USE OF DRONES IN CROP INSURANCE

CASE → MAIZE
(Small Scale Farmers)

Accadius Ben Sabwa
M.D
Objectives

- **Crop Acreage Estimation**
- **Crop Monitoring/Mitigations**
- **Yield Forecasting**
- **Crop Insurance**
Challenges

Small scale farmers pain points

- 40% Low Crop Productivity
- 2 X Crop Failures

Why?

- Lack of Modern Farming Techniques
- Lack of Access to Technology
- No Access To Information
Revealed: How Ksh.17B maize fund was looted at NCPB

By Enock Sikolia For Citizen Digital
Published on: October 25, 2018 09:32 (EAT)

MAIZE SCAM
TRADERS ON THE SPOT

Eldoret: 8 Traders - Ksh873.1m
Kisumu: 5 Traders- Ksh416.5m
Nakuru: 8 Traders- Ksh156.4m
Total: 21 Traders – Ksh1.7bn

Sh7bn Galana Kulalu project collapses after Israeli firm leaves
Insurance Vs Mitigation

Abiotic stress
- heat
- drought
- metals
- salt
- flooding

Biotic stress
- pathogen attack
- insect attack
- herbivore attack

primary metabolites
phytohormones
plant development
plant defence
Insurance factors

- Planting Methods
- Fertilizer Vs Organic Vs nothing
- Irrigation Vs Rain
- Pesticide/Herbicide Application
Technology : Segments
Role of Drones: Classification

- Supervised/Knowledge based
- Calibration/Ground Truthing
- Acreage estimation and Area(s) of operation
<table>
<thead>
<tr>
<th>Bands</th>
<th>Wavelength (micrometers)</th>
<th>Resolution (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band 1 - Coastal aerosol</td>
<td>0.43 - 0.45</td>
<td>30</td>
</tr>
<tr>
<td>Band 2 - Blue</td>
<td>0.45 - 0.51</td>
<td>30</td>
</tr>
<tr>
<td>Band 3 - Green</td>
<td>0.53 - 0.59</td>
<td>30</td>
</tr>
<tr>
<td>Band 4 - Red</td>
<td>0.64 - 0.67</td>
<td>30</td>
</tr>
<tr>
<td>Band 5 - Near Infrared (NIR)</td>
<td>0.85 - 0.88</td>
<td>30</td>
</tr>
<tr>
<td>Band 6 - SWIR 1</td>
<td>1.57 - 1.65</td>
<td>30</td>
</tr>
<tr>
<td>Band 7 - SWIR 2</td>
<td>2.11 - 2.29</td>
<td>30</td>
</tr>
<tr>
<td>Band 8 - Panchromatic</td>
<td>0.50 - 0.68</td>
<td>15</td>
</tr>
<tr>
<td>Band 9 - Cirrus</td>
<td>1.36 - 1.38</td>
<td>30</td>
</tr>
<tr>
<td>Band 10 - Thermal Infrared (TIRS) 1</td>
<td>10.60 - 11.19</td>
<td>100</td>
</tr>
<tr>
<td>Band 11 - Thermal Infrared (TIRS) 2</td>
<td>11.50 - 12.51</td>
<td>100</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sentinel-2 Bands</th>
<th>Central Wavelength (μm)</th>
<th>Resolution (m)</th>
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</thead>
<tbody>
<tr>
<td>Band 1 - Coastal aerosol</td>
<td>0.443</td>
<td>60</td>
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<tr>
<td>Band 2 - Blue</td>
<td>0.490</td>
<td>10</td>
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<td>Band 3 - Green</td>
<td>0.560</td>
<td>10</td>
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<tr>
<td>Band 4 - Red</td>
<td>0.665</td>
<td>10</td>
</tr>
<tr>
<td>Band 5 - Vegetation Red Edge</td>
<td>0.705</td>
<td>20</td>
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<tr>
<td>Band 6 - Vegetation Red Edge</td>
<td>0.740</td>
<td>20</td>
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<tr>
<td>Band 7 - Vegetation Red Edge</td>
<td>0.783</td>
<td>20</td>
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<tr>
<td>Band 8 - NIR</td>
<td>0.842</td>
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<tr>
<td>Band 8A - Vegetation Red Edge</td>
<td>0.865</td>
<td>20</td>
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<tr>
<td>Band 9 - Water vapour</td>
<td>0.945</td>
<td>60</td>
</tr>
<tr>
<td>Band 10 - SWIR - Cirrus</td>
<td>1.375</td>
<td>60</td>
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<td>Band 11 - SWIR</td>
<td>1.610</td>
<td>20</td>
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<tr>
<td>Band 12 - SWIR</td>
<td>2.190</td>
<td>20</td>
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</tbody>
</table>
NDVI/NDMI Score

