Natural Resource Assessments in Afghanistan Supported by High Resolution Digital Elevation Modeling and Multi-spectral Image Analysis

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USGS/USAID Natural Resource Assessments

Purpose is to support reconstruction activities by providing scientific information and foundation for future economic activities.

Natural resource assessments include scientific investigations and mapping activities for:

- Coal
- Oil and natural gas
- Minerals
- Hydrologic resources – groundwater and surface water
- Earthquake and flood hazards
Natural Resource Assessments Require Remote Sensing and GIS

Spectral Resolution of Quickbird, Landsat 7 ETM+, and ASTER and band ratios used for mineral mapping

ASTER BAND RATIO AND RBD IMAGES
B3/B2 - VEGETATION
B2/B1 - Fe³⁺
(B4+B6) / B5 - ALUNITE, KAOLINITE
(B5+B7) / B6 - MUSCOVITE, SMECTITE-ILLITE, SERICIT
(B7+B9) / B8 - CARBONATE, EPIDOTE, CHLORITE
B14 / B12 - QUARTZ-RICH ROCKS
Kajakai Dam and Spillway Level Increase: Location and Plan

- Kajakai Dam and Reservoir in Helmand and Uruzgan Provinces, SW Afghanistan
Kajakai Dam and Spillway Level Increase

- Terrain Visualization of Kajakai Dam

Image Credit: Digital Globe, Inc.

Civil Commercial Imagery Evaluation Workshop
March 14-16, 2006
USFWS National Wildlife Visitors Center, Laurel MD
Kajakai Dam and Spillway Level Increase: SRTM Elevation Data

Current Agricultural Areas

Town

1045 and 1050 Elevation Contours

Image Credit: Digital Globe, Inc.
Need for More Accurate and Refined Elevation Model
SPOT5 2.5m Resolution Panchromatic Image Stereo Collection

Image date 02/26/06

Image date 02/27/06

Image Credit: SPOT Image Corporation

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SPOT Derived 5m Resolution DEM

Raw 5m Derived DEM
Qualitative Elevation Comparison Results

SRTM 1045 (yellow) and 1050 (red)
SPOT 1050 (green)
Elevation Contours

Image Credit: Digital Globe, Inc.
New Reservoir Impact to Landuse/Landcover

Areas of Irrigated Agriculture

Landsat Image

Image1

Image2
Conclusion

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