



Height Above Nearest Drainage coupled with lineament mapping for delineating groundwater potential zones in Moroccan Central Middle Atlas.

Nadia Hamdani and Abdennasser Baali

Sidi Mohamed Ben Abdellah University, Faculty of sciences Dhar el Mahraz, Geology department, FES, Morocco
(nadiahamdani91@gmail.com)

In the 21st century, global warming, erratic rainfall and the pressure on the groundwater resources is becoming severe leading to water scarcity, which contributes to the poverty of around one-third of the world's people. Hence, it became necessary to use new geospatial technologies for mapping and monitoring of groundwater resources. Spatial analysis of hydro-geological lineaments network and hydrological modeling may allow accurate identification of zones that favor infiltration and recharge of overexploited groundwater. The Moroccan Middle Atlas region suffers from a chronic lack of reliable hydro-geological maps for local water resource managers. This research aims to assess the relative contribution of the topo-hydrological factor, known as Height Above Nearest Drainage (HAND) for efficient exploration and management of groundwater resources in Central Middle Atlas (Morocco). Our methodology is based on the Landsat-8 Operational Land Imager (OLI) data for retrieving the lineaments and the elevation data from Shuttle Radar Topography Mission (SRTM) for HAND model calculation. Four landscape classes namely waterlogged, wetland sloped, hillslope and plateaus, corresponding to the main hydrological regimes were delineated using HAND model. In addition, fissured limestone plateaus, faults, karstic shapes, water sources, lakes, and groundwater levels have been used to develop a decision support system based on Multi Criteria Analysis. The fractures analysis indicated that study area has many long and short hydro-geological lineaments with the highest densities are oriented NE-SW. Their synergy with the HAND model and the other factors has allowed the detection of potential areas for the recharge of groundwater table. The results have been confirmed and validated using lakes, water sources and piezometric levels. The HAND based landscape classification appears to be an efficient factor to groundwater potential zones mapping and the developed methodology may serve as an efficient tool for optimal groundwater management and development planning.

Keywords: Hydro-geological lineaments, Groundwater, Remote Sensing, HAND, Landscape classification, Middle Atlas, Morocco.