INFOCUS:

INNOVATION & TECHNOLOGY

SUBJECT

The high transaction costs of serving low-income clients in developing and emerging market economies demand innovative approaches and technological advancements. Challenges that inflate operational costs include data collection, processing and management, premium payment mechanisms as well as claims verification and settlement. Index insurance products, mobile payment devices or more accurate weather and agricultural-yield information based on satellite data are examples of innovative approaches that can help to overcome these challenges.

Remote sensing can help provide a timely and accurate picture of crop growth and development as it can gather information over large areas with a high revisit frequency. Moreover, the availability of remote sensing data archives allows users to compare climate and vegetation over time and analyse trends.

Remotely sensed indices do not take a direct measurement on the ground. Instead, satellites collect different types of datasets based on specific biophysical dynamics, such as cloud temperature to estimate rainfall or vegetation greenness. These data are typically calibrated with some ground information to create indices. The index is designed to proxy yield loss based on the parameters used.

Some of the most widely used remotely sensed products for agricultural monitoring are rainfall estimates, soil moisture, evapotranspiration and vegetation indices. Each of these products provides indications on crop health and productivity, and they can aid in identifying crops affected by weather-related damage or by pests or diseases.

CHALLENGES

Limited availability, accessibility, quantity and poor quality of data on the ground are some of the primary technical constraints preventing scale-up and sustainability of index insurance. Without sufficient quality data, either it is impossible to design products for some areas and countries, or products that are designed can become unreliable, not compensating when they should. These inconsistencies intensify vulnerability, leading to distrust of insurance, and ultimately have an impact on demand. However, remotely sensed data are not yet being used to their full potential for index insurance.

One bottleneck is that there is a lack of reliable information on remote sensing for index insurance, including different methodology options and their possible combinations; what works best in which areas and for which types of crops. The potential opportunities for insurers to use remote sensing for improving and scaling up index insurance are significant. The project "Improving Agricultural Risk Management in Sub-Saharan Africa: Remote Sensing for Index Insurance" was designed to consider the specific challenges remote sensing involves for insurers. These challenges were as follows:

Technical complexity and access to expertise. Under *traditional indemnity* insurance, the insurer controls almost all aspects of underwriting and distribution, with only loss adjustment delegated to third parties. The introduction of *weather index insurance or area yield index insurance* means insurers need to develop new technical skills and to access specialists in index insurance design and agro-meteorology, when setting index parameters based on the analysis of weather data and agricultural production data.

Access to agricultural risk information and experts. Technical expertise is needed to ensure that the index product can be context-specific for the target clients. For example, access is needed to experts who understand agricultural risks, causes of loss, farming systems and crop varieties, as well as soil water balance. In comparing different methodologies of remote sensing, a factor of importance to the insurer is the extent of ground-truthing needed to calibrate the products in the areas that will be insured (and thus to design operational products). If strong local fieldwork is needed, this is a potential constraint and creates additional costs in implementation while limiting the speed of roll-out and the opportunity to scale up.

Basis risk. Insurance payouts that do not correspond to the true loss experienced by the farmer, and which were caused by perils intended to be covered by the policy, carry the danger of poor value to the client, client dissatisfaction, and reputational risk for the insurer and for all stakeholders. A key question, therefore, is how each remote sensing methodology "performs", in terms of both underpayment and overpayment against losses. An objective of the project has been to understand the extent of variation of crop yields at the level of the individual farmer, village and larger aggregated area. Similarly, understanding the causes of crop loss is extremely important in order to interpret the potential basis risk from different methodologies.

