

The Role of Index Insurance in Agricultural Risk Management

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Risk in agriculture

- To feed a growing and increasingly affluent world population, it is necessary to modernize farming and close yield gaps
- This calls for comprehensive strategies to cope with risk
- Risk expands when you intensify, and in the face of resource overuse and climate change
- Risk is absorbed differently depending on the frequency of shocks and the severity of loss



Adapted from Hazell, 2009

Types of risk

Production-related risks

Farmers, ag practices



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Land, soil, biodiversity



<http://ddimick.posterous.com/biodiversity-crisis-lost-food-diversity-is-ra>

Bugs, diseases, weeds



Syngenta Field Report

Market & policy-related risks

Markets, prices



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Supporting environment



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Severe weather

Drought, excess rain



<http://www.ajc.com/multimedia/archive/00486/>

Production-related risks

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Syngenta Field Report

Technology, Crop Management

Market & policy-related risks

Markets, prices



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Supporting environment



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Policy, Infrastructure, Market rationalization

Severe weather

Drought, excess rain



<http://www.ajc.com/multimedia/archive/00486/>

Insurance

→ **Traditional approaches discredited, fiscal cost excessive, abuse potential high**

Index-based products (combined with crop models where applicable) eliminate:

- Need for loss adjustment on the farm
- Moral hazard
- Adverse selection

Challenges:

- Financial literacy
- Cost to farmer
- Administrative costs
- Weather data
- Triggers and design
- Basis risk
- Aggregation, distribution
- Commercial partnerships
- Retention

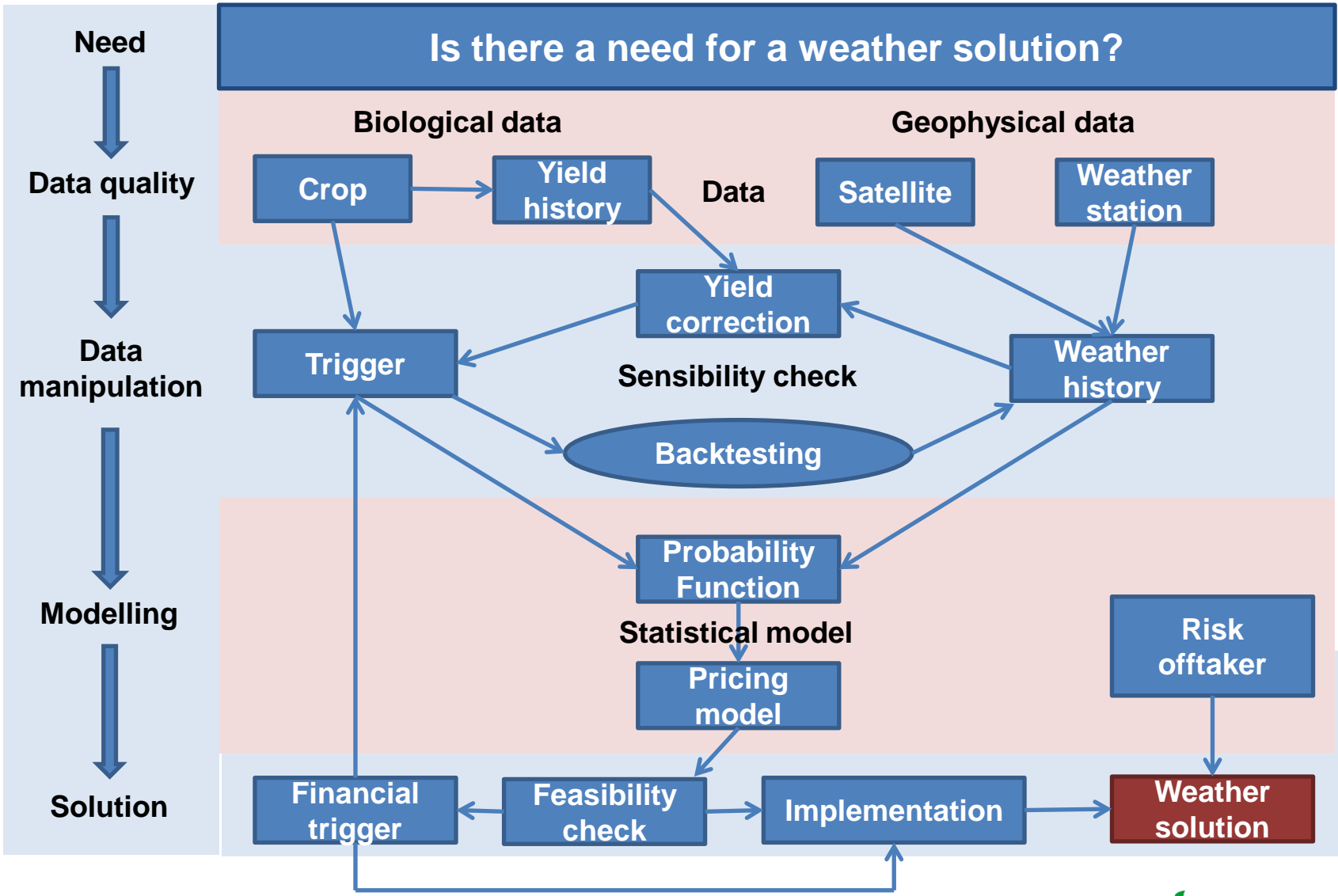
Minimize premium by:

- Lowering uncertainty in the probability function
- Keeping models simple (less mis-interpretation!); testing them for accuracy
- Designing products, triggers that represent risk correctly
- Encouraging risk management (agronomy, crop choice, timings)
- Finding right risk off-taker

Key questions need to be asked and answered – about agriculture in the target region, modelling and the insurability of risk (slides 7 to 10)

Weather insurance model

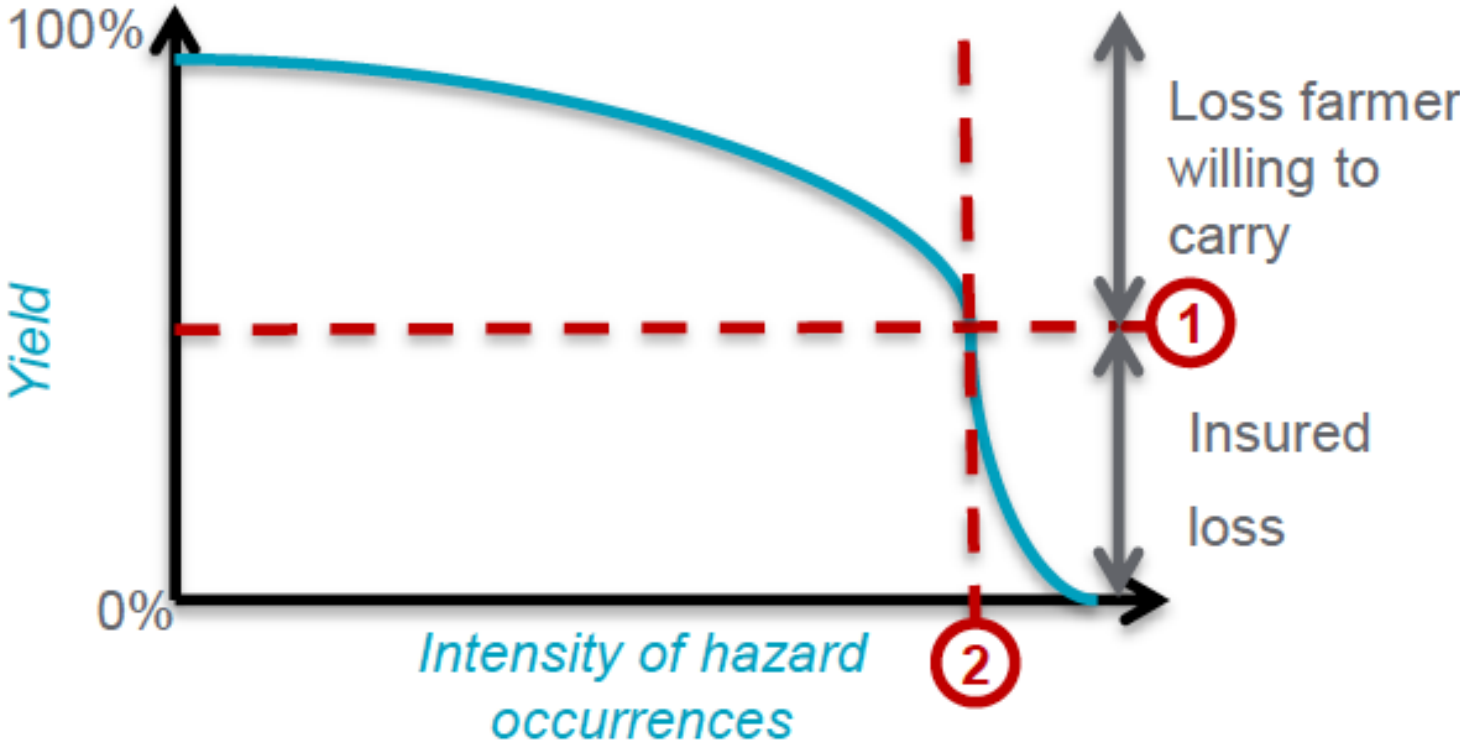
1. *Historic analysis*
2. *Future projection*
3. *Current weather correction*
4. *Monte Carlo simulation*



