GIS Scoping for V37- Results & Recommendations

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LAND O'LAKES VENTURE 37

PRESENTATION OUTLINE

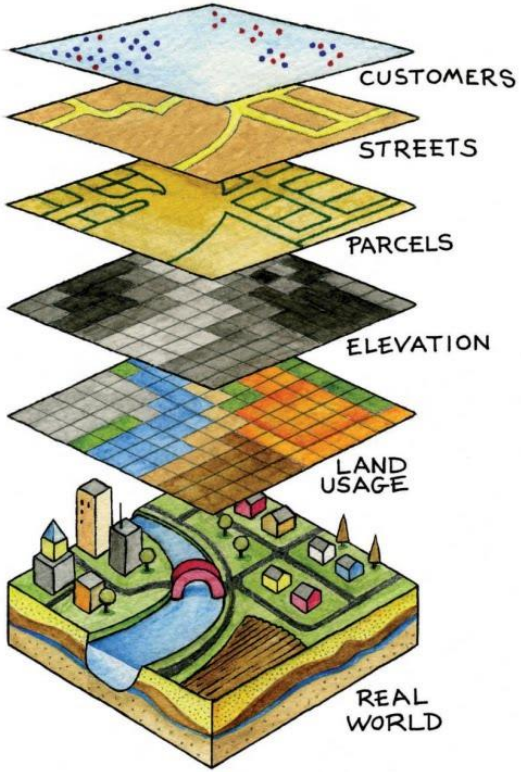
PRESENTATION (45 min)

- Project Goals And Methods
- Key GIS Applications For Ag
- What Do Donors Want?
- What Are Competitors Doing?
- Current expertise in LOL & V37
- Recommended V37 Actions

DISCUSSION (30 min)

INTRODUCTION- PROJECT GOALS & METHODS

What is GIS?



GIS

geographic information system

A system for storing and manipulating geographic information on a computer.

Common uses:

*Making layered maps

*Interpolation of info for nearby points, modeling

*Matching up georeferenced data in a database for analysis

Scoping Project Goals

Why do this GIS scoping?

USAID comments on lost BLNA bid said our GIS strategy was weak; we worry we are behind the curve on GIS, could win more grants, and have more impact, if we strategically invest in GIS

Key questions to answer

- What are our donors requesting around GIS?
- What is our competition doing with GIS?
- What expertise is there within V37 and LOL Inc?
- What should V37 do around GIS, and what will it take?

Scoping Task- Methodology

•Desk review of donor and competitor work, general GIS information and available data

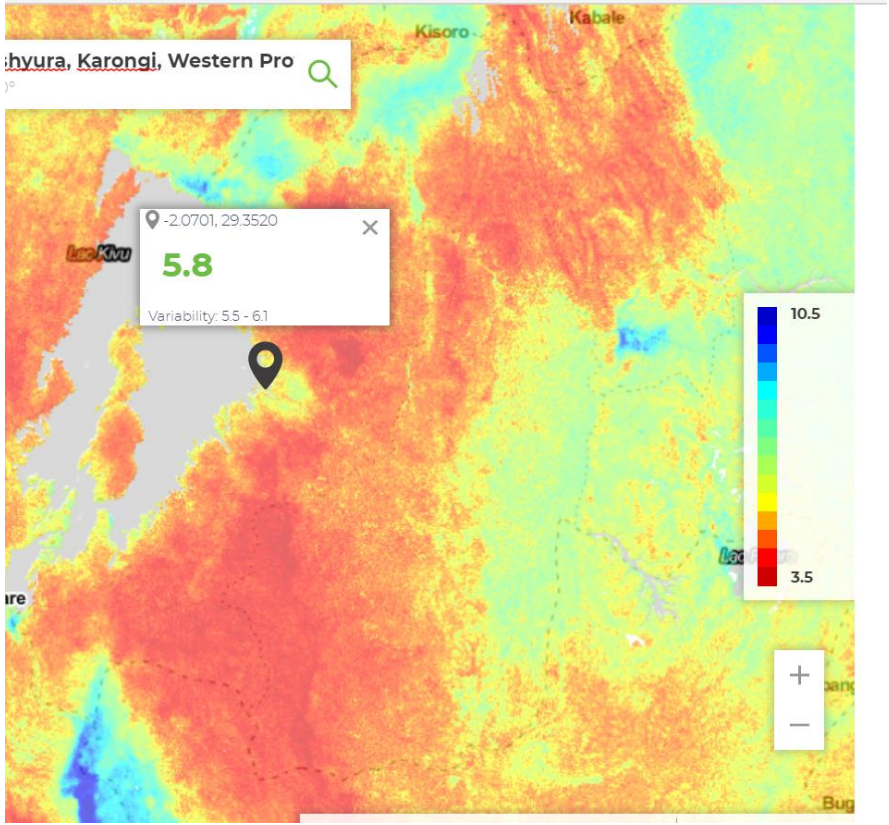
•Program team survey

•Interviews with LOL Inc. experts

Deliverables:

