



Integration of remote sensing and GIS for the assessment of flash flood modeling in arid region

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Variation in dryland -surface runoff can be attributed to the variation in rainfall amount and intensity, antecedent soil moisture conditions, watershed size and slope, and infiltration. The most significant criterion of dryland channels-runoff is the considerable decrease of magnitude downstream, unless augmented by tributary flows. This process, termed transmission loss, is important not only in its influence on hydrograph magnitudes, but also as a source of recharging the underlying alluvial aquifers. Traditionally, most of the previous work concerning the estimation of transmission loss was based on simple regression analysis of flow magnitudes at both the upstream and downstream gages. However, these simplified methods require the presence of gauged catchments and less information about the physical features of the channels. In this paper a new approach is developed to estimate transmission loss for un-gauged catchments using remote sensing and GIS techniques. However, there is no remote sensing devices have not been developed for direct measurements of runoff, information from remote sensing data has been used to compute runoff values indirectly. This is can be achieved by analysing the post flooding signatures with VIS/NIR data. This is because when

flow flows begin to recede, the larger particles settle first and the fines are the last to settle. The fines (Silts) are thus deposited on the top of the now dry channel and the spectral signatures exhibit a contrasting brightness compared to the surrounding area. Usually, The width of the bright signature decreases in the downstream direction indication an attenuation of the flood peak as water is lost to infiltration into the dry channel. Landsat images acquired on October and November 1984, shortly before and after a flash flood event, for Wadi Ghader Aab in the central Eastern Desert of Egypt were used to map the active (flooded) channels -

cross sectional areas of the main reach, that was not augmented by tributary flow (Fig 1). This is implying the maximum peak of the hydrograph that was traced downstream to calculate the reduction of maximum peak in terms of cross-section area. A DEM was generated from topographic maps and used for the estimation of active channels, derived from satellite data, geometry, consequently the maximum flow volume passed through. Therefore, the estimated maximum discharges at some cross-sections were used to calculate transmission loss volumes into channels bed between these cross sections.

Fig 1: Landsat Image for Wadi Ghader before (left) and after (right) flash flood event in 1984.