Source: Following M. Lal (IRI)

Premium model

Premium Model



- ① Estimation of loss that can be carried by farmers
- ② Calculation of risk for greater loss

Source: Following M. Lal (IRI)

Lowering uncertainty

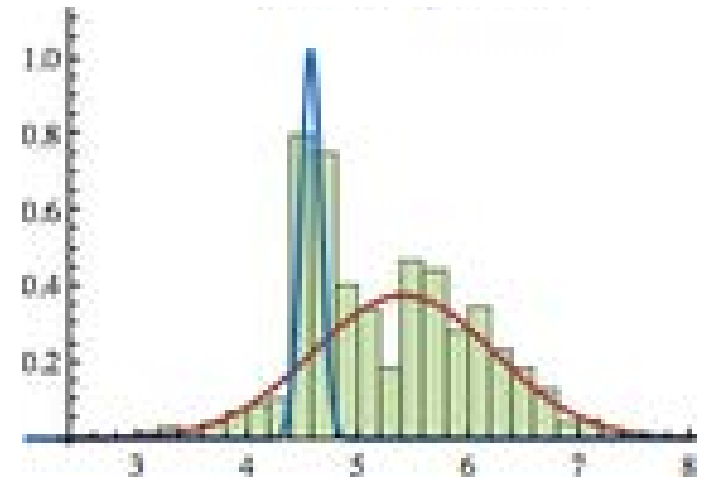
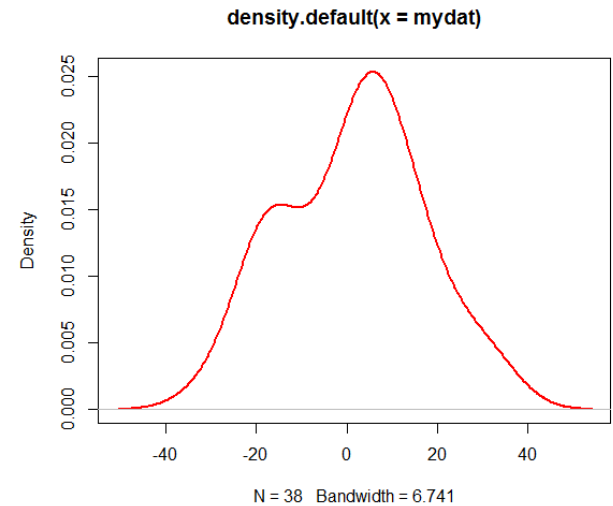
Utilization of the correct probability density function

- Normal distribution models may miss the point
- Extreme weather events favor a left or right leaning distribution
- Changing climate patterns increase the probability of a multi-peak function

Selecting the wrong model can result in a wrong premium

→ In the lower figure, the distribution of drought risk is shown with a left peak (el Niño years); both normal functions reproduce the wrong probability

Reducing uncertainty in the model tested by Monte Carlo methods lowers need for high margins



Modelling occurrences correctly

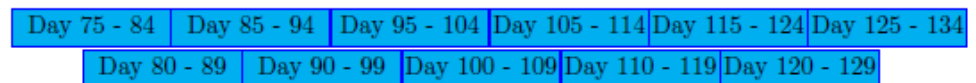
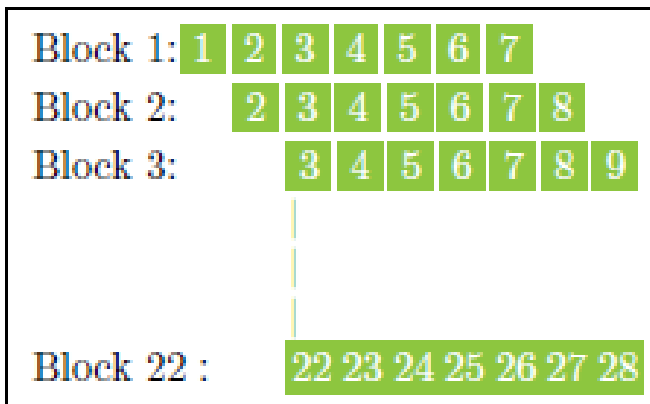
Weather perils are challenging to model; their probability varies according to seasons, weather patterns (el Niño) and long-term trends (climate change)