- Summary findings doc with full answers to questions
- GIS project database (+ other notes, program survey results)
- Detailed notes on LOL Inc interviews
- Data source catalog (+ list of GIS service firms)
- Focused data sources for Mozambique, relevant for RESINA

RESULTS –
Key Applications of GIS to Agriculture



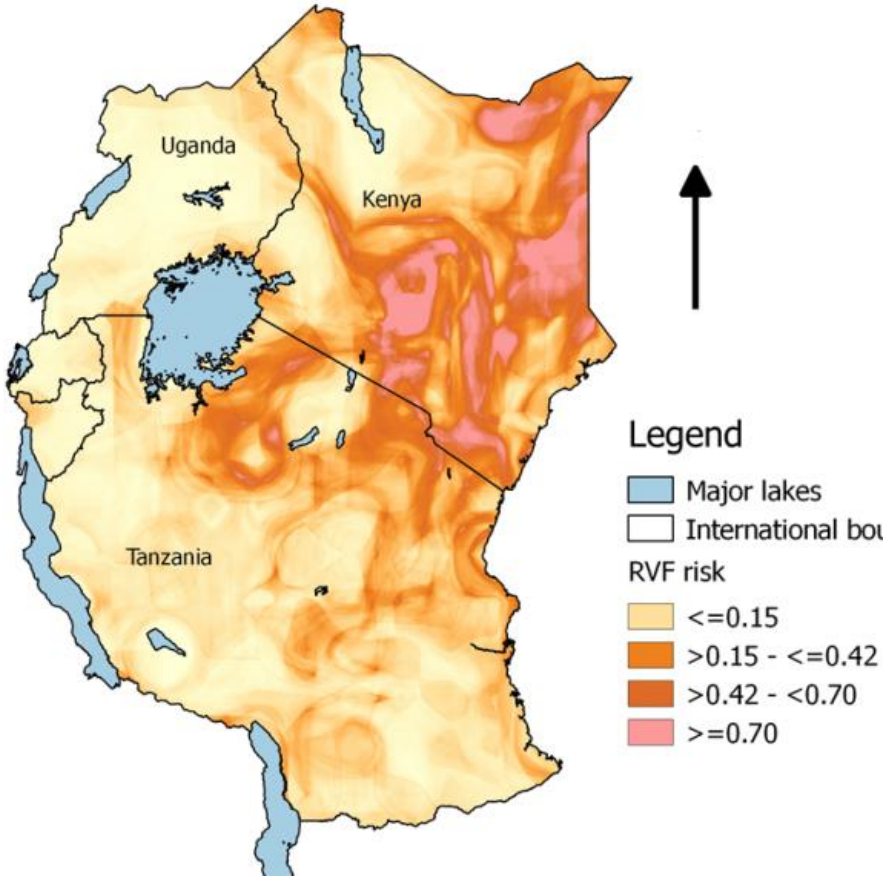
iDSA Soil map- Rwanda pH

Opportunities for GIS in Ag

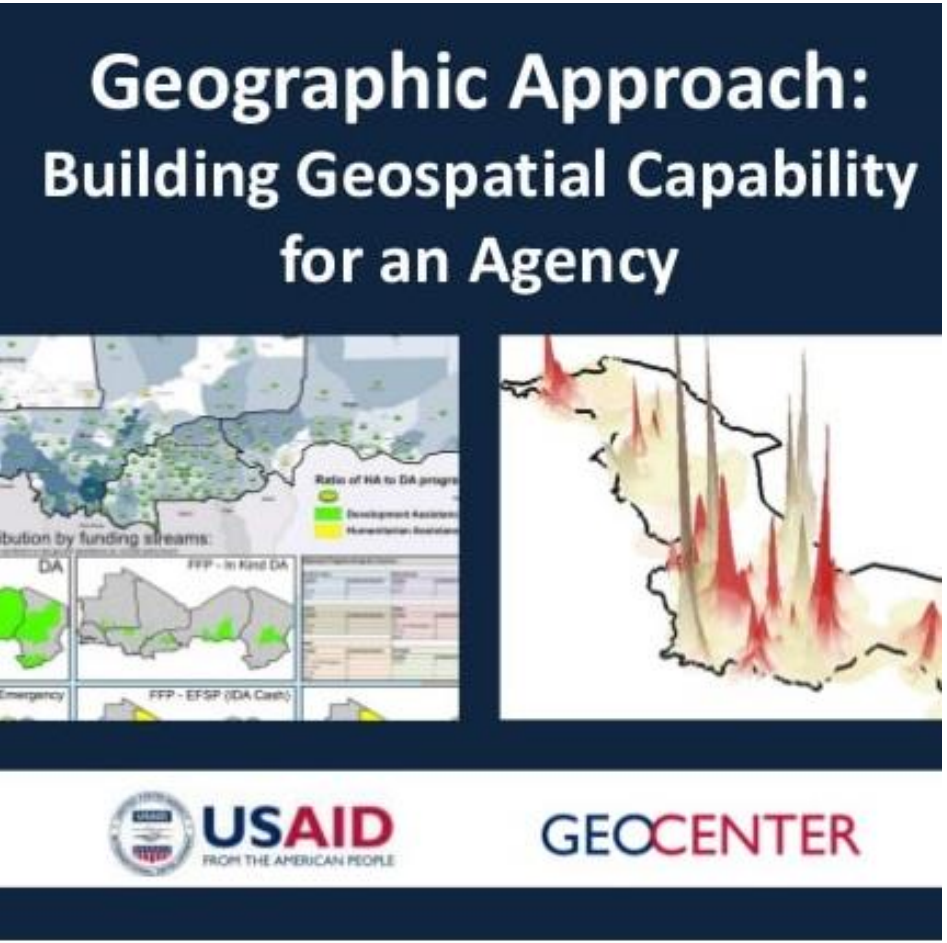
- HUGE amount free data
  - Catalog Ethan put together
- Data unification initiatives
  - CGIAR Big Data in Ag Platform, GARDIAN, RHoMIS survey
- Useful tools and interfaces
  - iSDA Soil map
  - SERVIR Rangeland Decision Support tool
  - USDA GADAS

