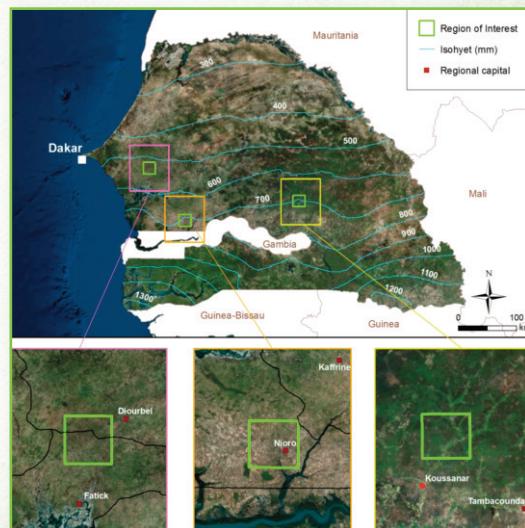
Improving agricultural risk management in sub-Saharan Africa

Natural disasters account for losses, on average, of US\$51 billion in developing countries every year, yet only a small minority of these losses are insured. Smallholder farmers are particularly exposed to the unpredictability of climate-related risks, e.g. drought and pests. These are difficult to tackle because they normally strike many farmers in the same area at the same time, making most risk management approaches or coping mechanisms unfeasible. Index insurance can offer a solution, helping to protect and encourage investment in smallholder agriculture and improve food security.

The project: an overview

- Duration: 2012-2016
- Goal: Contribute to sustainable approaches to index insurance that can help smallholders better manage their production risks.
- Objective: Develop remote sensing products for index insurance that can accurately depict yield loss in smallholder farming due to weather and/or other perils, and be scalable in insurance schemes delivered at micro and meso levels.

- Innovative remote sensing technologies are being tested in Senegal with lessons to be shared for application in the rest of the region and the entire insurance sector.
- A strong consortium of public and private sector partners working in remote sensing, insurance, agricultural development and research has been established.



The project focuses on different areas in Senegal. Its findings are intended for the whole insurance industry.

Data for index insurance: the challenges

- Indemnity insurance requires an insurer to make individual farm visits for pricing and loss assessment, which makes it inaccessible to smallholders. Index insurance captures trends in yield losses based on historical data, and uses contemporary data measurement to verify when a loss event occurs.
- The index is defined in advance of the season. All farmers within a given area receive the same policy, for the same price, and payouts are made when the index triggers, i.e. indicates losses have occurred due to drought or other risks.
- Index insurance requires historical and current weather and yield data to capture smallholder losses. But limited availability, quantity and poor quality of data on the ground are some of the main technical constraints preventing scale-up of index insurance.

PROJECT PARTNERS

MANAGEMENT AND COORDINATION

IFAD-World Food Programme (WFP) Weather Risk Management Facility (WRMF) in cooperation with technical experts in agricultural insurance and risk management.

REMOTE SENSING

VITO (technical coordinator), together with Environmental Analysis & Remote Sensing (EARS), Famine Early Warning Systems Network (FEWS NET), GeoVille, International Research Institute (IRI) for Climate and Society, ITC – University of Twente, and to Sarmap.

CROP MONITORING

The Senegal Agricultural Research Institute (ISRA) together with experts from the French Agricultural Research Centre for International Development (CIRAD) and the Regional Research Centre for Improving Adaptation to Drought (CERAAS).

PROJECT EVALUATION COMMITTEE

This includes, among others: Swiss Re and other reinsurance experts; space agencies NASA, European Space Agency, Italian Space Agency; other index insurance actors such as the Global Index Insurance Facility (GIIF), I4, PlaNet Guarantee; in-country experts from Centre de Suivi Ecologique (CSE), ISRA and CERAAS, as well as leading remote sensing experts from the Food and Agricultural Organization of the United Nations (FAO), the European Commission Joint Research Centre (JRC), WFP and the Technical University of Denmark.

Availability: lack of reliable weather stations and little or no yield data covering insured areas.

Quantity: long time series of yield and weather data often not available. Collecting new data on the ground is costly to maintain, e.g. investing in new weather stations requires long-term maintenance and would not solve all availability or quantity problems.

