Geophysical Research Abstracts,
Vol. 11, EGU2009-11389-1, 2009
EGU General Assembly 2009

Post-fire Vegetation regeneration effects on runoff and sediment yield: slope, aspect and fire severityPost-fire Vegetation regeneration effects on runoff and sediment yield: slope, aspect and fire severity

R. Barzilai (1), L. Wittenberg (2), and D. Malkinson (2)

(1) Department of Geography and Environmental Development, Ben Gurion University of the Negev, Israel (ronelb@bgu.ac.il), (2) Department of Geography and Environmental Studies, University of Haifa, Haifa, Israel

1 Post-fire Vegetation regeneration effects on runoff and sediment yield: slope, aspect and fire severity

During the last several decades fire occurrence at the Carmel Mountain ridge has been increasing, showing similar trends to the ones observed in the Mediterranean basin. Wildfires damage and destroy the vegetation and therefore alter the components of the eco-geomorphic system, which leads to an increase in runoff and sediment yields.

In April, 2005 a wildfire consuming 154 ha of planted and natural vegetation occurred at the north-western part of the Carmel ridge. Following the event, a 2x2x2 factorial design of monitoring plots was established to examine the relationship between vegetation recovery, runoff and sediment yield. Namely, slope aspect, slope steepness and fire severity were specifically examined in relation to the above mentioned response variables.

The research methods included (a) the establishment of 14 plots of $\sim 10.5 m^2$ each, designed for runoff and sediment collection and for monitoring vegetation cover change. (b) Monthly aerial photography of the research plots using a pole-mounted camera. The images were digitally classified to identify rock cover, vegetation cover, and bare soil patches. The time dependent vegetation regeneration was used for assessing landscape recovery. (c) Collection of runoff and sediment yield after each rain event. Multiple regression analysis was conducted in order to determine the relative importance of land cover classes and different precipitation parameters on runoff and sediment yield.

Vegetation recovery rates during the first wet season were relatively low; by the end of the first spring season vegetation cover reached 30%-35%. During the first summer, a year after the fire, there was a slight decrease in vegetation cover, due to the die off of the annual herbaceous vegetation. In the second winter vegetation cover continued to increase, and by the end of the research period (summer 2007) average vegetation cover of all plots reached 61.7%. Results indicate that runoff and sediment yields in southern aspect areas, on steep slopes or after high severity fires, were significantly higher than runoff and sediment yields in northern aspect areas, on the moderate slopes or after low fire severity, respectively. Results also show that between the first and second rain seasons after the wildfire, runoff yield did not decrease significantly, while sediment yield did. It has been found that the main factors influencing runoff yield during these seasons were the amount of precipitation and rain intensity (I10·6).

Results of the analysis of the sediment-generating mechanisms show that the vegetation and soil cover were the main factors that were correlated with the decreasing amounts of sediment yields. By the end of the first wet season and the beginning of the second one, sediment yields decreased in some cases by an order of magnitude and more. In the southern aspect, where vegetation cover increased from 26.4% to 33.7%, sediment yield diminished by an order of magnitude.

While sediment yield responded to changes of vegetation cover, as has been widely observed in other studies, runoff coefficients did not decrease during the second season, contrasting our expectations. We propose that this

pattern may be explained by the rapid regeneration of the herbaceous vegetation, which may act as a land cover feature impeding particle movement, but facilitates surface sheet flow.