ABSTRACT

This study aims at developing a monthly recharge estimation model for the ground water system at Auja-Tamseeh surface catchment of the Western Basin Aquifer- Systems in Palestine. The study was based on the hydrological observations developed by thorough analysis of rainfall quantities and their effect on groundwater level rise inside the aquifer.

The first hydrologic observation was related to **lag-time effect** for any rainfall event. Any rainfall event doesn't recharge the groundwater basin directly. A small amount of the rainfall event in that month is observed to reach the aquifer and cause a rise in the groundwater level of that aquifer. The effect of this rainfall event was noticed to increase gradually till a maximum influence is obtained inside the aquifer three to four months after the rainfall event. Then the influence of this rainfall event decreases gradually till it vanishes three months after the peak. Hydrographs of monthly groundwater levels revealed that groundwater level peak usually took place in April except for the very wet year 1991\92 were heavy rain in February and March drifted the peak to June-July. The study assumed a three month lag-time period with a groundwater level peak at April.

The second hydrological observation was concerned with the **accumulation effect** of a rainfall event. It was noticed that the rainfall influence on the ground surface didn't produce an instant change in the groundwater level. The change in the groundwater level was noticed to increase gradually till it reached its maximum effect (peak) at April which is three months away from the maximum long term average monthly rainfall values. The groundwater level decreased gradually till it vanished three months after the peak. The influence of any rainfall event was observed to last for seven months following a log-normal distribution.

These observations and assumptions led to the development of mathematical recharge equations for the monthly estimation of recharge over the Auja-Tamseeh catchment. These equations took into consideration the spatial and temporal variations of rainfall amounts impeding on the land surface and the replenishment through the outcropping formations of the pervious geological formations of the catchment.

The developed mathematical equations were used to calculate areal recharge volumes over the Auja-Tamseeh catchment. The percentage of recharge from rainfall volumes was equal to 21 % which was close to findings of other studies like SUSMAQ study of Wadi-Natuf were this percentage was equal to 25.7 %.

Key words: Auja-Tamseeh, Surface catchment, Rainfall, Recharge, Annual recharge, Monthly recharge, Lag-time, Accumulation effect, Mathematical equations, Log-normal distribution, Peak, Groundwater level, Arid areas, Semi arid, GIS.