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The Relationship between Groundwater Levels, Groundwater Salinity and Irrigation Activity

A crucial part of this initiative is to provide information on current status of groundwater levels, groundwater salinity, irrigation practices, and optimal groundwater table depth to assess their impact on crop production. A range of techniques, including the Soil-Water-Atmosphere-Plant (SWAP), are being deployed to achieve this.

This research component is designed to:

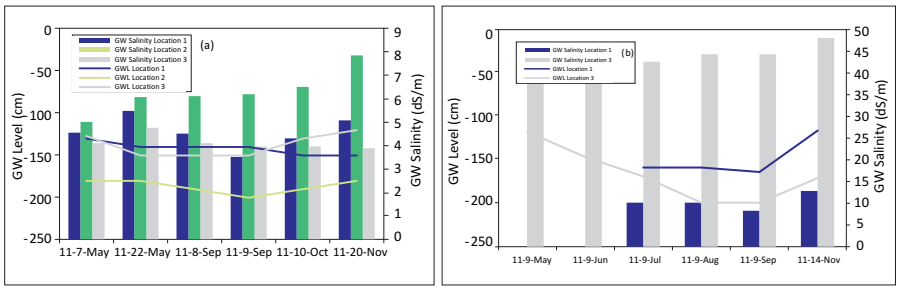
- **Assess the current state of groundwater and soil salinity, irrigation infrastructure and practices, drainage infrastructure and its management and their combined impact on crop production**
- **Determine groundwater management that prevents excessive salt accumulation whilst minimising irrigation water use and drainage requirement under a variety of climatic, soil and cropping conditions.**

How we're working

A comprehensive activity was started in May, 2011 to determine the physical properties of soil profile, depth to groundwater table and water quality (Graph 1b) at various points located in the two study areas of Al-Mussaib and Al-Dujaila.

This data along the crop evapotranspiration has been used in developing the Soil-Water-Atmosphere-Plant (SWAP) model to achieve the project objectives. The SWAP model has been calibrated to investigate the optimal groundwater level and irrigation depth for and soil salinity management.

Existing groundwater table depth and quality in (a) Al-Mussaib and (b) Al-Dujaila project areas. The initial SWAP simulations show that for the locations having GWT within 150-200 cm, 400-500 mm of irrigation for wheat is enough to get near potential yields and maintain GWT within safe limits. Increased salinity of irrigation water (GW salinity > 6 dS/m) will significantly decrease the yield due to high levels of soil salinity while saline irrigation water quality can considerably affect wheat yield. Therefore, Irrigation water of higher salinity may be used where drainage systems are operational and where additional water can be applied to leach down the salts from root zone. With reference to areas where drainage facilities are not available, controlling irrigation amounts and irrigation water quality would be the best options.



Observation of Grandwater level and salinity

Early results (at February 2012):

- The current irrigation practice is applying too much water to wheat and is causing ground water tables (GWT) to rise.
- Increased salinity of irrigation water will consequently increase soil salinity and lead to significant negative impacts on yields.
- It is necessary to modify the usual local trend of irrigation, to achieve the correct GWT lying and to achieve the near optimal yields of wheat.
- Increased salinity of irrigation water will consequently increase soil salinity

Through 2012**, activities in this Component** will continue with:

- Data collection of Cropping patterns, crop yields and fertilizer use;
- Provide information on chemical soil properties and water quality;
- Provide analysis of groundwater quality, soil salinization and drainage

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