The need

Smallholder farmers are often unable to access financial services as banks are reluctant to lend them money in case systemic price risk or weather-related crop failure leads to inability to repay. The result has been chronic underinvestment and continuing rural poverty in the developing world.

These issues are exacerbated by a lack of access to traditional insurance. A cheaper, more accessible alternative is weather-based index insurance (WII), which pays out if such an index is breached, rather than on a proven loss.

Satellite-based African rainfall estimates have been available for over 30 years, offering an opportunity to use these data to extend WII to thousands of farmers. This project helped overcome the technical challenges to using such satellite rainfall estimates.

What we have achieved

MicroEnsure and the University of Reading have developed satellite-based weather index insurance products that can be used to serve tens of thousands of smallholder farmers in sub-Saharan Africa. Using data from the University’s TAMSAT programme, MicroEnsure provided life and weather insurance for smallholder cotton farmers in Zambia.

The weather indexed insurance cover provided insurance for about 7,000 smallholder farmers against a severe drought or excess rain using TAMSAT satellite data. Coverage costs just K20 ($3) per farmer and can be added to the farmer’s loan balance so that he or she does not have to pay for the product upfront.

As a result of implementing the insurance product in ten locations in Zambia, claim pay-outs were made owing to drought and excess rainfall in five locations in eastern and southern Zambia, amounting to over $40,000 and benefiting about 3,700 farmers. There was a strong correlation between these satellite-based pay-outs and actual droughts and crop loss suffered by farmers on the ground.

“TAMSAT satellite data allows us to insure farmers previously excluded from agriculture insurance, mostly due to the lack of data. With this tool there is the potential to offer accurate coverage to hundreds of thousands of smallholder farmers in sub-Saharan Africa within two years.”

Agrotosh Mookerjee, MicroEnsure
How we did it

Historically, using agricultural insurance to protect smallholders has been difficult to scale. The small plot sizes and geographical distribution of these farmers means that manual loss verification is expensive and thus unsustainable. In 2004, MicroEnsure pioneered the use of parametric WII using rainfall as a proxy for crop yield in Malawi.

As an industry we hoped that WII would provide a mechanism for simply clarifying whether claims were payable. However, upscaling was hindered by the lack of weather stations that provided the basis for pricing and payout. Building new weather stations did not necessarily solve the problem, as the underwriters typically require 30 years of historical data to price products.

Recently, MicroEnsure has invested heavily in developing models that use satellite data as an alternative index to weather stations. Through this project, it has been possible to use TAMSAT data to price and settle WII products. A key aspect has been to carefully evaluate the TAMSAT estimates for Zambia using available rain gauges. The satellite estimates have shown to be skillful, with the ability to capture both seasonal and interannual rainfall variability very well, thus increasing confidence for using TAMSAT data in WII over Zambia.

Whilst many of the technical challenges to providing WII have been overcome through the use of satellite data, agriculture products remain far behind other micro-insurance products in terms of scale, and this will be the next challenge to address if these products are to succeed.

“\[\text{The recent development in TAMSAT of a long-term and reliable satellite-based rainfall data set has many uses, but its direct application to weather-based index insurance has great potential. However, assessing and understanding the limitations of such rainfall estimates is crucial to developing robust and scalable weather indices.}\]\n
Ross Maidment, University of Reading

Meet the team

From left to right
Ross Maidment, University of Reading
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