Applications of GIS to Agriculture

- Project mapping and planning
- Strategic location selection
- Tailored advice for farmers
- Remote field assessment, crop monitoring
- Insect and pest control, forecasting
- Ag market mapping, development
- Disaster monitoring and response
- Livestock monitoring
- MEL- Triangulating data, showing impact, telling a story



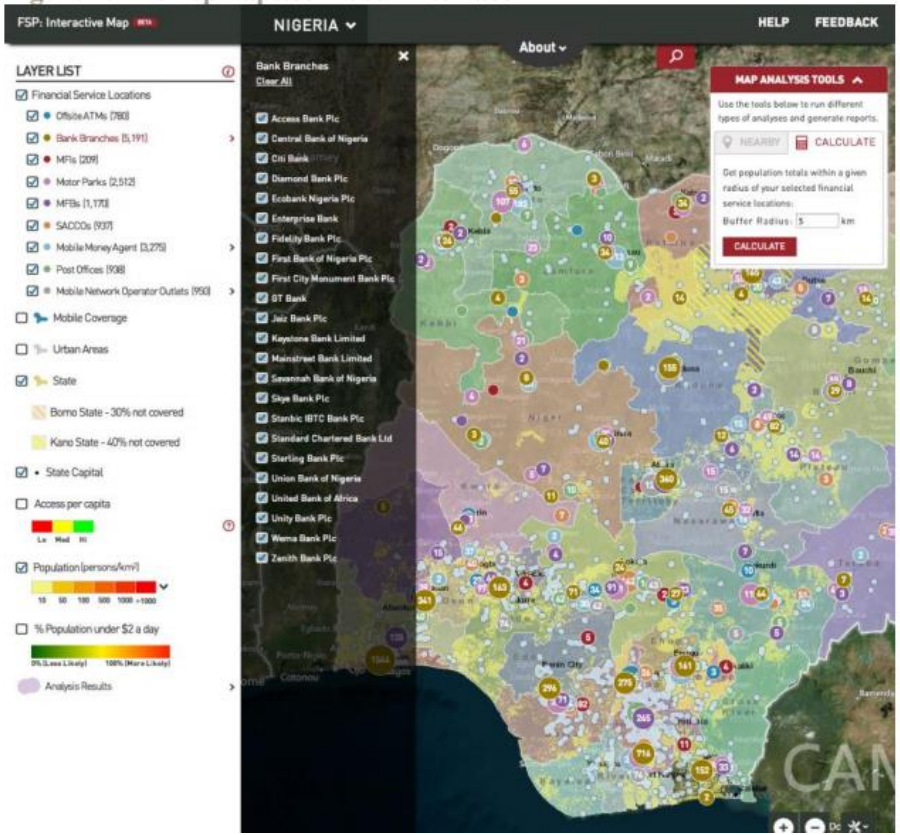
RESULTS –
What do donors want?



