WESI

Faria Catchment

Water Resources

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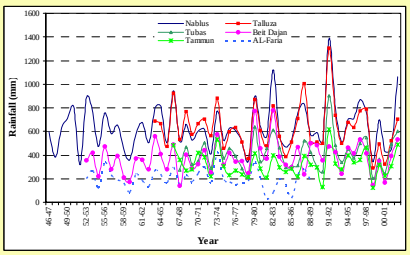
General

In the Faria catchment, water resources are either surface or groundwater. Most surface runoff in the catchment is usually lost in winter as there are no storage structures in the catchment to store that excess water. The groundwater aquifer system of the Faria catchment comprises several rock formations from the Triassic (Lower Cretaceous) to recent age. These formations are composed mainly of Limestone, Dolomite and marl. Ground aquifers are usually utilized through springs and wells. Most of the springs are located in the upper and middle parts of the catchment.. Rainfall is the main replenishment of surface and groundwater resources in the Faria catchment.

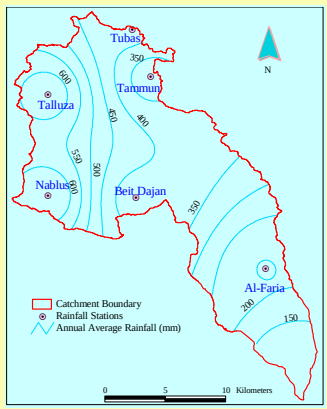
Rainfall

The Faria catchment is gauged by six rainfall stations that record rainfalls. These stations are: Nablus, Taluza, Tammun, Tubas, Beit Dajan and Al-Faria. The Nablus station is a regular weather station in which most climatic data are measured. Monthly and annual rainfall data for this station is available for more than 55 years (from 1947-2005). Al-Faria station is located in Al-Jiftlik village in the lower part of the catchment and is still under Israeli control. Therefore, data available from this station is limited to only few years. The other four rainfall stations are located in the schools of Taluza, Tubas, Tammun and Beit Dajan. These stations are simple rain gages which measure daily rainfall. Data from these stations cover also monthly and annual rainfall for 30 to 40 years.

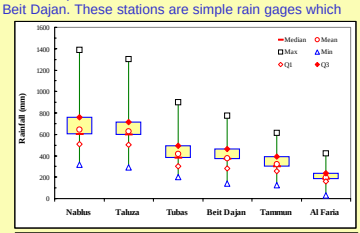
The magnitude of rainfall in the Faria catchment varies with space and time. The rainfall distribution within the catchment ranges from 640 mm at the headwater to 150 mm at the outlet to the Jordan River. In general, rainfall averages decrease moving from north to south and west to east.



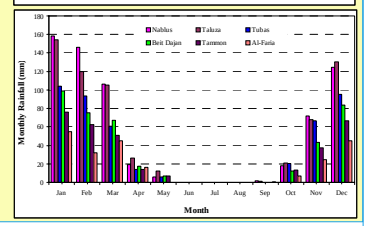
The annual rainfall variation for different year periods for various rainfall stations in the Faria catchment.



Box plots were prepared to illustrate the statistical values of the annual rainfall for each station of the annual rainfall for the stations of the Faria catchment. Nablus station has the highest annual rainfall with median and maximum values of 606 and 642 mm. Whereas Al-Faria station has the lowest statistical values.

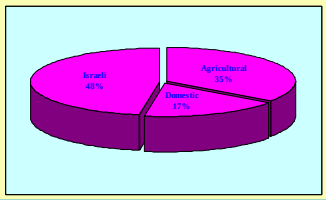


The average monthly rainfall of the six stations of the catchment. The plots indicate the wet period from November until April and that there is a relatively dry period from May to October. This is associated with the climatic conditions of the catchment.

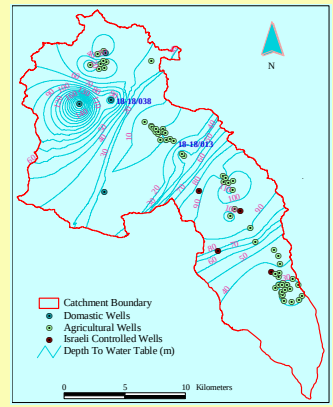


Groundwater Wells

There are 70 wells in the Faria catchment; of which 61 are agricultural, 4 are domestic and 5 are utilized by Israeli. Based on the available data, the total utilization of the Palestinian wells ranges from 4.4 to 11.5 MCM/year. Data on the pumping rates from the Israeli controlled wells is available for four wells for only four years. The average total abstraction from these four wells was found to be about 8 MCM/year. Average well abstraction from Israeli controlled wells is about 2 MCM/year. Thus, considering the fifth Israeli controlled well without data available, the total abstraction from the five Israeli controlled wells in the Faria catchment is estimated at 10 MCM/year, which is more than the 62 Palestinian agricultural wells combined. Depth to water table in the Faria catchment is in the range from 10 to 190 meter.



