Database-driven web mapping using jQuery, PHP, PostgreSQL & SDE

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http://geoglam-crop-monitor.org/
About the GEOGLAM Crop Monitor
Look at different phases of development as the application advanced
Understanding the roles of the different technologies used
   jQuery, PHP, PostgreSQL & SDE, etc.
Developing ArcGIS Mapping application with total customization flexibility
Group on Earth Observations (GEO) Global Agricultural Monitoring Initiative

Objective: Strengthen the international community’s capacity to produce and disseminate relevant information on agricultural production at national, regional and global scales, through earth observations (EO)

Adopted by the G-20 in 2011 as part of the Action Plan on Food Price Volatility & Agriculture along with the AMIS (Agricultural Market Information System)

http://www.earthobservations.org/geoglam.php
Objective: develop transparent, timely, crop condition assessments in primary agricultural production areas highlighting potential hotspots of stress/bumper crop.

These assessments reflect an international consensus of crop conditions.

Crop Monitor assessments are published monthly in the AMIS Market Monitor, with supplemental information available on the GEOGLAM Crop Monitor website.

http://www.geoglamm-crop-monitor.org

Coordinated by Inbal Becker-Reshef and Chris Justice, Center for Global Agricultural Monitoring Research, UMD
Application
Data Aggregation

Database Infrastructure

Interface Design

Usability & testing

Collect and organize data on server

Configure and set up tables and spatial databases

PHP, jQuery, HTML5, ESRI Maps

Communicate with end users for testing

Postgres Database SDE

WebGIS/ESRI

User Testing

Raster Layers
NDVI
Temperature
Rainfall
Imagery
Feature Layer
User input comments (db)
Crop Calendars

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Collect and organize data on server

Configure and set up tables and spatial databases

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Communicate with end users for testing
Assessment Reporting
<table>
<thead>
<tr>
<th>Country Name</th>
<th>Region Name</th>
<th>Crop Name</th>
<th>Condition</th>
<th>Trend</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Alberta</td>
<td>Spring Wheat</td>
<td>Watch</td>
<td>Stable</td>
<td>Heavy precipitation (more than 30 cm) in SW MB resulted in flooding</td>
</tr>
<tr>
<td>Canada</td>
<td>Manitoba</td>
<td>Spring Wheat</td>
<td>Watch</td>
<td>Worsening</td>
<td>Heavy precipitation (more than 30 cm) in SW MB from a large snowstorm resulted in flooding Seeding is essentially complete</td>
</tr>
<tr>
<td>Canada</td>
<td>Saskatchewan</td>
<td>Spring Wheat</td>
<td>Watch</td>
<td>Worsening</td>
<td>Heavy precipitation (more than 30 cm) in SW MB from a large snowstorm resulted in flooding Seeding is essentially complete</td>
</tr>
<tr>
<td>Argentina</td>
<td>Humid Pampa</td>
<td>Winter Wheat</td>
<td>Favorable</td>
<td></td>
<td>From Carlos di Bellas</td>
</tr>
<tr>
<td>Brazil</td>
<td>Central-West Region</td>
<td>Winter Wheat</td>
<td>Favorable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>South Region</td>
<td>Winter Wheat</td>
<td>Favorable</td>
<td>Stable</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>Southeast Region</td>
<td>Winter Wheat</td>
<td>Favorable</td>
<td>Stable</td>
<td></td>
</tr>
<tr>
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</table>
Map
Assessment Reporting
June 2014: Synthesis Maps

http://geoglam-crop-monitor.org/content/june-maps-and-charts
June 2014: Drivers and Impacts

http://geoglam-crop-monitor.org/content/june-maps-and-charts
Contributing to the Market Monitor

http://www.amis-outlook.org/
Agricultural Stress Index (ASI)

% of cropland area affected by drought per GAEZ, 2 region

From: start of SEASON 1
to: end of SEASON 2
Non-cropland years excluded

Legend

Crop NDVI Anomaly

< 0.4 0.4
Less green Average vegetation More green than avg than avg

FAO

UMD/NASA

JRC
Development Phases: Version 1

Description

- Simple web map to visualize data layers
  - NDVI
  - Rain Sum
  - Temperature Sum
  - Crop Calendar

- Purpose:
  - **Only to visualize data

Tech Specs

- ArcGIS Server
- REST
- jQuery
- HTML
Everything was hard coded
Early summer 2013
Development Phases: Version 2

**Description**
- Visualized data layers
- Use interface to collect data
- Purpose:
  - Visualize dataset
  - Collect Crop condition information
  - Based on Crop Calendars

**Tech Specs**
- ArcGIS Server
- REST
- jQuery & Ajax
  - Application functionality
  - To make php requests
- PHP
  - Query results from database
- MySQL
  - Reference Table
- HTML
**MySQL Database:**
- Fast set up time
- Works great with PHP
- Great way to store REST URL
- ** Made things way easier for populating the interface
- User Login/ Registration

**PHP Integration:**
- Allowed server side functionality
- Allowed us to manipulate the interface dynamically.
- Data Collection Submission from client side to server side.
- Database Query’s !!!!!!!!!!!!!!!!!!!

**New Challenge:**
- Crop Calendars
- To many REST Services
- Performance
- Expandability
Development Phases: Version 3

**Description**

- Visualized data layers.
- Use interface to collect data
- Different levels of users
  - Admin
  - Reporters, etc.
- Dynamically store spatial data
- Data product expandability!

**Tech Specs**

- ArcGIS Server
- REST
- jQuery & Ajax
  - Application functionality
  - To make php requests
- PHP
  - Query results from database
- PostgreSQL with SDE
  - Relational DB model
- HTML
PostgreSQL

- Enterprise-level database
- Leveraging the schemas
- Relational database model

PostgreSQL is perceived as more powerful, more focused on data integrity, and stricter at complying with SQL specifications, but correspondingly slower and more complicated to use.
ArcSDE

Contains one master geometry table that defines the boundaries of the administrative units. The boundaries are used when visualizing the data.

- Using Databases views to connect geometry to other DB tables
- Complex Joins
- Data Export

- We are only storing the geometry once.
Proxy & Security

**PHP Proxy File**

A PHP proxy that handles support for:
- Accessing cross domain resources
- Requests that exceed 2048 characters
- Accessing resources secured with token based authentication.
- OAuth 2.0 app logins
- Enabling logging
- Both resource and referer based rate limiting

**Instructions**

- Download and unzip the .zip file or clone the repository. You can download a released version (recommended) or the most recent daily build.
- Install the contents of the PHP folder by adding all files into a web directory.
- Test that the proxy is able to forward requests directly in the browser using:
Code Examples
Thank You

http://geoglam-crop-monitor.org

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