USAID

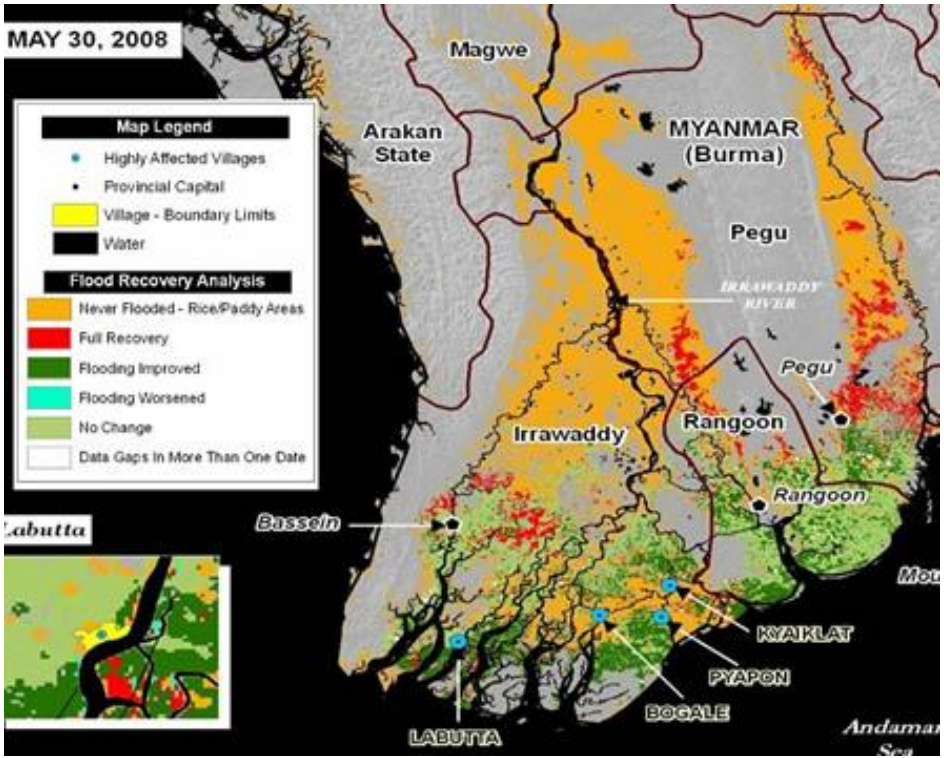
- Of all donors, puts the most emphasis on GIS
- 12% of searched projects include GIS or related term as a keyword
- RFA requirements: Activity GIS location data in many, mapping or other GIS data types in some
- GeoCenter (formed 2011) coordinates GIS data from all projects, provide analysis support, training
- Supports major GIS programs like FEWS NET and SERVIR
- Digital Strategy 2020-2024 mentions using geospatial data to prioritize investments

Figure 2. The Fspmaps.com user interface.



Gates Foundation

- No GIS requirements in many grants
- 62 projects from 1994-2021 had GIS as a core component (only 0.21% of total)
- Supports several big GIS initiatives
  - STARS
  - iSDA Soil
  - Harvest Choice
  - Financial services for the poor GIS maps of financial services



FAS Uses GIS, MODIS, and Landsat to Monitor Rice Production in Myanmar

USDA

- Does not have GIS requirements in many of its international project bids (might add in future?)
- But the FAS uses GIS very extensively for internal operations, has high level expertise, as do domestic divisions of USDA
- Platforms and tools to estimate and map crop production, yields, market prices, effect of crises
  - Crop Explorer
  - Global Agricultural & Disaster Assessment System (GADAS)
  - Global Agricultural Monitoring (GLAM)
  - Data is freely available, easily searchable

ONS and FCDO Data Science Hub

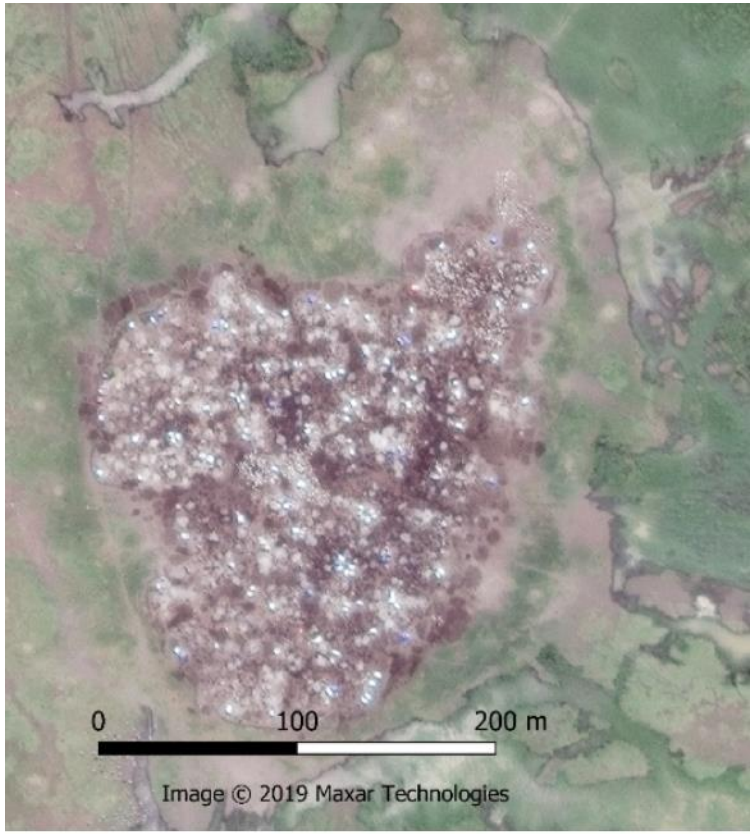


Figure 3 – Cattle Camp seen on pan-sharpened 0.5 metre image from Maxar showing campfires and structures in the camp and, in some locations, individual cattle

What do other donors want?