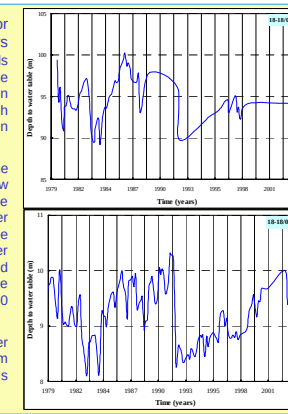
Percentage of the average annual abstraction from the Faria catchment wells.



Analysis of water levels for continuous data of about 30 years for the Faria catchment wells showed that there is a large variability of water table elevations in upper part of the catchment which could be attributed to variations in rainfall and pumping rates.

Wells in the Neogene aquifer in the middle areas of the catchment show very small variability in water table elevations. Records for wells in upper Cenomanian, alluvium and Eocene aquifers in the middle and lower areas of the catchment showed significant reductions in water table elevations. This reduction is 10 to 20 meters for the last 30 years.

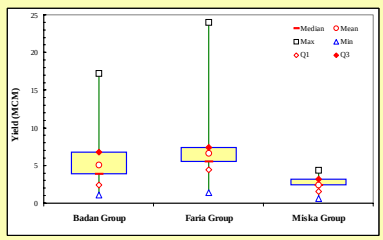
The impacts of the reduction in water table elevations are also seen from the increase in water salinity for wells in the lower parts of the catchment.

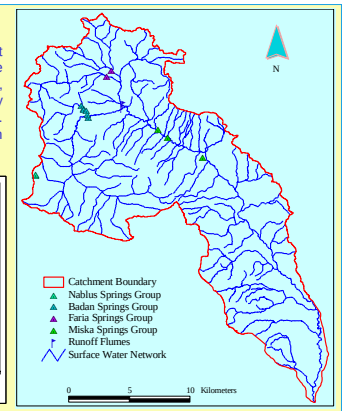


Springs

Springs are the only natural drainage outlets for ground water in Faria catchment. Most of the springs are located in the upper and middle parts of the catchment. Within the Faria catchment there exists 11 fresh water springs forming three groups: Faria, Badan, and Miska in addition to another two springs that are entirely utilized by the city of Nablus. Discharge data of the springs show high spring discharge variability. Annual discharge from these springs varies from 3.8 to 38.3 MCM/year with an average amount of 14.4 MCM/year.

Box plots were used for better visualization of the annual spring yield for each springs group of the Faria catchment. Faria group has the highest annual yield with median and maximum values of 5.5 and 6.6 MCM. Whereas Miska group has the lowest statistical values.

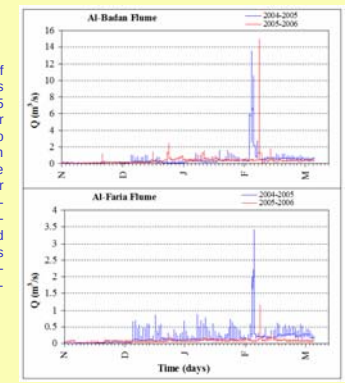




Surface Water

No detailed runoff data were available for Faria catchment. The only hydraulic structure which was constructed in the early 70's for measuring surface runoff in the Faria catchment is located next to Ein Shibli in the lower central part of the catchment. This hydraulic structure is a wide crested weir which is used as a diversion structure to Al-Faria Irrigation Project. The structure has an upstream stage gage which could be monitored to estimate runoff flows. However, the structure does not have an automatic recorder to register water stage continuously. Therefore, only few sporadic measurements are available for runoff rates from structure. These measurements are not sufficient to estimate the volume of annual runoff through the structure. In August 2003, An-Najah National University in coordination with GLOWA JR project established two Parshall Flumes at the upper part the catchment to measure runoff rates from both Al-Badan and Al-Faria Wadis, which meet at Jiser Al-Malaqi, 10 km east of Nablus city.

Continuous records of 10 minutes time steps are available for about 5 months from November to March for the two years 2004-2006. From these records it can be inferred that one major runoff event, low-frequency and high-amplitude, is observed as part of the obvious continuous, high-frequency and low-amplitude baseflow.



Water Demands

In the Faria catchment as well as the rest of the West Bank, water demands data are not available. Therefore, all data available regarding demands is mostly consumption data. Based on the existing population in the area and assuming a consumption rate of 70 liters/capita per day with 30% losses and unaccounted for water, the annual domestic water demands are estimated at about 5.7 MCM for the year 2004. By the year 2015, it is expected that, most villages and communities in the Faria catchment will have pipe networks and the target will be to satisfy the domestic demands of about 120 l/c/d (liters per capita per day) which is less than 150 l/c/d, the recommended consumption by WHO. Based on this assumption and assuming a 20% water losses in the systems, the annual domestic demands were estimated at about 8.3 MCM. Data for actual agricultural consumption and agricultural demands are not available for the Faria catchment. Therefore, the climatic data was analyzed to determine crop water requirements in the catchment utilizing the FAO irrigation model known as CROPWAT. Using this model, the annual irrigation water demands in the Faria catchment was estimated at about 15.25 MCM. Water from irrigation wells is used in conjunction with spring discharge in most of the catchment. During wet years when the spring discharge is high, abstraction from wells reduces while pumping increases in dry years.