

# Development of a Web-Based GIS Management System for Agricultural Authorities in Iraq

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# Introduction

- Texas A&M University assisted the Ministry of Agriculture, Iraq National Program for the preparation of Agro-ecological Zoning System maps Department (AEZ), to initiate an online GIS program
- Part of the USAID-Inma Agribusiness Program, comprehensive program funded by the United States Agency for International Development (USAID) to support the development of agribusinesses and agricultural markets in Iraq
- Inma means "growth" in Arabic
- Training and technical expertise was provided on GIS methods and procedures, database, and web-based products implementation

# Objectives

- Conduct a preliminary analysis of the current organization, and identify the goals and scope of project
- Provide training to Iraqi cooperators on basic GIS skills needed for project
- Work with Iraqi cooperators and Inma personnel on implementation of the GIS

# Focus

- GIS and database capabilities
- Software, hardware and internet resources available
- Existing data and GIS
- Database system, including software and data organization
- Web-based products needed

# Preliminary analysis

- Several meetings were organized at the USAID-INMA Monsur compound in Baghdad, and at the AEZ office premises, with AEZ personnel, local ESRI software provider, and Inma personnel
- The AEZ Department was constituted in 2010, with a crew of 15 people with various background (ex. agronomist, computer science and statistical, data entry and analysis)
- Part of the GIS database and maps were created from a previous project carried out in 2005

# Preliminary analysis (cont)

- Available data: Land-use and land-cover classification maps, crop suitability maps, temperature maps
- AEZ current focus: Contribute improving management of water issues, identify soil salinity using satellite imagery, create land crop maps based on desertification
- Local network: Computers are not connected to a local network
- Software utilized: Excel and ArcGIS 9.3
- GIS experience: 3-7 years; a training room exists with several machines connected to a server with installed ArcGIS Server 9.3 Advance Enterprise and Microsoft SQL Server 2005 Enterprise. The server is not currently in use

# Preliminary analysis (cont)

## Identified interests

- Connect all computers
- Move to a real database (ex. SQL)
- Develop GIS advanced skills and image processing
- Create a website to be used for internal or public use

# Training and GIS Implementation

## Training Program

- The training program was agreed with AEZ personnel, and classes were taught by the local ESRI software provider (Atlas) at their training center
- Training was given in 4 components:
  - Advanced GIS
  - ArcGIS server
  - Multiuser geodatabase
  - Image processing
- The ESRI Arcgis server was identified as a key component of the training. It allow sharing resources, like maps, and to access the GIS functionalities embedded in them

# Implementation Component

The implementation component of our program included:

- Exchanging completed projects data
- Creating a new “AEZ-GIS Online” website (<http://aez-gisonline.org/>)
- Hosting online GIS demonstrations with collected data:
  - Land use/Land cover maps for the Middle Tigris area
  - Monthly average temperature in Iraq for several years, including interpolations among meteorological stations
  - Soil Suitability map for wheat in North Iraq
  - Soil Suitability map for wheat in Baghdad

To give a wider view of online GIS capabilities, we demonstrated two options:

- Directly publishing of SHP files with Esri ArcGIS Map Server
- Overlaying of KLM export of SHP files using Google Map API