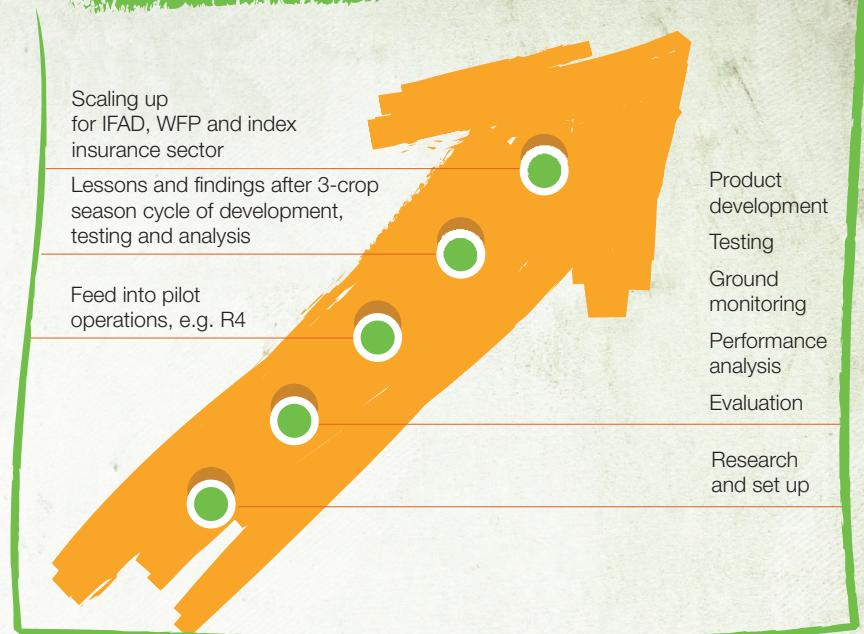
Quality: many existing stations unable to provide the right quality of data required to develop insurance indices, unreliable or patchy yield data.

- Remote sensing could help index insurance reach more smallholders. Currently there is a lack of reliable information on remote sensing for index insurance, including: different options and their possible combinations, what works best in which areas and for which types of crops, and how remote sensing solutions can be mainstreamed into index insurance.

How the project works

The project is filling a critical information gap and addressing a scaling up constraint for index insurance. Based on extensive research of the sector, the project is developing and testing seven innovative remote sensing technologies to improve index insurance product offerings. Each season, crop monitoring on the ground takes place in three identified Regions of Interest (ROIs) in Senegal to help analyse performance. This is also supplemented by official government yield statistics from 2002 until the present day. Evaluation assesses how these technologies can best be used for the sector. The project will introduce the most promising methodologies into active index insurance schemes such as the R4 Rural Resilience Initiative (a joint partnership between WFP and Oxfam America) and IFAD-supported projects and programmes, as well as disseminate lessons and findings to the rest of the sector.

THE PROJECT: MAIN STEPS



Innovative remote sensing technology for index insurance

The different technologies being developed and tested range from vegetation indices to rainfall estimates, soil moisture and evapotranspiration. These data sets are either directly integrated into index insurance structures or are first linked with ground observations such as yield or Start of Season information. Maps of homogenous crop areas and growth patterns based on optical and radar technology are also being developed.

If used in an insurance contract, some of these indices would pay out based on yield loss due to drought (input based – rainfall deficit), whilst others on yield loss caused by drought and other perils (output based – estimated yield deficit). Most of the indices are crop specific (for groundnut, millet and maize) and contracts designed by combining remote sensing information with ground data.

PARTNER	TYPE OF REMOTE SENSING PRODUCT/APPROACH	TYPE OF INDEX AND OTHER PRODUCTS
EARS	Relative evapotranspiration	Estimation of yield deficit
Geoville	Radar-based estimation of soil moisture Start of Season detection based on Soil Water Index	Start of rainy season as basis for an agricultural insurance product
FEWS NET	Actual evapotranspiration	Estimation of yield deficit
IRI	Rainfall estimates	Rainfall deficit
ITC	Vegetation indices (NDVI)	Estimation of yield deficit and crop mask
sarmap	Radar crop maps and Start of Season indicators	Agricultural mapping and detection of Start of Season at field level
VITO	Vegetation indices (fAPAR) Start of Season estimation based on rainfall estimates	Estimation of yield deficit

The IFAD-WFP Weather Risk Management Facility (WRMF) was established by the International Fund for Agricultural Development (IFAD) and the World Food Programme (WFP) in 2008. It supports initiatives aimed at reducing smallholders' vulnerability to climate-related production risks. The WRMF does so through research, technical assistance and capacity-building, and implementation of innovative risk management solutions such as agricultural index insurance. WRMF comprises specialists from IFAD's Inclusive Rural Financial Services team in the Policy and Technical Advisory Division and WFP's Climate Resilience team, as well as international experts with a wide experience in agricultural insurance and risk management.

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