



Long term rainfall and runoff observations in a semi-arid watershed of the northern Negev, Israel

Eli Argaman (1), Raphael Barth (2), and Meni Ben-Hur (3)

(1) Soil Erosion Research Station, Soil Conservation and Drainage Division, Ministry of Agriculture & Rural Development, Israel, (2) University of Applied Forest Sciences, Rottenburg am Neckar, Germany, (3) Institute for Soil, Water and Environmental Sciences, Volcani Center, ARO, Israel

Arid and semi-arid regions cover about one quarter of the global land area and inhabit more than 18% of the world's population. These regions are characterized by harsh conditions including, high temperatures and evapotranspiration, water scarcity, and low overall biomass production. Moreover, these regions are under tremendous anthropogenic pressure, such as intensive agriculture activities and livestock grazing. Therefore, it is very important to understand the ecosystems of drylands. Our study was carried out in Sayeret-Shaked Park research area located along the transition border of arid and semi-arid climate of the northern edge of Israel's Negev desert, and was initiated in 1991.

The variation of the hydrological factors (i.e. precipitation and runoff), which impact the rainfall/runoff ratio, was studied during 22 years from 1991 until 2013. Rainfall data showed that the mean annual rainfall for this time scale is 154 mm with a variation of ± 58 mm/year. However, while the period from 1991 to 2006 had a mean annual rainfall of 171 mm and 27 rain days per year on average, the following period from 2007 to 2013 had mean annual rainfall of 117 mm with 16 rain days per year in average. Observations showed that these variations in the precipitation and the dramatic decrease in the annual rainfall since 2008 affected the vegetation and landscape pattern.

Overall, 684 runoff events were recorded from plots, with 64 m² size of each, since 1991 to 2013. The results show a mean runoff/rainfall ratio of 0.12 with an insignificant ($r^2 = 0.17$, $p = 0.07$) decrease in the yearly runoff/rainfall ratio and an increase in the runoff events, which generate $\leq 10\%$ runoff of the total rainfall. The average standard deviation of the runoff/rainfall ratio within each year was $\pm 8\%$. Although we found that threshold value for runoff generation was 7 mm of rainfall per event, some events with high rainfall amount resulted with no significant runoff. About 10% of the events with the highest rainfall accumulation that resulted with more than 50 mm produced 15% runoff on average. Furthermore 20% of all rainfall/runoff events exceeded a runoff rate of $\geq 19\%$ of the total rain amount. The highest runoff /rainfall recorded ratio was 45% during the highest rainstorm event with 99 mm.