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Research Paper

The effect of Forest canopy Decrease in runoff amount on shafarood basin

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Abstract: Many factors interfering in flooding of a watershed such as climatological characteristic (precipitation), cover diversity and physiography, The only factor which interfering on watershed could be precipitation of independent variable and harvest. The other factors mostly stable. The present research try to establish link between climatological effects and forest cover decreasing with maximum debi discharge and trying to assess interplay of two natural parameters on flooding within two determined period beforee and after harvesting. By applying precipitation data, number of harvested trees along with watershed debi before and after harvesting by using of regression method and correlation coefficient for each independent variable .There is a regular relation for each independent variable with increasing precipitation debi base wich shown an increasing, Meanwhile before harvesting start (from 1978) in spite of decreasing in precipitation ratio we observed that the debi amount has increased. The study basin more able mean shown among 2,3 and 5 annual precipitation determined that before harvesting the area got enough water but after harvesting (in 1985 and soon) annual precipitation decreased but debi ration with respect to the last year increased. By accessing the mean debi in harvesting seasons the observation shown that before harvesting months, the water regime in study area imitating of precipitation with autumn and peak debi could be observed, in winter season. It is in least range but by evaluating after harvesting observation denoted that in winter season. There is pseudo peak, by comparing with last year precipitation observation shown that range of debi has increased but in winter this debi could be equal with autumn debi. Statistical data of pounel station debi from beginning up to now shown the daily debis from december till march in shafarood river in past years before harvesting had been monotonous and this variablities had been from 2 to 3 m^2 but this amount increased after harvesting years and it had been variable between 6 to 9 m2 after 1978 (year) precipitation rate has decreased. This change was due to forest utilization which caused limitation area in forest. By evaluating after harvesting in shafarood basin water regime has got a regular link with precipitation regime, meanwhile with respect to forest utilization data, we can observed that in winter season maximum debi, high water volume and multi water in autumn. Therefore it is necessary to select a utilization method which could be appropriate with selected management method in the study basin.

Keywords: Utilization, Root, Runoff, Shafarood, Gilan

Introduction

The countries that are among the poorest countries of forest percapita level in the world, forest preservation is important. Forests are headspring of rivers and water sources that supply for agriculture. Forest with produce of Homus that has textured sponge is causing keep water and excretion of it for over time, that this prevents the creation of flood and act as a natural dam and provide water in the dry season. Tissue most villages and towns in watershed north of Iran has been formed along the rivers and looks in one or two of the last decades have devastating floods. Opinion of experts said that created the floods caused by incorrect operation methods in forest of this regions. This Study evaluate the relationship between forest harvest and the amount of water flowing Shafaroud area that since the old have been exploited and source raw materials for wood and paper factory Chuka and changed more in terms of land use. According to statistics from the Governor of Gilan from 1993 to 1997 years over 93 miliard rials has been damaged due to flood, and only 1998 years, has had sixty casualties.

Materials and methods

Shafarood areas has equivalent of 349.9 kilometers and set west of Gilan, Longitude 48 6 30 until 48 41 degree east and Latitude 37 25 until 37 34 30 North. Maximum height is 2903 meters and the minimum is 60 meters. Geological structure of the second period and expand layers sensitive to erosion can be seen in most parts. Sediment production in this area is 149,880 tonnes per year. This area has humid climate with annual precipitation 1431.76 mm and containing water regimen in autumn. Maximum rainfall in the area Shafaroood in autumn (October) is 240.5 mm and minimum rainfall in summer (July) 60.9 mm. The average annual temperature is 5.16 mm and the maximum evapotranspiration occur in summer (July). The maximum debi discharge to be in March 9.22 in August and the least 2.99 cubic meter per second. 100.7 km is the basin environment and has a slope 6.06%, textured soil is heavy to very heavy. Quality of vegetation were used with Landsat_Tm processing satellite images in 1991. statistics of Exploitation collected from the Natural Resources Office of Gilan province and aranged to annual cutting, which were statistics included number and volume of trees harvested in the years of harvesting.