Recognizing and implementing these dimensions correctly is complex

Important to use appropriate insurance model set-up to capture true risk

- Use the same bucket size for similar solutions
- Limit the number of different insurance types to reduce confusion
- Define simple triggers that cause pay-out

Below: An overlay of blocks reduces the risk of missing a true event – good



Above: Because a block only starts every 5 days, the start time of the block is significant and influences the insurance – not good

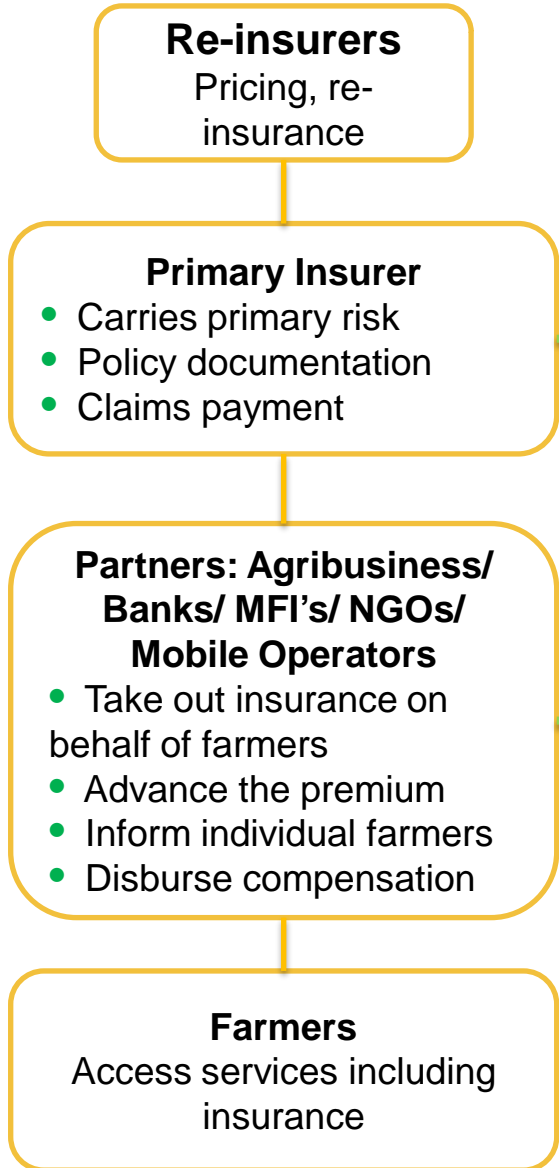
What the Syngenta Foundation for Sustainable Agriculture and its partners are doing – how we provide for scalability and growth (slides 12 to 17)

Mission: Develop and implement agricultural insurance products for smallholder farmers

- Started as Kilimo Salama in 2009 with 185 maize farmers in Kenya
- Serves as an **insurance intermediary** doing product development, contract pricing and monitoring
- Provided for insurance of **294,390 smallholder farmers** in 2014 (through June), in Kenya and Rwanda (Tanzania soon to be launched)
- Main product: **drought insurance**, linked to agricultural credit by MFI used for fertilizer and improved seed
- New products linked to quality inputs and registration/pay-out via mobile networks

→ ACRE Ltd launched in June 2014 as an insurance surveyor

ACRE's role as a risk surveyor



Headquartered in Nairobi

- Product development






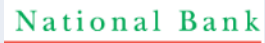


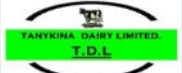



Local offices (Kenya, Rwanda as of 2013)

- Marketing and distribution
- Financial education
- Data collection

Income from operating margin charged on premium
 Any profits re-invested in the company
 All regulated entities as per local Insurance Acts



Current product portfolio

Crop Covered	Risk Covered	Ag Package Covered	Target Farmer	Distribution Partner
Maize, Beans, Potatoes, Sorghum & Millet	Weather and Yield cover	Ag-Credit for Inputs & Training	0.5 acres	  
Maize and Beans Seed	Weather and Yield cover		5-1000 acres	  
Coffee/ Tea	Weather cover		1- 200 acres	
Livestock	Animal mortality	Value of animal and veterinary care	Owens 2-3 dairy cows	 
Maize	Germination of hybrid seed	Seed bag	1 acre = 8 bags of seed	 
Wheat	Weather cover	Ag-Credit for input package	+200 acres	

