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

Peter G. Chirico
USGS
Earth Surface Processes Team
12201 Sunrise Valley Drive
Reston, VA 20192
pchirico@usgs.gov
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

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

Image Credit: Digital Globe, Inc.
Need for More Accurate and Refined Elevation Model

1045 and 1050 Elevation Contours

GPS Control Points

Image Credit: Digital Globe, Inc.

Civil Commercial Imagery Evaluation Workshop
March 14-16, 2006
USFWS National Wildlife Visitors Center, Laurel MD
SPOT5 2.5m Resolution Panchromatic Image Stereo Collection

Image date 02/26/06

Image date 02/27/06

Image Credit: SPOT Image Corporation

Civil Commercial Imagery Evaluation Workshop
March 14-16, 2006
USFWS National Wildlife Visitors Center, Laurel MD
SPOT Derived 5m Resolution DEM
Qualitative Elevation Comparison Results

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

GPS Control Points

1061.63
1054.92

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

Areas of Irrigated Agriculture

Landsat Image

Image1

Image2

Image1

Image2
Conclusion

Peter G. Chirico
USGS
Earth Surface Processes Team
12201 Sunrise Valley Drive
Reston, VA 20192
pchirico@usgs.gov