Geophysical Research Abstracts
Vol. 17, EGU2015-7174, 2015
EGU General Assembly 2015
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Zonation of flood production potential in Kabutar Ali Chai watershed using SCS model

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Kabutar Ali Chai watershed is located on the southern hillsides of Mishow mountains, 75 km northwest of Tabriz, NW Iran. This watershed is confined to 1390 and 3230 m elevation levels, where the general dip is from north to south. The watershed area is 67.46 km2 and the length of the main stream is about 24.5 km. This is one of the flood basins in the region and considering the availability of precipitation data for the 20 year interval and the possibility of flood occurrence threatening the downstream villages, the flood production investigations in order to prioritize the sub-basins regarding their flood-potential were carried out using the SCS method. In this regard, the watershed area was divided into 4 sections based on physiographic and topographic characteristics and the existing stream network: A1 (the southern and the low-height end of the watershed), A2 (the mid-western half), A3 (the mid-eastern half) and A4 (the northern and highest part).
The precipitation data for 20 year interval were gathered from the nearby weather stations of Tabriz, Sahand, Marand and Sharafkhaneh based on which, the average annual precipitation is about 294 mm, with the highest amounts of 415 to 450 mm in A4 sub-basin and the lowest value of 253 mm in the southern A1 sub-basin.
According to the time of concentration estimates based on the stream lengths and the elevation differences, this parameter is highest in A1 sub-basin with the rate of 1.64 h and lowest at A3 sub-basin with the rate of 0.35 h. This parameter has negative correlation with the flood production potential.
The runoff height is estimated using the SCS method. In order to determine the CN curve Number, the maps of hydrologic groups of soil, land use and vegetation were prepared and combined with each other and then, by taking into account the area of each homogeneous unit, the CN number was calculated for the watershed and the related CN map was prepared. The peak discharge of the hydrologic units across the watershed were estimated experimentally using the SCS method, based on which, A3 and A4 sub-basins have the highest peak discharge (15.55 and 19.44, respectively), which can be one of the flood production factors in this watershed. Meanwhile, the A1 sub-basin in the southern end of the watershed has the lowest peak discharge with low flood production potential. Finally, considering the runoff height and discharge, as well as the determined CN number, the flood production potential was calculated for 2, 5, 10, 25, 50 and 100 year return periods. According to the these flood-potential maps, A3 sub-basin shows high flood risk in its northern, central and southern parts. A2 and A4 sub-basins have lower flood risk, respectively, and the A1 sub-basin shows the lowest flood potential, which is due to the presence of permeable alluvial sediments and the widening of the stream bed. It was also revealed that the land slope is not the sole effective factor in flood production, but lithology and vegetation are also efficient.