Replanting Guarantee



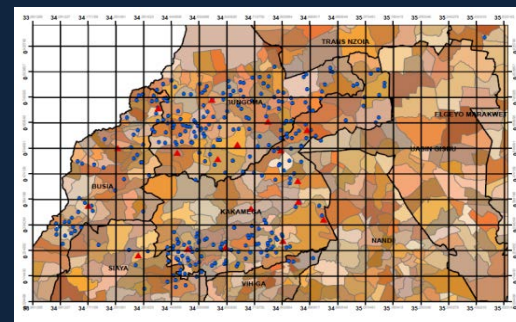
Insurance in the bag



Opens bag on planting, finds card inside



SMS unique code to short code



Get farm location from SMS and monitor satellite imagery for that location



Germination fails after 21 days without rain

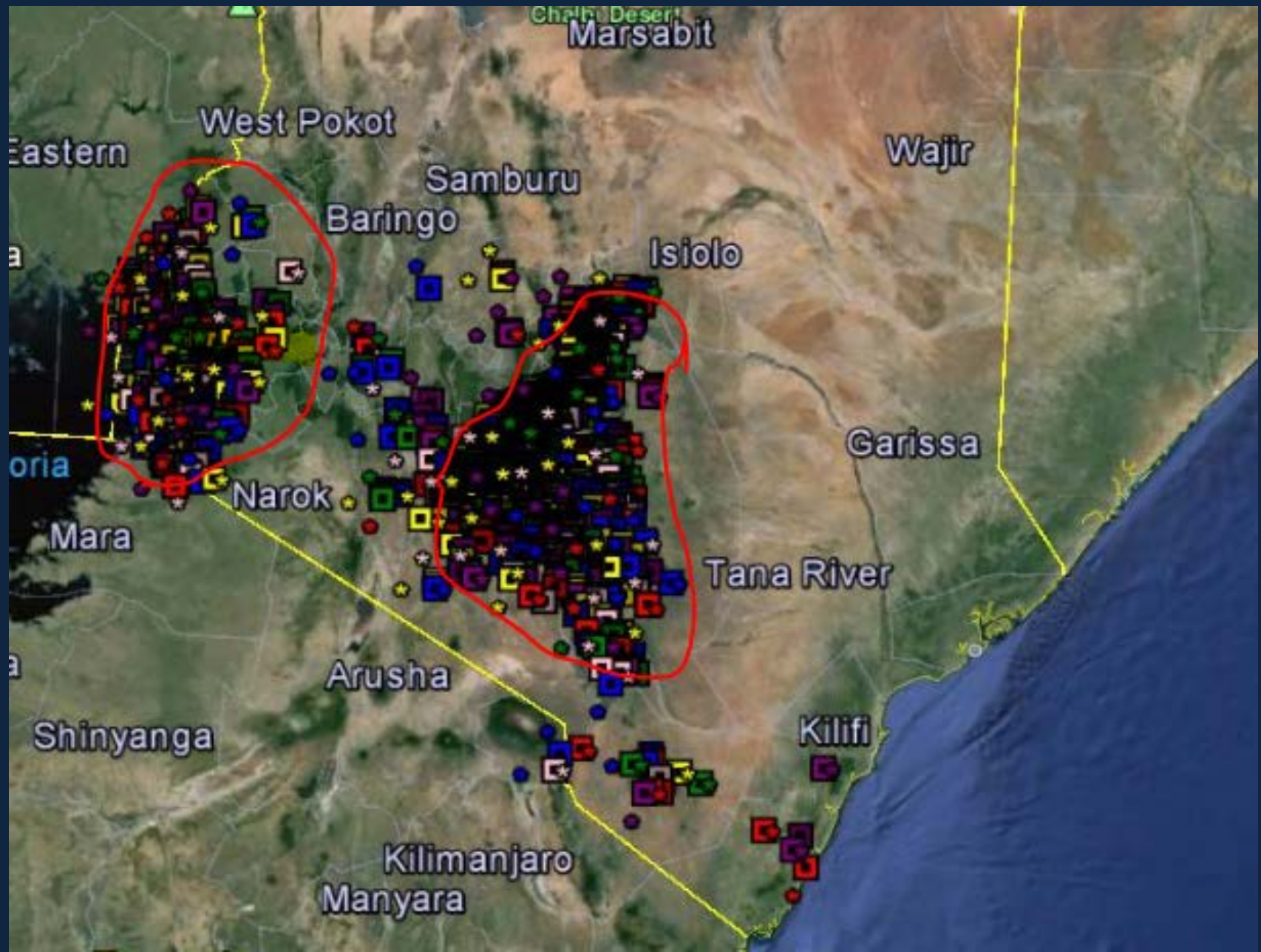


Compensation sent to Farmer via M-Pesa

