Groundwater Management of the South Al Batinah/Interior Governorates in the Sultanate of Oman

By
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Facts & Statistics

- One of the driest and hottest countries of the world
- The Sultanate classified among the countries falling below the water poverty line
- Annual renewable water resources = 1300 Mm³
- 70 % of them is used and the rest is lost to the sea or desert
- 92 % of water resources used in agriculture
Distribution of rainfall rates in the Sultanate governorates

Mean of Monthly Rainfall (mm) for the period 1988-2013 in the Jabal Al Akhdar Area

Muscat, 28/10/2014
Objectives

- To understand and clarify the role of groundwater in the region;

- To overview the problems associated with groundwater in the study area;

- To address the challenges of the groundwater resource management in the study area;
Most of the water demand in the study area is supplied by groundwater resources.

A gap between recharge and discharge.

Absence of alternatives water resources.

Quantifying the available water is very crucial for effective water resource management, sustainable agriculture and stable environment.
Geomorphology & Geology of the Study Area
Problems Associated with Groundwater in the Study Area

Depletion of the Groundwater

Water Level in the Different Monitoring Wells in Northern Part Chatchments

Legend
- Pzometers
- GWL_msl
dem_sarea_90m
- 22 - 134
- 134 - 279
- 279 - 490
- 490 - 763
- 763 - 1,157
- 1,157 - 1,720
- 1,720 - 2,383

28/10/2014
Problems Associated with Groundwater in the Study Area

Depletion of the Groundwater

Water level in the different monitoring wells southern part catchment
Problems Associated with Groundwater in the Study Area

Oman Salinity Strategy 2012 (MAF)
GW use is about 54% higher than renewable supplies

MRMWR, 2012
Salinity moved 12 km towards inland in 2005

Walther M. et al, 2014
2-4 km (1974) - 5-7 km in 2005
Final state of transient simulation
Problems Associated with Groundwater in the Study Area

- **Groundwater pollution**
  Microbial and chemical contamination in the densely populated areas because of the lack of wastewater sewerage systems and the extensive use of septic tanks.

Agrochemicals, fertilizer and pesticides, is widespread and is a serious hazard to groundwater quality as most aquifers are unconfined and soils are sandy loams with low organic content.

Storage tanks of gasoline and oil, hazardous waste sites and landfills
Main Challenges in Study Area

- Balance between demand and renewable water resources
- Protection of water resources from both pollution and depletion
- Increase in collection and reuse of treated wastewater
- Secure agricultural water demand according to the available water resources
- The complexity of the hydrologic system & Lack of information
Alternative Water Sources in the Study area

- 12 of treatment plants operated by the MRMWR distributed in the towns located in the study area.
- One main water desalination plant located in Barka operated by PAEW supplied most Wilayates of the study area (under progress).
Groundwater management Issues

- Institutions Governing groundwater
  - Water rights & legislation
  - Stakeholders participation
  - Awareness and education

- Management Functions
  - Basin planning
  - Information management
  - Resource allocation
  - Pollution control
  - Prevention of side effects

- Technical Inputs
  - Resource Assessment
  - Quality evaluation
  - Aquifer monitoring networks
Conclusions

- Quantifying groundwater resources is a key issue for the management of the limited water resources in arid regions,
- The main challenges facing groundwater in the study area are scarcity, sea water intrusion, and anthropogenic pollution,
- Applying of alternative water resources will reduce the pressure on groundwater aquifers,
- Constructing of the recharge dams to increase the infiltration and storage dams to harvest water will reduce the salinity intrusion and groundwater depletion,
- Consider IWRM tools for change in different areas to improve water management systems

Muscat, 28/10/2014
Next Steps of the Study

Development and application of a large-scale groundwater balance model to:

- understanding the nature of groundwater recharge in the study area,
- Identify the major flowpaths and residence times of the water recharging the aquifers,
- Evaluate of the past and current state of the system,
- Evaluate the water budget in a mixed region and to identify and apply sustainable management strategies of the existing groundwater resources.
Thank you for your attendance........