SOLUTIONS

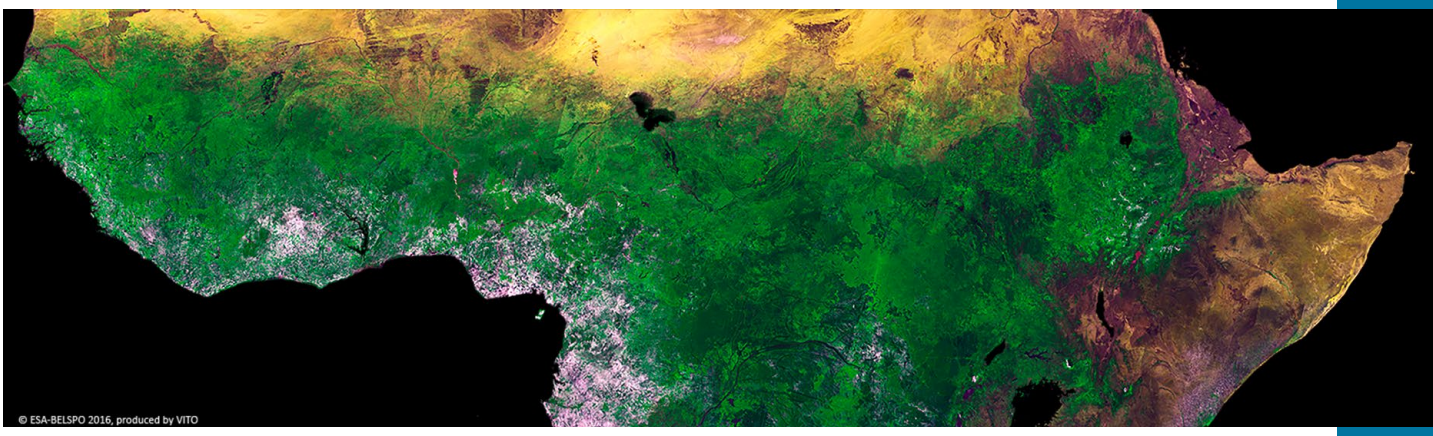
The project "Improving Agricultural Risk Management in Sub-Saharan Africa: Remote Sensing for Index Insurance" was designed to contribute to scalable and sustainable approaches to index insurance. More specifically, it assessed if and how remote sensing could be used for index insurance to benefit smallholder farmers.

Based on extensive research into the sector, the project developed and tested seven innovative remote sensing methodologies over two seasons in Senegal. These were evaluated to produce findings and recommendations on:

- the performance of the different indices in accurately depicting village-level yield loss due to weather and other perils (depending on the remote sensing approach); and
- the operational feasibility and implementation needs for mainstreaming remote sensing in index insurance operations

The project united a wide range of different actors who would not normally have collaborated. Their expertise spanned remote sensing, insurance and reinsurance, aid and development and agricultural research. Moreover, the project focused on end-users and their needs, considering the ways in which stakeholders might implement and maintain sustainable index insurance programmes that make use of remote sensing.

A multidisciplinary evaluation committee was tasked with assessing the technical and operational performance of the methodologies developed, and highlighting the opportunities and constraints of each methodology to better understand the feasibility of remote sensing for index insurance.



LESSONS LEARNED

The project found in order to further improve index insurance products based on remote sensing and scale-up, it is recommended that:

- Additional research and development activities be supported to further improve the potential of remote sensing for index insurance.
- Further investment be made in ground data collection protocols, capacity, and systems.
- Different remote sensing approaches, dedicated mapping tools, and ground level sources of data and information be combined to improve the quality of index insurance structures.
- Future initiatives focus on developing proper segmentation of the size of the insured area
- Schemes based on remotely sensed data be carefully planned for measures aimed at mitigating the occurrence of basis risk events (the potential mismatch between the payout and the losses incurred).
- Capacity be built of private and public remote sensing institutions in order to fill gaps in expertise currently available and ensure future sustainability

Name of programme:
Improving Agricultural Risk Management in Sub-Saharan Africa: Remote Sensing for Index Insurance

Duration:
2012 – 2017

Name of component activity:
Remote sensing; index insurance

Programme area:
Senegal; Global

Cooperation partners:
Agence Française de Développement, Belgian Federal Science Policy Office, International Fund for Agricultural Development (IFAD), World Food Programme (WFP), Flemish Institute for Technological Research (VITO)

Senegalese Institute for Agricultural Research (ISRA), International Cooperation Centre in Agricultural Research for Development (CIRAD), Regional Research Centre for Improving Adaptation to Drought (CERAAS), Centre de Suivi Ecologique (CSE)

Target group:
Poor people in rural areas relying on smallholder farming for food security and/or income

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Documentation:
www.ifad.org
https://www.ifad.org/documents/38714170/39144386/RemoteSensing_LongGuide_2017.pdf/f2d22adb-c3b0-4fe3-9cbb-c25054d756fe

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