Geospatial Technology
Applications for
Agricultural Risk Management

Agricultural Risk Management Team
Agriculture and Environmental Services Department
The World Bank
Agricultural Risks: Cross Cutting Agenda

- Disasters
- Productivity
- Social protection
- Food security
- Climate change
Why does Agricultural Risk matter?

- **Crop failure / Livestock asset loss** is one of the biggest shock (poverty trap) for rural households

- Principal cause of **transient food insecurity**

- Major driver of **GDP volatility** in Ag. dependent countries

- Major impact on **Government’s fiscal balance**

- Biggest cause of **diversion of development financing**, primarily for crisis response

- Principal source of ag. supply chain **disruptions** and commodity chain failures

- Increasingly negative impact in **recent years**
Agricultural Risk Management Framework

- **Instruments**
  - Investments
  - Technical Assistance
  - Policy

- **Stakeholders**
  - Producers
  - Commercial Sector
  - Public Sector

- **Risks**
  - Production
  - Market
  - Enabling Environment

- **Strategies**
  - Mitigate
  - Transfer
  - Cope
<table>
<thead>
<tr>
<th>Geo Spatial Applications</th>
<th></th>
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<tbody>
<tr>
<td><strong>Risk Assessment</strong></td>
<td>• Better historical information on weather and production parameters to assess risks, its consequences and prioritize risks</td>
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</table>
| **Mitigating**          | • Real time information  
 |                        | • Early warning  
 |                        | • Agronomic advisory to farmers  
 |                        | • Vulnerability and crop suitability mapping |
| **Transfer**            | • Agricultural insurance |
| **Coping**              | • Objective trigger for impending disasters  
 |                        | • Scaling up of social safety net programs |
Mitigation: Geospatial application for early warning

FEWS-Net

- Livelihood systems are based on subsistence agriculture and/or pastoralism, and are highly drought sensitive
- Conventional climate station networks are sparse and/or late reporting
- Satellite remote sensing and models fill the gap, and provide the basis for early detection of agricultural drought
Declaration of Worst Drought in 60 Years

2010/11 rainfall compared to historical totals since 1950/51 in select pastoral areas of Kenya and Ethiopia.

Figure 1. Selected drought-affected pastoral areas of northern Kenya and southern Ethiopia.

Source: FEWS NET
Mitigation: Geospatial applications for early warning FEWS-NET

FEWS NET Monitoring

Current monitoring domains: A, B, C

Red – Presence countries

Yellow – Remote agroclimatic AND availability/access monitoring

Green – Remote agroclimatic monitoring only
Mitigation: Geospatial application for crop vulnerability and crop suitability
Mitigation: Geospatial applications for farmer advisory (e-leaf)

- Funded by IFAD (2011-2014), executed by IWMI, eLEAF, DLV Plant and local Partners

- Field-specific information on crop and water conditions and irrigation advice through Smart ICT channels to smallholders in pilot areas in Ethiopia, Egypt and Sudan (see www.smartict-africa.com)

- eLEAF: Supplying reliable quantitative data on water and vegetation to support sustainable water use, increase food production and protect environmental systems

- Spatial data converted to text-based SMS
  - both qualitative and quantitative info
  - both on-demand and weekly “push”
Mitigation: Crop Monitoring GEOGLAM

GEOGLAM, the GEO Global Agricultural Monitoring initiative was initially launched by the Group of Twenty (G20) Agriculture Ministers in June 2011, in Paris. This initiative will coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections and weather forecasting data.
Mitigation: GEOGLAM

2011: The G20 Agriculture Priority
GEOGLAM & AMIS

• Two initiatives to increase information availability, quality and transparency:

GEOGLAM: improve information on supply (GEO)
AMIS: improve information on markets (FAO)
Mitigation: GEOGLAM

Example of Crop Crisis Situation: 2012

Northern Hemisphere Crop NDVI Anomalies - August 13th 2012

http://www.geoglам-crop-monitor.org
FESA Micro-insurance is a Meteosat based drought and excessive precipitation index insurance system developed by EARS.

EARS has processed 32 year of Meteosat data to evaporation and precipitation data fields that cover the entire African continent at 3 km resolution.

Based on these data, EARS designs index insurance solutions for any location in Africa.

Using its Meteosat receiving system, the company will also monitor the insurance index during the growing season and calculate and report pay-out to the insurance stakeholders.
### Table 8.1: Overview of the main FESA Micro-insurance pilot projects carried out in the period 2011-2013.