- None have common GIS requirements for projects
- But those with moderate involvement with GIS >>
- **European Union-** EU-CAFÉ; AgriCultuReS, NADiRA
- **FCDO-** Internal Data Science Hub; Cattle census in South Sudan; Many forest management projects; project to track and control Monilia disease in cocoa in Belize
- **Irish Aid-** GIS for risk reduction planning; Concern Worldwide GIS story map of ag livelihoods projects

DANIDA- PREMACA project

RESULTS –
What are our competitors doing?

Competitor GIS Resources

Some have dedicated HQ-based GIS units:

- **RTI-** Geospatial Technologies team
- **Tetratech-** Information System Group
- **DAI-** ICT/Geospatial Services Group

Others have projects with GIS specialists assigned:

- **Winrock-** KISAN, AgNRM, RISE II WSR
- **ACDI/VOCA-** FIFES, ADVANCE II, ACIP, BLNA
- **TechnoServe-** CajuLabs, ADVANCE II, Cellulant Agrikore
- **Chemonics-** RDPA, B+WISER, FEWS, Soma Umenye
- **CNFA-** Agro-Inputs Project Bangladesh

ACDI/VOCA Simple Mapping for Work Planning

- ADVANCE II, Ghana (USAID)
  - GIS specialist made many maps (70 in one year) to guide their work using public shape files + project activity data
  - Ex 1- FAW outbreak map made from call center data, use to prioritize visits
  - Ex 2- Used Smart cards to track farmers training attendance, then mapped coverage
- BLNA, Bangladesh (USAID)
  - Collected GPS locations of fodder plots, chilling centers, livestock service providers, and markets.
  - Used smart phones and "Simple GPS Display" App for collection, Bing Maps for mapping

CNFA- Market Info System and Relational MEL

Agro-Inputs Project Bangladesh (USAID)

- Contracted Spatial Systems Associate to make a Market Info System platform
- This include a map portal using ESRI software and a personalized Android App
- Collected GPS locations for 3,000 inputs retailers, tracked sales and other data on each
- The data also fed into Monthly price outlook bulletins, which included visualizations

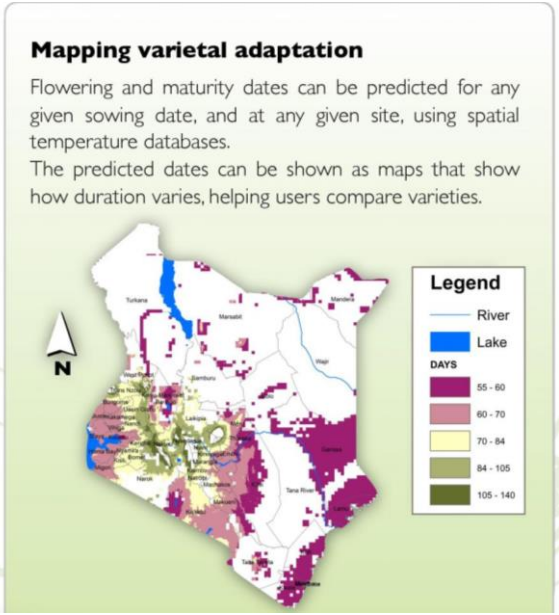
TechnoServe Crop Monitoring with Remote Sensing

Equator Seeds partnership, Uganda (Innovation in Outcome Measurement, Gates Foundation)

- Used drones and sensor data for monitoring seed multiplication fields of out-grower farmers in Uganda
- Piloted with 270 farmers, intention was to scale up to 30,000, BUT stopped after pilot due to high costs

CajuLab, Benin (USDA & Belgian Development Agency)

- Operate test plots of different climate smart ag practices for cashew
- Use AI analysis of aerial images (from drones and satellites) to monitor and assess the plots, use for adjusting the CSA recs