# ESRI ArcGIS Server

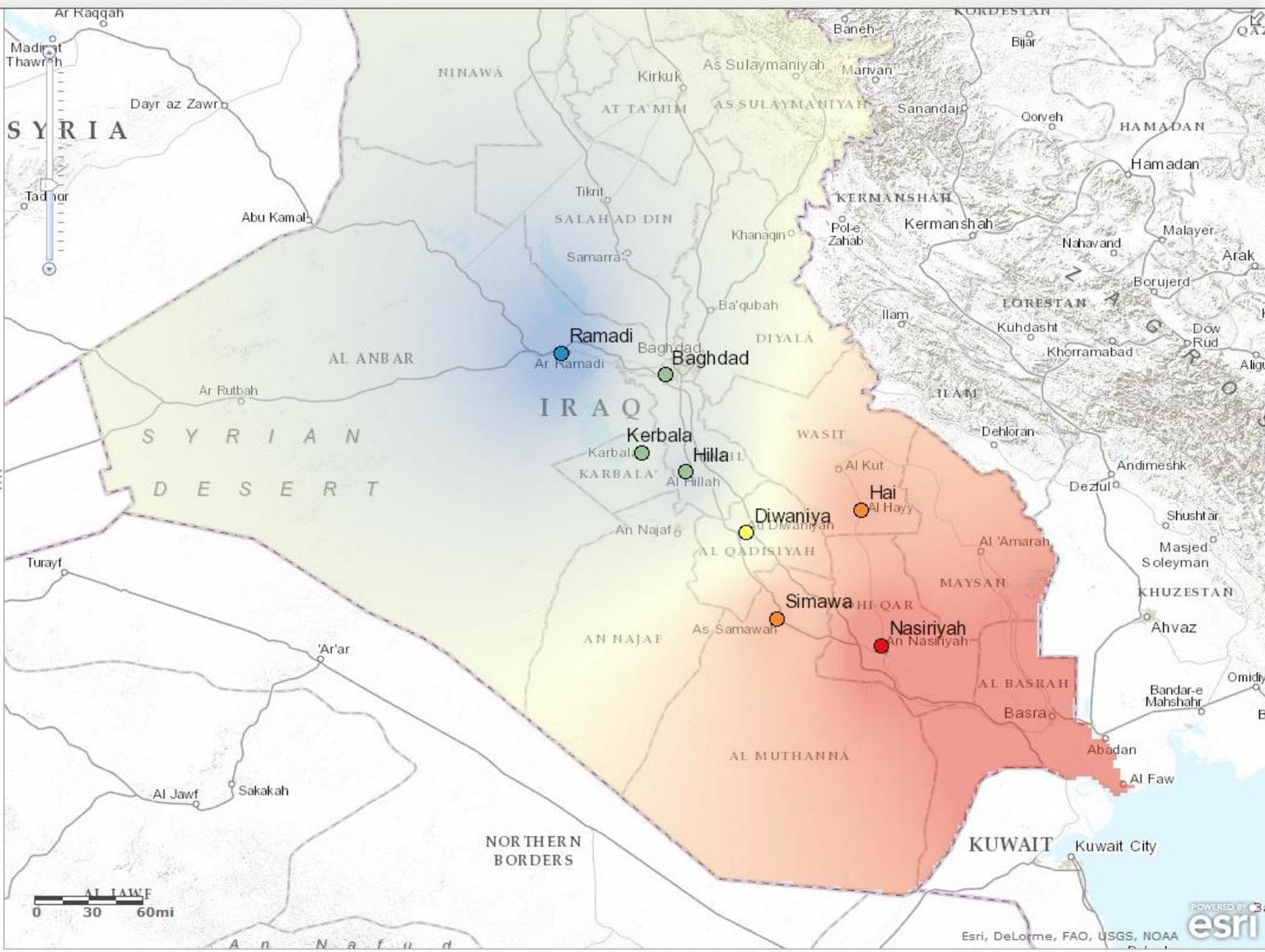
- Commercial – Licensing fees
- Requires software installation on a dedicated ArcGIS server in addition to a normal web server for site development
- Requires good working experience with ArcGIS

**Legend**

**AEZ**

**TEMPERATURE MAP**

- Annual\_2010\_station
- 24.225000
  - 24.225001 - 25.350000
  - 25.350001 - 25.591667
  - 25.591668 - 26.708333
  - 26.708334 - 27.383333
- Annual\_2010\_map
- High : 27.9163
- 
- Low : 24.2251



# Google Map with KML layer

- Freely available from Google
- Open and flexible API
- Requires working knowledge of ArcGIS for creation of the KML layers (it would also be possible to use polygons through the Google API)
- Requires web development knowledge for creation of the website