<table>
<thead>
<tr>
<th>Partner / broker</th>
<th>Countries</th>
<th>Period</th>
<th>Crop</th>
<th>Peril</th>
<th>Insurer(s)</th>
<th>Re-insurer</th>
<th>Aggregators</th>
<th>Co-financing framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>PlaNet Guarantee</td>
<td>Burkina, Mali,</td>
<td>2011-13</td>
<td>maize, cotton</td>
<td>drought, excessive precipitation</td>
<td>Allianz</td>
<td>Swiss Re</td>
<td>IFC-GIIF, AECF</td>
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<td></td>
<td>Benin</td>
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<tr>
<td>PlaNet Guarantee</td>
<td>Kenya</td>
<td>2012-13</td>
<td>cotton, sorghum</td>
<td>drought</td>
<td>APA, Jubilee</td>
<td>Swiss Re</td>
<td>Rift Valley Products</td>
<td>AECF</td>
</tr>
<tr>
<td>Syngenta Foundation</td>
<td>Kenya</td>
<td>2011-12</td>
<td>French beans</td>
<td>drought, excessive precipitation</td>
<td>UAP</td>
<td>Swiss Re</td>
<td>Frigoken</td>
<td>IFC-GIIF</td>
</tr>
<tr>
<td>MicroEnsure</td>
<td>Tanzania, Rwanda</td>
<td>2011-12</td>
<td>cotton, maize, rice</td>
<td>drought</td>
<td>Golden Crescent, Sonowara, Soros</td>
<td>Swiss Re</td>
<td>Gatsby Trust, Opportunity International</td>
<td>IFC-GIIF</td>
</tr>
<tr>
<td>FSD Kenya</td>
<td>Kenya</td>
<td>2011-12</td>
<td>wheat, maize</td>
<td>drought</td>
<td>APA</td>
<td>Swiss Re</td>
<td>AFC, Equity Bank</td>
<td>Rockefeller Foundation, World Bank</td>
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<tr>
<td>COIN-Re</td>
<td>Malawi, Mozambique</td>
<td>2012-13</td>
<td>maize</td>
<td>drought</td>
<td></td>
<td></td>
<td>Universal Corporation</td>
<td></td>
</tr>
<tr>
<td>ARC</td>
<td>Uganda</td>
<td>2013-</td>
<td>maize, livestock</td>
<td>drought</td>
<td>Lion Assurance Co., &amp; 7 others</td>
<td>Swiss Re</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRA</td>
<td>Botswana</td>
<td>2013-</td>
<td>sorghum</td>
<td>drought</td>
<td>HRA</td>
<td>Swiss Re</td>
<td></td>
<td></td>
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<tr>
<td>IFAD/WFP</td>
<td>Senegal</td>
<td>2013-</td>
<td>several</td>
<td>drought</td>
<td></td>
<td></td>
<td>IFC-GIIF</td>
<td></td>
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</table>

*) Dutch Government contributing to all projects through present millennium project.
• LEAP- Livelihoods, Early Assessment and Protection

• The LEAP food security early warning tool converts agro-meteorological data into crop or rangeland production estimates and quantifies the financial resources needed to scale up the Productive Safety Net Programme in case of a major drought.

• LEAP provides a transparent and verifiable way to trigger contingent funds to enable an early response before the most severe consequences of drought affect people’s lives and livelihoods.

• The meteorological information used in LEAP comes from satellite data and a network of automated and conventional weather stations.
Coping: Scaling Up Social Safety Nets

Examples of LEAP software outputs showing decadal rainfall and yield reduction

Source: WFP and DRMFSS

SUPPORTS THE SCALE-UP OF
SOCIAL PROTECTION AND SAFETY NETS
Saving lives and livelihoods
Geospatial Application for Improved Agricultural Risk Management

• Geospatial applications have a critical role for improved risk management

• Key role in risk assessment and putting in place adequate risk mitigation-transfer-coping programs and strategies

• Some pilots projects have demonstrated the significance of geo spatial applications

• Scaling up of existing successful applications and testing of new applications is needed

• Important role in insuring resilience of agricultural systems
Questions/ Comments/ Concerns.
Let’s Discuss

www.worldbank.org/agrm
https://www.agriskmanagementforum.org/
www.agrisktraining.org