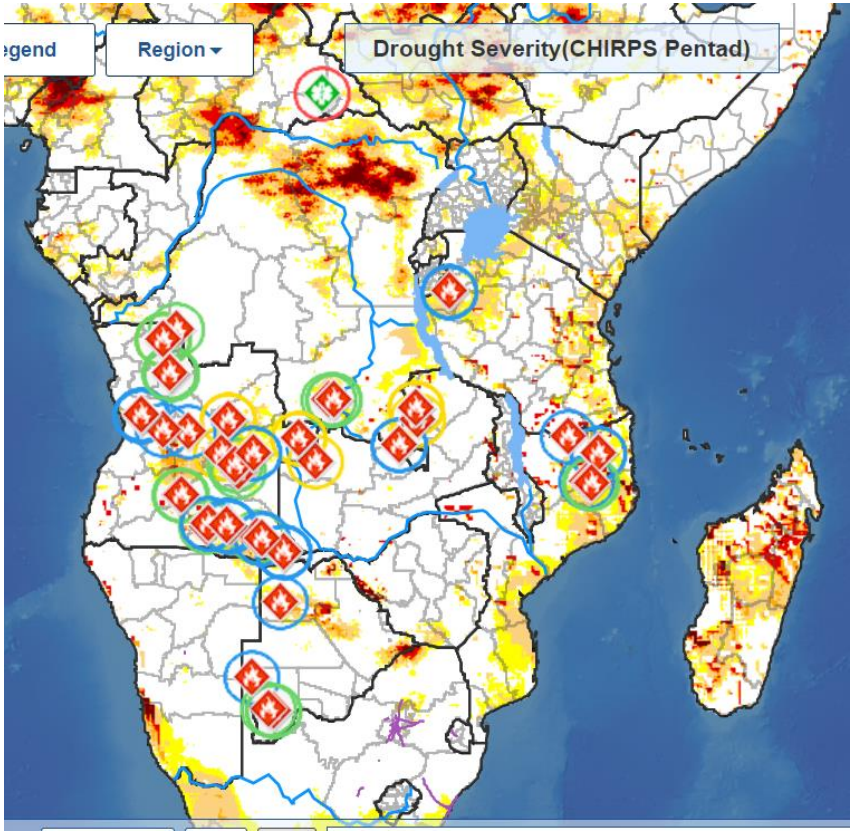


CIMMYT & IITA-

Tailored Advice for Farmers

TAMASA – Taking Maize Agronomy to Scale in Africa

- Worked in Ethiopia, Tanzania and Nigeria
- Gates foundation-funded
- Created tools using georeferenced maize trial data
  - Maize variety selector app
  - Maize Area Selector App
  - Nutrient Expert decision tool

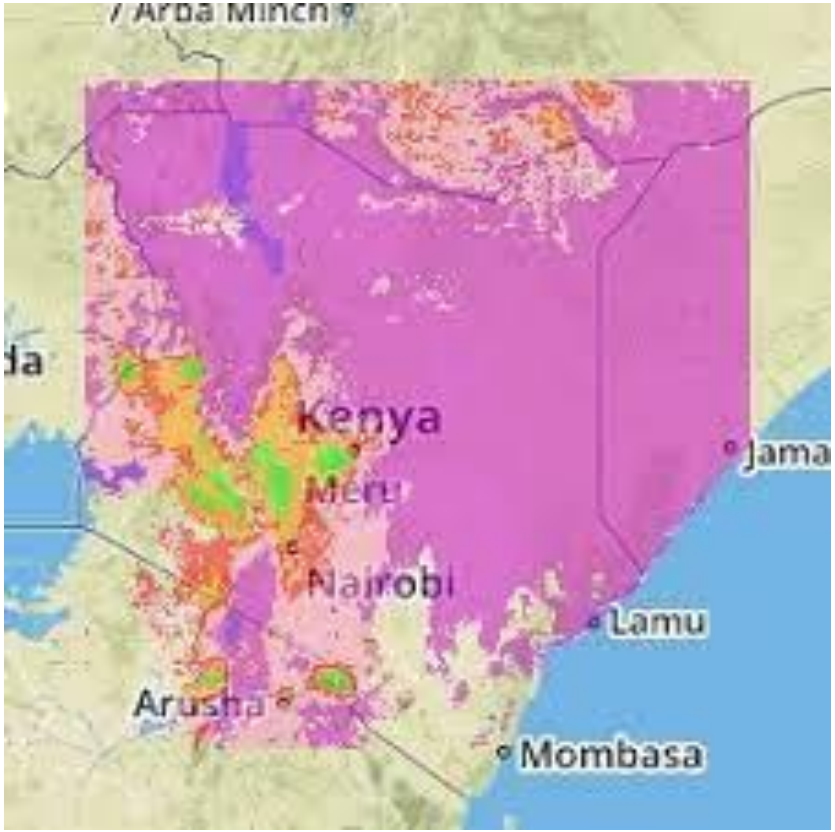


GADAS (usda.gov)

USDA Disaster Monitoring

GADAS (Global Agricultural and Disaster Assessment System)

- FAS used for rapid damage assessment for Haiti after Hurricane Matthew in 2016
- Quickly estimated flooded areas, agricultural land effected, population affected
- **Story Map shows other use cases**



SERVIR (USAID)

Frost Monitoring & Forecasting

- Developed by SERVIR project, for Kenya, to reduce losses from frost by tea farmers
- Combines weather and satellite data, plugs into a frost forecasting model
- Generates map of locations at risk for frost with 3 days warning
- Shared with farmers via radio, SMS, extension agents
- Evaluation found:
  - 40% accuracy rate of predictions
  - Reduced cost of frost damage by $80 on average per tea farmer

Frost Monitoring and Forecasting Service (servirglobal.net)

RESULTS –
Existing GIS Expertise in LOL Inc & V37

Current GIS Expertise

- **Internal V37 Capacity- existent, but low:**
    - Of 20 program staff surveyed, 3 have advanced and 5 have basic GIS experience
    - Of 19 projects, 9 use some level of GIS, though most is collected through a partner organization and use cases are limited (mostly just activity mapping)
- **Lots of experience to tap into from Land O'Lakes, Inc**
    - Many potential VentureLink Gigs volunteers
    - Major uses of GIS in Land O'Lakes, Inc:
        - Winfield United Answer Plots & R7 Tool
        - Business Analysis
        - Truterra Insights Engine