**Healthy Vegetation Reflectance**
- 50% NIR
- 8% Red
- NDVI = 0.72

**Stressed Vegetation Reflectance**
- 40% NIR
- 30% Red
- NDVI = 0.14

**NDVI** = \( \frac{\text{NIR} - \text{Red}}{\text{NIR} + \text{Red}} \)

- Dead Leaf
- Stressed Leaf
- Healthy Leaf
Role of Ground Segment

Agri Module Smart System

Solar-powered & energy-efficient smart wireless sensor that monitors weather, soil and crop parameters 24/7.
Several methods can be used to determine yield potential, each with its own limitations. One of the most reliable methods is long-term yield data collected by each individual producer, as this reflects inherent yield of the specific environment, as well as the effect of agronomic practices such as fertilisation, soil cultivation and plant population and managerial abilities of the producer.
Water

Approximately 10 to 16 kg of grain are produced for every millimetre of water used. A yield of 3 152 kg/ha requires between 350 and 450 mm of rain per annum. At maturity, each plant will have used 250 liters of water in the absence of moisture stress.
<table>
<thead>
<tr>
<th>Category</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>50,000.00 ~ 100,000.00</td>
</tr>
<tr>
<td></td>
<td>10,000.00 ~ 50,000.00</td>
</tr>
<tr>
<td></td>
<td>0.00 ~ 10,000.00</td>
</tr>
<tr>
<td>Government</td>
<td>71,000.00 ~ 180,000.00</td>
</tr>
<tr>
<td></td>
<td>17,000.00 ~ 71,000.00</td>
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<tr>
<td></td>
<td>0.00 ~ 17,000.00</td>
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<tr>
<td>Cooperatives Societies</td>
<td>3,000.00 ~ 7,000.00</td>
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<tr>
<td></td>
<td>800.00 ~ 3,000.00</td>
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<td></td>
<td>0.00 ~ 800.00</td>
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<tr>
<td>NGO</td>
<td>6,300.00 ~ 15,000.00</td>
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</tbody>
</table>

This map is made of 710 storage facilities in the following countries: Kenya(185), Uganda(73), Tanzania(81), Malawi(310), Rwanda(51), Burundi(7) and Democratic Republic of Congo-DRC (1).
Thank You

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Voice Of Your Soil

Presented By,
Swathish Bellam Ravi
USAMV Cluj Napoca, Romania
08/05/2019
The Problem

Small farmers pain points

40% Low Crop Productivity

2 X Crop Failures

Why?

Lack of Modern Farming Techniques

Lack of Access to Technology

No Access To Information
The Product

Agri Module Smart System

Solar-powered & energy-efficient smart wireless sensor that monitors weather, soil and crop parameters 24/7.
Measures:

Air Temperature, Humidity and Pressure
Solar Irradiance
Location
Soil Nutrient - NPKM
pH
Organic Carbon and Type of Soil
Electrical Conductivity
Soil Temperature and Soil Moisture

Variables in Pipeline:

Boron
Arsenic
Wind-Speed
So, What we do?

We enable farmers with Instant and Real-Time access to crop and soil health Diagnostics.

Our solution aims to be the foundation of all future farming services.
Our Innovation

Vibes Protocol

Next-Gen Artificial Intelligence (AI) based crop intelligence software.

Our Competitive Advantage

► First of its kind FMIS
► Scalability protocols
► Advanced AI and CV
► Robust and Novel Sensors
Validation

Survey - 400 Farmers in India, Africa and Eastern Europe
Paid testbed providers - 2000 Hectares farm land across Romania, Hungary and Germany

Partnerships
Agriculture Universities
Electric, Solar and Diesel Manufacturers
Renowned Research Institutions

Crowdfunding campaign & Initial customers
Pre Orders & Pilot Projects – Over 5000 devices across EU
>500K Euro raised through crowdfunding and EU Grant
Market Potential

Small- Medium Farmers
0.1 to 50 ha

330,000 farms
150 million €
(farmer age group 35 to 45, easy to train, bigger communities, etc.)

610,000 farms
330 million €
(Access to smartphones, medium & higher income group farmers)

1,205,000 farms
605 million €
(Severe problems of crop failures, lack of easy access to soil testing facilities)

Initial target

Addressable Market Segment

Attractive segment

May 2019

Solarvibes_UNOOSA Presentation
Business Model

Direct Sale
Product Price

Agrisensor

Subscription

99€/year

299€

Farm Assistant Controller

Software and Application Access

Online Farm Management
Remote Operations
Monitoring
Organic Farm Guidance

Subscription fees for Add-ons.
Solarvibes unveils the scalability potential of IOT in Agriculture

- Connects all the farm devices to one dashboard.
- Every Network will have 1 master operator.
- Master Farmer get a small fee for operating the Network.
- Farmers can monetize data by sharing their results on their network.
- All farmers can monitor and control their farms independently.
- We can connect up to 10,000 devices and 20,000 farmers in one network.
How to Adopt a Farmer?

499€/Farmer

Choose the farmers of your choice
Solarvibes Gives Agrimodule, Seeds and Fertilizers
A Transparent Dashboard to Connect Backers and Farmers
Installation and Demonstration to Farmers

Backers from over 12 countries adopted over 80 farmers in our First Campaign!
Our Vision is to empower farmers and lead the transition towards tackling the biggest problem of the century, “The Energy-Water-Food” nexus.