Map Satellite

**Layer Control**

**LULC - Middle Tigris**

- Land use/Land cover

**Temperature - Iraq**

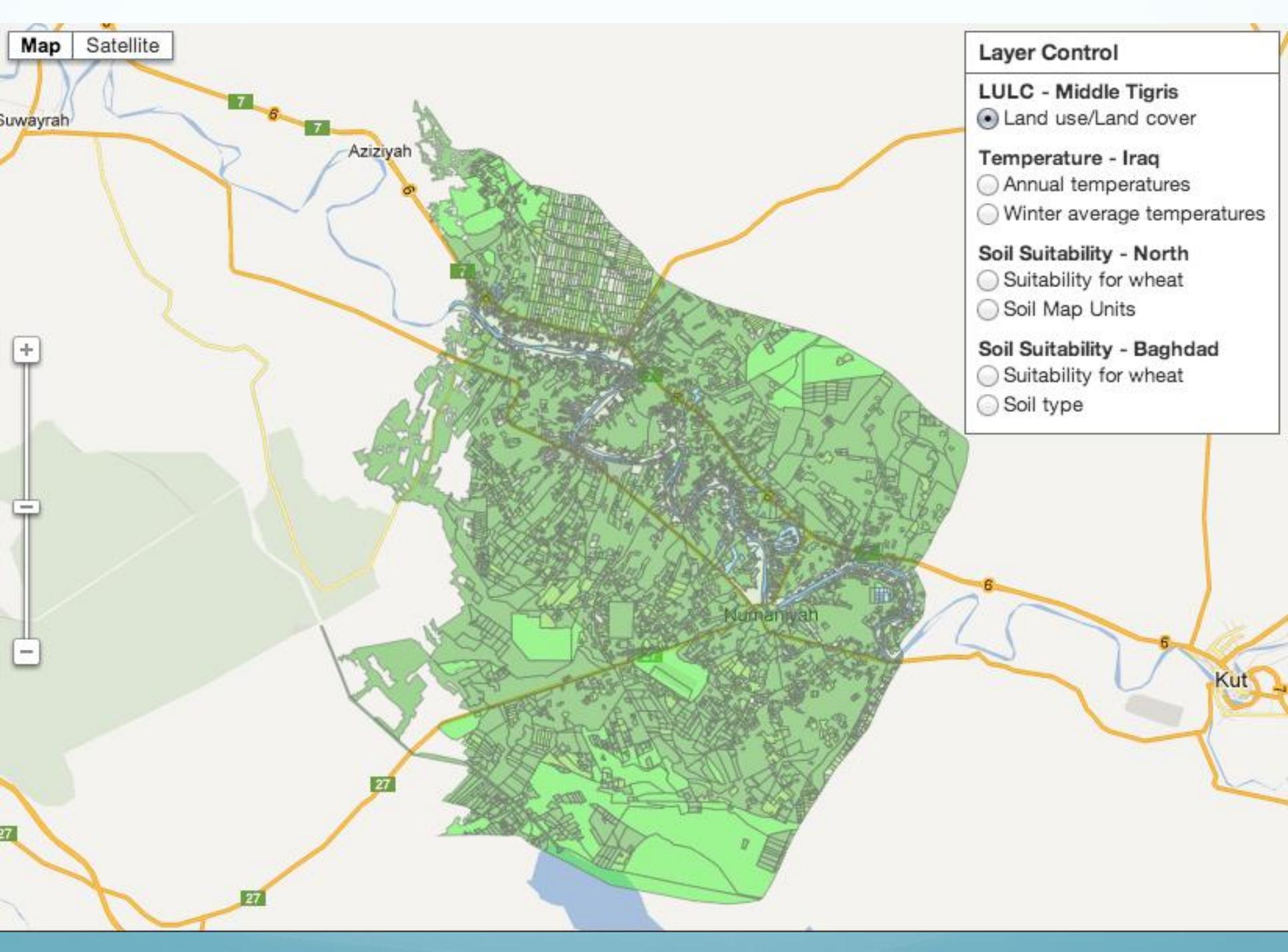
- Annual temperatures
- Winter average temperatures

**Soil Suitability - North**

- Suitability for wheat
- Soil Map Units

**Soil Suitability - Baghdad**

- Suitability for wheat
- Soil type



# Advantages

- ESRI ArcGIS Server 9.x
  - Native GIS Platform
  - Web publishing is integrated into the desktop client
  - Do not need to know web programming to use
- Google Map with KML layer
  - Fast
  - Open API
  - Very flexible design
  - Familiar Google maps interface
  - Can be deployed on any web server

# Disadvantages

- ESRI ArcGIS Server 9.x
  - Slow (version 10.x is much better)
  - Somewhat clumsy interface
  - Software to maintain, security patches, etc
  - Requires dedicated server hardware
- Google Map with KML layer
  - Requires advanced web development skills, especially JavaScript
  - Difficult to match map projections to get an absolutely accurate KML overlay

# Database management

- Provided and installed the Cisco Firewall
- Provided and installed one upgrade to ArcGIS Server Enterprise Advanced Up to Four Cores, version 10
- Identified preliminary steps
  - Getting an IP address
  - Setup a network among computers
- For security reasons, setup of the network and the construction of the database were not completed

# Conclusions

- The program provided a preliminary analysis of database and GIS capabilities at the Iraqi AEZ Department, together with a list of main interests. While GIS skills resulted fairly advanced, computers and database setup are basic and need improvement
- AEZ personnel expressed interest in specific GIS advanced training (ex. image processing) and in opening a public website

# Conclusions (cont)

- Three-weeks advanced GIS training was successfully completed by AEZ Department personnel
- We managed to obtain completed projects data and publish them as online GIS demonstrations in a new “AEZ-GIS Online” website (<http://aez-gisonline.org/>)
- To give a wider view of online GIS capabilities, we demonstrated two options, directly publishing SHP files with Esri ArcGIS Map Server, and overlaying KLM export of SHP files using Google Map API

# Conclusions (cont)

- For security reasons it was organized only one visit to the AEZ office, and working using a remote desktop was not possible. Therefore some related activities were slowed down and in some cases not completed
- Assisted by the local Esri software provider, we managed to provide and install a Cisco Firewall and an upgrade to ArcGIS Server Enterprise, but we could not setup the database and complete the ArcGIS Server registration. Online GIS services are therefore currently hosted in our server in Texas