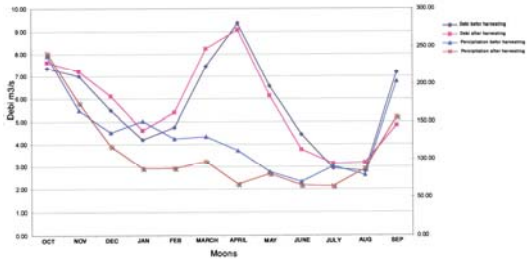

Figure 1 Comparison of average monthly precipitation and discharge in the years before and after harvest

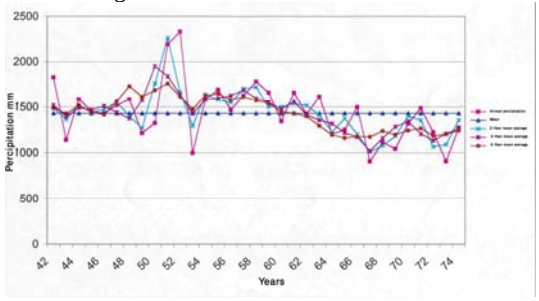

Figure 2 moving average rainfall of 2, 3 and 5 years Pounel Station

Quality of vegetation was used with Landsat_Tm processing satellite images in 1991. statistics of Exploitation collected from the Natural Resources Office of Gilan province and aranged to annual cutting, which were statistics included number and volume of trees harvested in the years of harvesting. Accuracy Hydrological data were examined , using the Test Run test and fitting the data using different statistical distributions (to help software Hyfa1) was performed and the maximum precipitation and flood flows with return periods of probability was extracted. Required digital maps prepared using GIS (ILWIS) and physiographic parameters were calculated. Changes in forest cover with changes in flood flows examined in terms of compliance and the occurrence time of each other and were set. The mean moving 2, 3 and 5 years calculating and rainfall water courses and probe were determined. Seismicity parameters to effectively flood divided to the two periods before and after harvest and were calculated separately. Study of rain and debi discharge for each period were done. Using diagrams obtained, comparing maps and flood zoning and vegetation produced, correlation of each independent parameters exploitation of forest lands and rain were

associated with discharge values. Finally, analysis of these relationships and increase or decrease in the amount of peak flood flow was determined and the necessary and practical suggestions were presented.

Results and discussion

Several factors such as rainfall, vegetation changes, physiographic and .... interfered in flowing water. In this field, the only factors that real change are utilization of forest cover and Rainfall that is not under human control. So coverage areas only factor that man can management and with appropriate management practices, control the water flowing.

Forest generally Homus sponge tissue store water. With harvesting coverage, maintaining and penetration rate groundwater storage decreased and flow regular is outside the hydrological sycle. In these areas water flow that occurs with percipitation, to form a temporary flood outside areas. Therefore, with forest utilization, the maximum instantaneous flow increase relate ago. In this case, the minimum flow rate and the average annual flow volume for reason increasing CN will be inverse relation with amount volume and number of trees harvested (Charts 3 and 4). Research Engler (1919) also reveals that in the region of low coverage and outer of forest, average maximum water flow is more than 2 times.

Diagram between rainfall in heavy rain months of years and debi discharge in before harvest years shows that with increase or decrease precipitation, the base flow changed, if the studies were taken after the operation from year 1979 although rainfall decreased than years ago but amount of the desired flow months has increased (Figure 1). Reason of it can be utilization of forest and decrease water infiltration in soil and lower evapotranspiration idue to exploitation.

