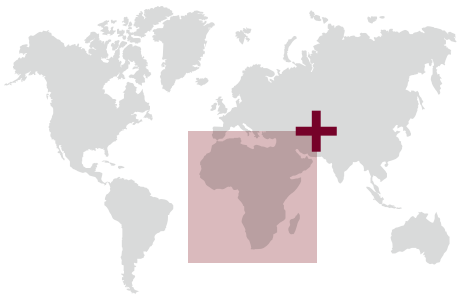
Using Satellites to Make Index Insurance Scalable



AT A GLANCE

Name
Using Satellites to Make Index Insurance Scalable

Duration
2012 – 2014

Focus area
Ethiopia

Target group
Index insurance programs for the benefit of low-income, rainfed subsistence farmers

Funds available
Confidential

The project is jointly implemented by …
the International Research Institute for Climate and Society (IRI) of the Columbia University and Oxfam America (OA) along with the Relief Society of Tigray (REST) for the Horn of Africa Risk Transfer for Adaptation (HARITA) initiative

The core objective is …
to understand where the index-based insurance is functioning well and where it must be improved to provide outputs potentially valuable for index insurance mechanisms, applications and reliable scalability.

IMPACT INSURANCE

ILO International Labour Organization

BACKGROUND

Low-income, rainfed subsistence farmers are amongst Ethiopia's most vulnerable segment of population, particularly when rainy seasons start late and end early. About 40% of the targeted 50,000 households are headed by women and about 60% are enrolled in the country's Productive Safety Net Project, a well-established social protection program that serves eight million low income people.

The lack of comprehensive rainfall and crop data is a key constraint in scaling insurance. Historical data is necessary to calculate the price of insurance, while current rainfall data is needed to verify claims. The conventional approach to develop weather insurance indices is to use field-based rain gauges. However, gauges are subject to tampering and current rain gauge coverage in many developing countries is sparse; installing new gauges is an expensive and time consuming process.

Satellites may provide a more viable and scalable solution to estimate rainfall. As satellites collect rainfall information automatically, they are difficult to tamper and data is available in almost real time.

Satellite rainfall data, however, requires validation to ensure the rainfall estimates match the actual rainfall measured through gauges. Satellite data is often validated through a manual process requiring multiple site visits, making the process expensive and time consuming, and thereby limiting scale. To overcome this challenge, this project proposes to use satellite images of the vegetation, reducing the requirement for physical validation in order to enable scale.

Challenges

Technology and index payout estimations: Three villages complained about the performance of the index. However, the concerns of two villages (Hawelti and Tsegea) were not primarily the result of error in satellite rainfall estimation. Instead, differences in the insurance packages offered between the villages and neighboring villages caused dissatisfaction among farmers. In the third village, it was found that the index needed to be improved. In parallel to the village visits, IRI flagged the areas of the map where there was the lowest level of agreement between EVI and the satellite rainfall index. The flagged areas included all of the sites with meaningful complaints in 2012, suggesting that EVI offers a useful validation tool. On the contrary, other sources of information, such as historical yield assessments and farmer interviews did not clearly flag concerns for those regions.

However, a problem which has been noticed with EVI is that it struggles to detect droughts during less extreme years, suggesting that it should not be used on its own. Vegetation satellite products do not perform as well at the beginning of the rainy season but alternative rainfall satellite products offer valuable validation tools. This suggests that alternative validation tools are still required.

Payout complains: The indices in some of the villages in the Tanque Abergele woreda and the Tsegea and Hawelti villages in the Raya Woreda complained about their payouts.

Farmers' initial complaints were confirmed by a lack of agreement between satellite products and through ground-based project discussions in 2012. Further investigation of the problems suggested (albeit qualitatively) that the EVI ranking technique has great potential as a validation tool, one that might be able to preemptively flag issues before a product is brought to market.

Satellite technology data inaccuracy: Satellite pro-ducts provide important information about rainfall patterns. Yet, they are not always accurate and often require additional physical validation at farm sites. This has come to the surprise of some providers who expected data from satellites to be more accurate. Therefore, IRI has adjusted its educational material, stressing the limits of information from satellites, to ensure that participants of workshops become aware about the limitations of satellite technology.

APPROACH

The project tested approaches on how different remote sensing products could help in the index insurance verification process. The aim was to develop and test checks that can identify the subregions where there may have been problems with the index, so that the project network of experts could focus their attention and resources on those places.

The project focused on analyses and products that could be most quickly, easily, and cost effectively integrated into practical operations led by local implementers, tools that link directly to the discussions, expertise, and information present on the ground in these projects. It developed and tested a practical set of cross-checks and diagnostics that could allow satellite technologies to be integrated directly into the index design and verification, as well as into the response to complaints, and annual product updates.

Various rainfall and vegetation satellite products are available and can be used for validating indices. These different products can each provide new information about conditions on the ground, reducing the need for physical validation. To gain a better understanding of the potential and challenges of different product, a selection of them is used and analyzed for this project. The following products are included in this selection: Africa Rainfall Climatology (ARC) - a 30 year timeseries of data from the NOAARFE2 rainfall satellite, the Enhanced Vegetation Index (EVI), the Enhancing National Climate Services (ENACT), the Normalized Difference Water Index (NDWI) and the Tropical Applications of Meteorology using Satellite Data (TAMSAT).

CONTACT

ILO's Impact Insurance Facility
E impactinsurance@ilo.org

International Research Institute for Climate and Society (IRI)
Daniel Osgood
E deo@iri.columbia.edu

Foto credits

© The ILO's Impact Insurance Facility
© Corzet, ILO
© Millard, ILO

June 2017

Websites

For more information about implementing partner visit:
http://iri.columbia.edu/
For more information on the project visit:
http://www.impactinsurance.org/projects/lessons/satellites-index-insurance-scalable