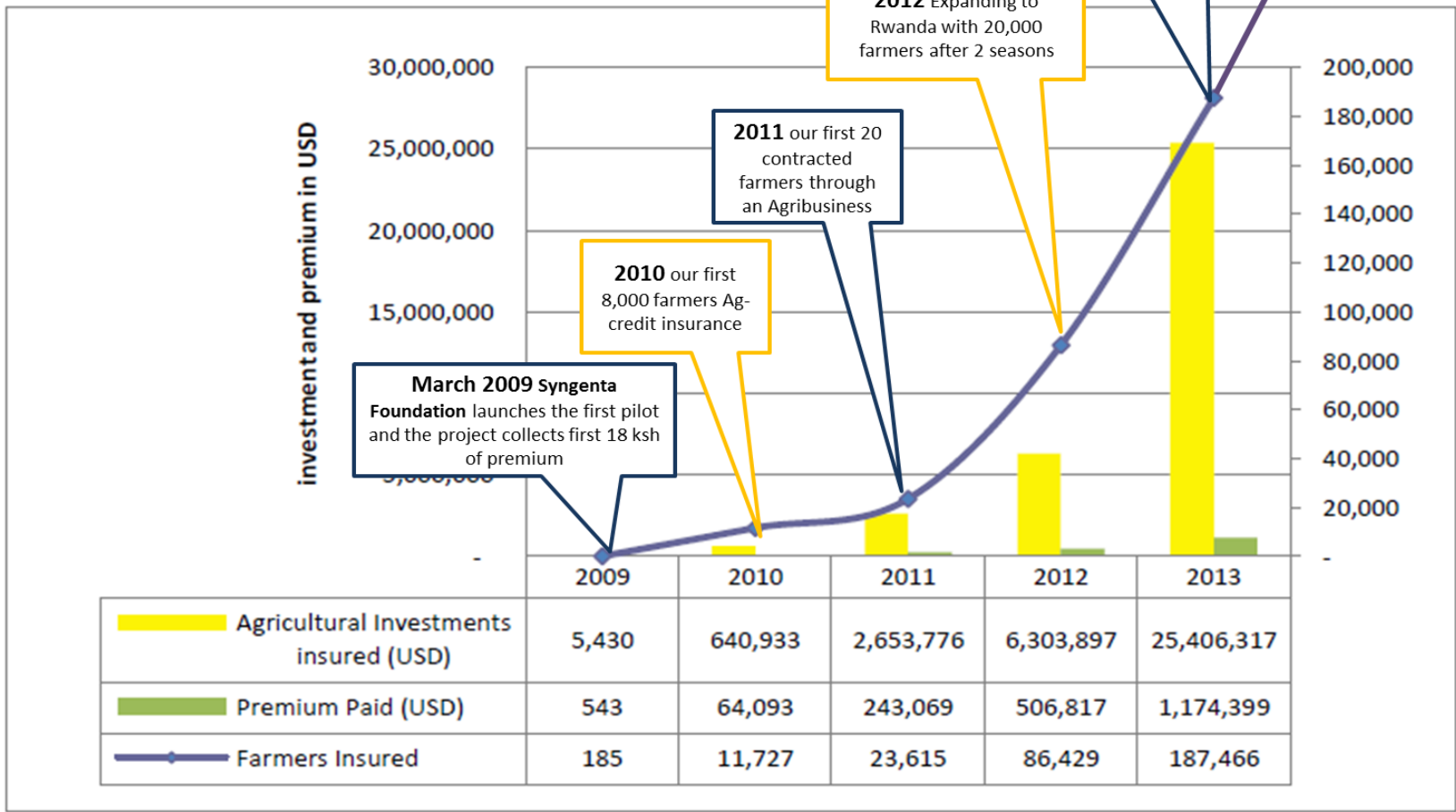


Farmer can replant and harvest the same season

Redeemed cards 2014 Long Rains



Growth stats 2009-2014



What next?

You guessed it: Global roll-out, with partners, step by step

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Acknowledgement:

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