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Water and Sustainable Development
From vision to action



Application of geospatial and geophysical technologies to identify potential aquifer drilling points

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Short summary

This case study was undertaken in Mali in support of the peacekeeping mission (MINUSMA) operations. The study used geospatial technologies and geophysical surveys to identify exact drilling points to secure potable water in support of deployment of UN troops and civilian personnel. Both, radar and multispectral satellite imagery was processed, analyzed, and interpreted to map geological features and coupled with spatial/terrain analyses (surface modeling) to identify potential sites for groundwater. Field geophysical surveys were conducted and the collected data was analyzed to model the subsurface. Three-Dimensional models of the aquifers were produced through the integration of the surface and subsurface models. Then drilling points were located in the deepest parts of the aquifers. A very high rate of success was achieved in this drilling campaign (over 90%) and in some areas (e.g. Kidal) historical highest yields were secured.

Key Words:

Geospatial Technologies, GIS, Spatial Analysis, Terrain Analysis, Remote Sensing, Satellite Imagery, Geophysical Surveys, SuprSting

Issues addressed:

Water resources management (water-use efficiency, integrated water resources management, transboundary cooperation, sustainable extraction and supply of freshwater)

Sustainable extraction of and supply of freshwater: Groundwater exploration in dry zones in Mali and drilling of boreholes to extract the water from the identified aquifers to sustain the peace keeping missions operations and share fresh water with the local population.

Tools for implementation

Technology: Geospatial technologies and geophysical surveys.

Who is involved?: The GIS Section in United Nations Global Service Centre and a local drilling contractor.

What were the objectives of the intervention?: Secure fresh water for peacekeeping mission in Mali (MINUSMA).

Implementation challenges: Collection of hydrogeological information to perform rigorous desk studies, conduction of geophysical surveys and drilling boreholes in many sites across Mali in a short timeframe that required serious logistical preparations and adjustment of plans as deemed necessary.

Main task/activities undertaken: Identification of sites with high potential for groundwater and drilling successful boreholes.

Main outcomes / impacts (what has changed?): Very productive wells and a very high success rate of over 90%. Very positive impact on sustaining MINUSMA operations and eliminate the need to compete with the local population on their limited water resources. Also, sharing fresh water with local population was well perceived by the beneficiaries and the government authorities.

Lessons learned

Triggers: Deployment of UN missions in dry zones.

Drivers: Sustaining UN missions' operations and providing access to clean fresh water to the locals as well.

What has worked well?: Coordination with different mission components to ensure proper logistical preparations to allow the team to move from one site to another to perform their duties.

What can be improved?: Early communication regarding the request for services.

The way forward: Extension of the groundwater exploration service to other UN Agencies, Funds, and Programmes through Service Levels Agreements (SLAs).