Science in Support of Economic Development and Stabilization in Iraq and Afghanistan

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Conducted under the auspices of the Department of Defense (DoD) Task Force for Business and Stability Operations (TFBSO)

Scoping Missions April-June 2009

Project Began in October 2009 as a 2-year project

Project ended prematurely in September 2010 as DoD funding prioritization shifted to Afghanistan

Public release of final products through 2011
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Focus of USGS Activities

- Nonfuel Mineral Resources
- Water Resources
- Agromet Network
- Iraq National Spatial Data Infrastructure
- Modernization of GEOSURV Central Laboratories
Nonfuel Mineral Resources – Providing Mineral Resource Information and Technologies to Promote Economic Development in Iraq

- Updating Geologic and Mineral Deposit Information to Promote Investment in the Nonfuel Minerals Sector
- Reprocessing Existing Geophysical Data for Assessing Iraq’s Mineral Resource Potential
- Using ASTER Satellite Imagery for Identifying Areas of Mineral Resource Potential
- Regional Geochemical Surveys for Identifying Areas of Mineral Resource Potential in Western Desert

Newly Re-processed Aeromagnetic and Aero-radiometric Data
Water Resources – Development of Water Resources Information and Tools in Support of Economic Development in the Western Desert and Kurdistan Region of Iraq

- Surface Water Assessment in Support of Agriculture and Hydropower
- Groundwater Assessments Supporting Economic Development in Target Regions
- Transboundary Flow Assessment

- Water-quality monitoring
- Hydrogeologic cross section of Suleimaniya Basin
- Zlum Spring
- Tigris in Baghdad
- Renovation of satellite telemetry network
- 51 gauging stations
- 5 water quality stations
- 5 snow monitoring stations

MODIS 8-day Maximum Snow Cover Extent - Tigris / Euphrates Basins

- Current versus Previous Year
- Legend
- Rivers, Snow, Land, Water
Agromet Network for Iraq – A Critical Need for Increased Agricultural Productivity

- AgroMet Station Installation and Data Collection
- Crop Yield Forecasting
- Analyses and Publications
- Capacity Building
Iraq National Spatial Data Infrastructure (INSDI)

- INSDI Stakeholder Assessment and Strategic Plan
- Major Data Project Coordination
- INSDI Initial Website and GeoPortal
- Agency Enterprise Capacity Building Program
- Development of a USGS Project Portal

Stakeholder Organizations

- Baghdad Authority
- Prime Minister’s Office
- Ministry of Agriculture
- Ministry of Communications
- Ministry of Defense
- Ministry of Environment
- Ministry of Higher Education and Scientific Research
- Ministry of Industry and Minerals
- Ministry of Oil
- Ministry of Planning
- Ministry of Sciences and Technology
- Ministry of Transport and Communications
- Ministry of Water Resources
- Kurdistan Regional Statistical Office

Existing Situation

Future Vision

Network of Cooperating Nodes
Modernization of Geological Survey of Iraq Central Laboratories –
*A Critical Need for Sustainable Mineral and Water Resource Evaluations*

- Lab Evaluation and Recommendations
- Laboratory Information Management System (LIMS)

Reference Materials for Instrument Calibration
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Phase I – 2004-2007

- Under the Auspices of USAID and the Government of Afghanistan
- Nonfuel Mineral Resource Assessment – Countrywide
- Petroleum Resource Assessments – Afghan-Tajik, Helmand, and Katawaz Basins
- Water Resource Assessments of Kabul Basin and Selected Regions
- Earthquake Hazard Assessment – Countrywide
- Airborne Geophysical and Hyperspectral surveys – Countrywide

Field Investigations and Training

Digital aerial photography
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**Phase II – 2010-2011**

- Under the auspices of DoD/TFBSO and in cooperation with the Government of Afghanistan
- Focused on mineral resource and development potential of target areas identified in previous USGS mineral resource assessment (2007)
- Studies include hydrogeology, geophysics, hyperspectral remote sensing, geochemical sampling and resource analysis

Sampling at Balkhab

Trenching in Badakshan

**Important Areas of Mineral Interest Identified in FY 2010**
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- Compilation of data and information packages for each target area to promote interest in investment and development

- Compiled information based on existing and new field-derived data
  - New 20 and 40 m DEM
  - Quickbird and IKONOS Multispectral 17-m images
  - Hyperspectral data
  - ASTER mapping data
  - 2008 and previous geophysical data
  - Data from scoping missions
  - Data from AGS field work
  - Data from archival compilations

Hyperspectral Data
Zarkashan Cu-Au area

Sampling in Khanneshin U-REE District

Color Comparison Chart
- Fe<sup>3+</sup> Type 1
- Fe<sup>3+</sup> Type 2
- Ferrhydrite
- Goethite, Fine-Grained
- Goethite, Medium-Grained
- Goethite, Coarse-Grained
- Epitrite
- Chlorite
- Isonite
- Maghemite
- Goethite + Isonite
- Not Classified
- Wet Soils
- Water
- Cloud

Data and Information Package

Geophysics
Landsat
ASTER
SARS, Airs
Hyperspectral
Geology
1 m Imagery

Prioritized Target Area

Sampling and Mapping
Challenges, Issues, and Lessons Learned

- Two customers...sometimes with different needs and requirements
- Communicating the importance of making data and information available to the public domain
- Doing field work in a conflict zone
Science Diplomacy at All Levels

With Fellow Scientists

With Government Leaders
Thank You