Winfield United Answer Plots & R7 Tool

Field Selection

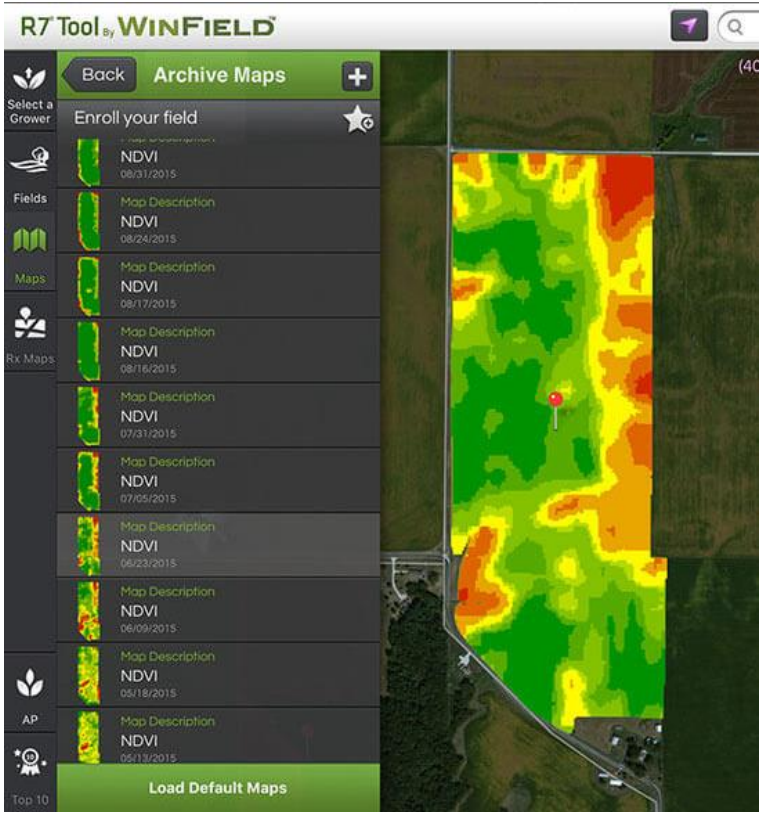
Measure geo-spatial elements of fields and load them into software tools for overlaying other data points

In-season monitoring for farmers

R7 Tool provides real-time satellite data and nearby Answer plot data for monitoring and advice

Precision Agriculture

Map ag-product application over field maps to enable precision planting, fertilizer, & crop protection application



Truterra Insights Engine

Add data inputs

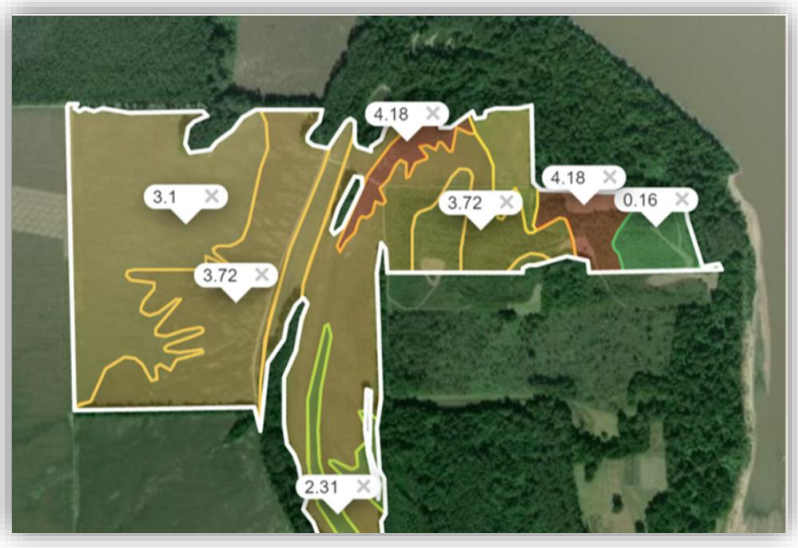
- Crop rotation, fertilizer, irrigation, cover crops, soil type

Anchor in geo-spatial data

- Farm and field level
- County aggregated level

Provide Insights

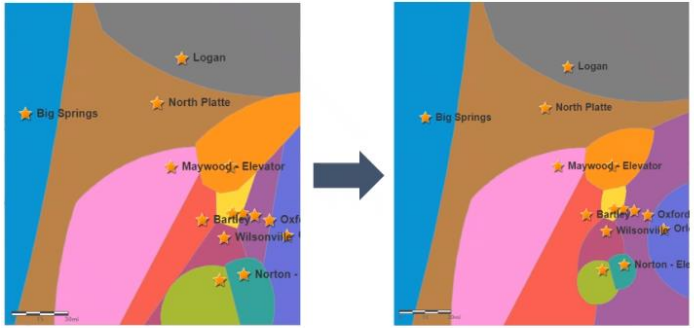
- Farm sustainability scores
- CPG companies use aggregated data for marketing