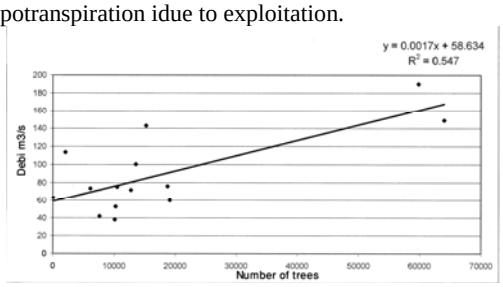

Figure 3. The correlation between the number of trees harvested and the moment of maximum flow

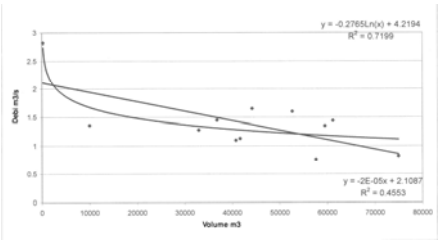

Figure 4. The relationship between volume of trees harvested and the minimum flow area

Daily statistics Debi discharfe in the months December to March in the years before the operation between 2 to 4 cubic meters has been variable, if this amount in the years after the 6 to 9 cubic meters has risen. The reason for this phenomenon is the utilization of the forest annually, especially in late autumn and winter season due to sleeping trees, the sap flow and thus the time rate of water infiltration decreases in soil.

Curve moving precipitation 2, 3 and 5 years (Figure 2) shows that amount of precipitation are decreased. Such interpretation can be given that the physiographic conditions and other parameters constant normal and rain than previous years have reduced. what factors may play an important role in increasing discharge. Answer this question is only one parameter that its unsuitable utilization and excessive of forest.

Comparison vegetation map (Figure 7) with flowing water potential map (Figure 8) show, most basin area are located in high potential areas that attack by a man.

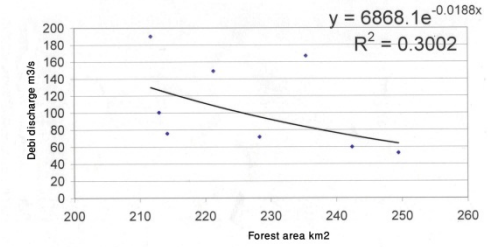

Figure 5. Relationship between the level of forest degradation with maximum moment discharge

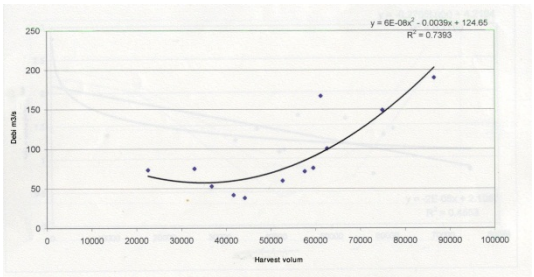

Figure 6. Relationship between the maximum discharge volume harvested

Investigate the relationship between low levels of forest with discharge using Form regression between reduction forest (126.2 ha) with discharge in the years harvest showed that reducing the level of the forest, discharge increased (Figure 5 and 6) and in Whereas if the trees afforest, be up to 12 years can not be expected that seedling hydrologic cycle able to intervene effectively. Therefore, it is necessary, that preserving existing forests and enriched with afforest in utilization and review management methods appropriate for the area to be applied. we use close to nature method, Because in this way always as dense masses and ages are available. Research and experience of other countries including Australia also shows that it is the best way to prevent flooding.

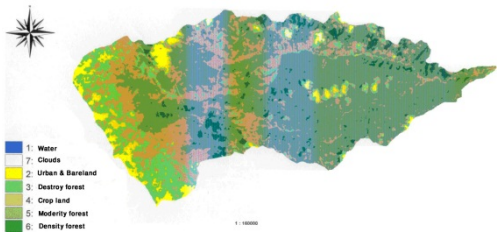

Figure 7. Vegetation Map of Shafarood

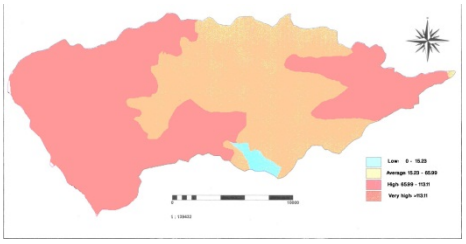

Figure 8. Zoning potential flood map of Shafarood

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