CLIMB Case Study: Gaza Site, Palestine

Study site

The Gaza Strip is a part of the Mediterranean coastal plain (31°26’N, 34°23’E). Its area is about 365 km² and its length is approximately 45 km. The urban areas are very dense. An estimated 1.7 million people live in Gaza by the end of 2012, with a density of more than 4,500 people/km², making it one of the most overcrowded areas in the world. Nowadays, the need of water is not satisfied by the available resources, and this is causing a huge deficit between water demand and supply. Considering the nowadays population growth rate of about 3.5 %, by year 2035 the population will reach a total number of about 3,7 million. This rate plays a big role in the planning and management of water resources.

Challenges

Water
- groundwater as the only current resource of fresh water in Gaza
- increasing water shortages from lower rainfall and higher evaporation
- increasing storm water flooding from greater rainfall variability
- insufficient rain to recharge aquifers
- lower supply of water from Israel

Agriculture / Coastal Management
- changes in economic viability of crops
- more frequent droughts and increased desertification
- increased crop water requirements
- saline intrusion into the Coastal Aquifer
- land use impacts from sea-level rise and coastal erosion

Results

Analysis of climate change impacts on available water resources is undertaken for Gaza aquifer catchments area. IUG in cooperation with LMU and CRS4 applied two hydrological models (Wasim-ETH, CODESA-3D). The models delivered estimates of changes in hydrological components. Advanced climate scenario analysis techniques in addition to risk analysis and mitigation of seawater intrusion in coastal aquifers under climate induced changes was employed. The results showed that overexploitation of Gaza coastal aquifer is leading to constant drop in water level, which estimated to be about 20-30 cm/year. In addition, groundwater salinity is considered to be most pressing problems.

Field monitoring and measurement for subsurface hydrological processes was performed and adjusted to specific requirements. Using Remote Sensing, GIS and field visits helped to update land use land cover maps. This served in providing spatial knowledge about major indicators that are lent to describe land use dynamics and ecosystem change over the recent ten years. Segmentation algorithms were applied to high resolution imagery to produce high precision classifications of urban and agricultural areas. IUG had succeeded to develop new soil map based on laboratory analysis of more than 200 collected samples.

IUG team realised around 50 local activities to notify and update local related stakeholders to ensure dissemination of achieved results and gather future support and implementations of outcome results. Other regional activities (Workshops, conferences, meetings, ...) were conducted in close cooperation with regional experts (Egypt, Tunisia, Morocco, ...). This served to ensure optimised dissemination of results in the regional level.

A metrological station was purchased in January 2013. The station provide updated information for future modeling research which help IUG staff continuing research in field and sustain project after 2013.