



Title: Assessment of Vulnerability and Risk Mapping at Marsaba – Feshcha Catchment

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Abstract:

Groundwater resources are the main fresh water supply for Palestinians especially from karst aquifers. Human utilization of water resources for several uses has increased that make a water stress on the resources.

This study focuses on Marsaba-Feshcha Basin as one of the most important basins in the West Bank that connected to the Dead Sea have been studied and water budget, vulnerability and risk maps were constructed due of its location in eastern aquifer and karstic formation.

Lithological data of well bores was drawn using the “Win Log” and "Win Fence" software in order to have a more detailed insight of the strata around the area of Daraja Catchment that locates in the lower part of the basin in the east.

Water budgets provide a means for evaluating availability and sustainability of a water supply. A water budget simply states that the rate of change in water stored in an area, such as a watershed, is balanced by the rate at which water flows into and out of the area. The water budget has been calculated by using Guttman model 2000 through period of 2010-2013. This model depends on the precipitation, evapotranspiration, surface runoff, water import, spring discharge, well abstraction and groundwater recharge of the basin to have the remaining lateral outflow. Depending on these estimates, Out of calculations the groundwater recharge was about 124.9mm/yr corresponding to the value of 80 MCM/a with a remaining lateral outflow of 89.2 MCM/a.

Population growth is a major contributor to water scarcity. Growth in populations means increasing demand and competition for water for domestic and agricultural uses. By using geometry method for projection, the growth rate of the study area ranges between 2.63% and 2.66%. It shows that population in year of 2040 will be doubled as it in 2015 which means increases around 51%.

The water quantity that supplied to household is an important indicator that measures the

adequacy of domestic water supply. The average rate of water supply slightly increased through projected years.

By using Geometric method in statistics calculation, the population has been projected through the period from 2007 to 2040 in addition to water supply, demand, consumption and wastewater production. The population starts to be increased in 2015 until it will be doubled in 2040. The water demand for domestic and agricultural uses in 2040 will increase 68% of 2007 uses, water supply in 2040 will increase with 77% of 2007 supply, the water consumptions in 2040 increased with 31.47% while wastewater production volume in 2040 increased with 31.45%. With the increasing of population, this mean an increasing gap between availability and expected demand which will reach 0.425 MCM/yr with population of 200921 in 2040.

Protection of groundwater starts with the evaluation of the sensitivity of its environment. For M-F basin a groundwater vulnerability map have been demonstrated which shows the areas with potential for groundwater contamination on the basis of hydro-geological conditions.

The research uses a GIS-based approach called the PI method, which takes into consideration the nature of karst aquifers. Inherent geological, hydrological, hydrogeological, climatological and vegetation data, in terms of thematic layers, were collected and used in the creation of the groundwater vulnerability map of the Study area. The results obtained from this study indicate that majority of the study area is under moderate to low groundwater vulnerability for contamination.

Also, the risk map has been constructed in this research by using ArcGIS and myObservatory software based PI map. The risk appears in both methods shows low risk in the majority of the study area.