Business Analysis- Retailer Plant Insights

- Combine regional data
- Aid in choosing new retailer or plant locations
- Run mock scenarios like the impact of adjusting bid price

Corn bid differentiation ($.05 adj)



Projected financial impact of $.05/bu adj	
Current volume at selected locations*	15.6m bu
Anticipated reduction in volume**	(2.7m bu)
Remaining volume at selected locations	12.8m bu
Margin impact of lost volume at $0.20/bu	($547k)
$.05 margin increase on remaining volume	$641k
Reduced transfer cost at $.22/bu on 2.7m bu	$602k
Net financial impact	**$696k**

- Lowering the corn bid by $0.05 at select locations* drives grain deliveries directly to primary locations, reducing transfers
- Lower volume origination offset by increased margin & reduced transfers
- May require investment in addt'l grain capacity at other locations

Locations considered for $.05/bu reduction: Norton, Clayton, Eustis, Holbrook, Wilsonville & Orleans

**Volume impact assumes 35% reduction in volumes at selected locations, of which 50% is lost to competitors vs. alternate Ag Valley location

LAND O'LAKES, INC.
STRATEGIC ASSET MANAGEMENT

RECOMMENDATIONS

General Recs- Low hanging fruit

- Collect GPS coordinates of all project sites, where not already done
- Begin using the existing GPS data we have in simple ways
  - Make and regularly refer to project activity maps, for logistics planning
  - Make comparison maps with MEL data for evaluation reports
- Can do this with free software
  - Smart phone apps for data collection
  - Bing Maps or QGIS

General Recs- GIS Task Force

- Create a GIS task force, with GMEL + NBD and Program reps
- Proposed tasks would include:
  - Pick specific priority project use cases to begin some GIS work
  - Coordinate detailed planning of use cases together with project teams
  - Get basic GIS training, determine training plan for others in V37
  - Determine which GIS software platform to use at scale
  - Make decisions about outside expertise needed (gigs, new hires, contractors)
  - Define additional next steps needed

Example Existing project use case: Malawi CAT

- **Use maps to provide tailored recommendations to farmers**
  - Incorporate GEMS datasets and additional public data that is georeferenced
  - Potential tools could include:
    - Best new crops by location (using climate forecasts, expected yields, available markets)
    - Seed variety recommendations by location
- **Use for low-touch impact evaluation**
  - Compare maps of crops grown at baseline vs. after project
    - Tobacco vs. key alternative crops land area changes over time
    - Overlay CAT activity locations on this, to see any correlations

Example New project use case: RESINA

- **Make GIS maps to guide location selection**
  - Define criteria from variables mentioned in RFA
  - Map these using free data sources
  - Select locations with highest need, suitability for as many data layers as possible
  - Both simple illustrative mapping for proposal, more extensive if get award
- **Extrapolate RAMA trial plot findings to similar geographic areas**
  - Do matching on map of similar geographic areas from RAMA and RESINA (same agro-ecoloical zone, elevation, soil type, etc.)
  - Use RAMA trials results and these matches to determine useful recommendations to share with RESINA beneficiaries
  - Use this to guide some training, tools and other activity planning

Example New project use case: RESINA

- **Integrate GIS more into MEL plan**
  - Plan how external data can be combined with project survey data for deeper analysis
  - Plan some comparison maps to make at baseline vs. endline
- **Utilize GADAS platform to guide use of 10% crisis budget**
  - Plan to monitor the site regularly, and especially check after a known large disaster
  - Prioritize districts/postos which GADAS shows to have more affected crop area and people

What will this cost us?

- **Software**
  - Completely free options exist- simple systems like Google or Bing Maps, or full-service packages like QGIS
  - QGIS has the same functions as ArcGIS, a bit weaker on advanced functions
  - If we use ArcGIS:
    - NGOs can get reduced-price licenses (Admin fee only, might be very cheap, but would need to apply and then get a formal quote)
    - Would get licenses for both Online and Desktop versions
- **Hardware**
  - Smartphones with free GPS capture app- should be adequate, can be used without an internet connection
  - Dedicated GPS devices have a better success rate in connecting to satellites and are more durable for field use, but cost $85+

What will this cost us?

- **Expertise**
  - For “low-hanging fruit” recs, existing staff could do with minimal training
  - Could find volunteers using VentureLink-- to do some work directly, or lead trainings
  - For more sophisticated functions (using raw satellite data; modeling)
    - Would need more staff time for training and execution
    - Hiring a specialist or consultant, or even a GIS services firm, might start to make sense
  - Some cost estimates:
    - ESRI trainings $1,500-$2,500 each (40% discount for NGOs)
    - GIS full-time specialist in US- around $58,000/year
    - GIS specialist in Kenya- $9,000/year (??)
    - GIS part-time Consultant in US- $50-60 per hour

DISCUSSION

Discussion

- What questions do you have about these findings?
- What do you think of the recommended next steps?
    - Recs for current projects
    - GIS task force
- Any immediate extra research we need to do (especially around costs)?