Sediment transport in forest

Maryam daghestani

Islamic azad university, Abhar branch
maryamdaghestani@yahoo.com

Abstract

Sediment production and transport in forest are affected by human activities such as harvesting and skidding. For this reason a study about forest sediment could be very useful. In this study the effect of human activities on sediment transport were evaluated. The study area was located in Noshahr-Iran. Two similar condition areas were selected, one as treated and the other as control. In treated plot all of trees were cuted and transported by skidder. Then the amount of sediment that transported by run off was measured in two plots for 16 times (5 points in each plot). The results showed that sediment transport in cut area was 82% higher than control area, and that sediment transport significantly affected by harvesting and skidding.

Key words: *sediment, forest, human activities, harvesting.*

Introduction

There is increasing public concern about forest stream pollution by excessive sedimentation resulting from forest management activities (Flanagan et al.,2001). The balance in forest soil and sediment are influenced by harvesting instruments. Also forest harvesting, which results in complete clearance of the tree cover prior to regrowth, can clearly be expected to increase the sediment yield from a forest catchment (porto et al.,2009). Because of the importane of water,forest soil and sediment transport, and that harvesting and skidding affects on changing sediment transport, the study of these effects is of great importance (Hayes, 2000). In a research titled harvesting and increased base flow, showed that harvesting increased the erosion and sediment transportation also harvesting disarranged normal distribution of sediment.

Study area and methodology

This research was carried out in experimental and educational forest of Kheyrood, Iran, in a Fageto- carpinetum community. For this research, tow similar condition areas were selected, one as treated and the other as control. physiography, slope, aspect, altitude, percentage of crown cover species composition and Edaphic conditions in both area were matched. Control area was locatd near to treated area. In treated area trees were fallen as group selection by power chain saw, after delimbing, trees were transported by unimog. Then five metal plots were established in slop direction in both areas. The amount of sediment transport resulted from run off, were measured. These measurements were reported after every rainfall,and 16 phases were totally measured. The obtained data were compared using Mann-whitney non parametric test.

Results and discussion

The result showed that the mean amount of sediment transport in treated and control area in 16 phases were 1343.84 ppm and 230.51 ppm respectively. This result showed that in treated area sediment transportation increased 82% compared with control area (figure 1). Using Mann-whitney test showed that there was no significant difference in sediment data, because of high variance of samples. Measurements of sediment in 16 phases and in different period and consequently different rain fall, created a high variance in samples so the 16 measurment phases divided to 3 time phases. whereas with this division the variance of data decreased, the difference between sediment transport in treated and control area became significant(p value phase1= 0.0418, p value phase2=0.0218, p value phase3=0.0111).

A bare area in contrast to a sylvan can be a major source to supply sediment into stream water (Miura et al.,2003). In this study elimination of trees caused more sediment in comparison with non harvested area. Hillslopes with high density stand potentially generated more overland flow and caused more rapid transfer from the upper to the lower slopes than those with dense stands that had greater opportunities for infiltration (Gomi et al.,2008). The areas of greatest soil loss are associated with the slopes where the tree cover is discontinuous, and forest harvesting causes significant short term increases in sediment mobilization and sediment yield (Porto et al., 2009). The results obtained from this study have highlighted the potentially important effect of deforestation in increasing sediment yield and the effect of forest harvesting activities in increasing sediment transportation.

Figure

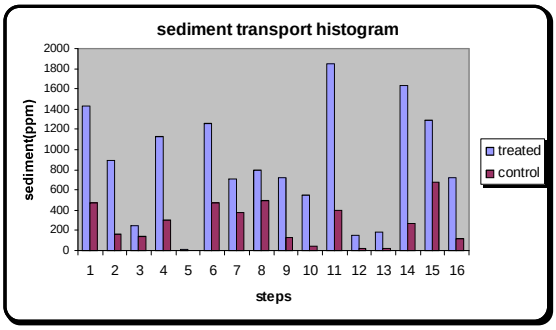

Figure 1. sediment transportation in treated and control plots

Refrences

1. Flanagan,D.C.,Ascough II.,J.C.,Nearing,M.A.,La .en,J.M.,2001.The Water Erosion Prediction Project (WEPP)Model.In:Harmon,R.S.,Doe,W.W.,III (Eds.), Landscape Erosion and Evolution Modeling.Kluwer Academic/Plenum Publishers,New York,pp.145 –199.

2. Gomi,T.,Sidle,R.C.,Miyata,S.,Kosugi,K.,Onda,Y.,2008.Dynamic runoff connectivity of overland flow on steep forested hillslopes:scale effects and runoff transfer.Water Resources Research 44,W08411.

3. Hayes, Shnnon. 2000. Harvesting and increased base flow. Department of Geosciences, Oregon State Univ.

4. Miura,S.,Yoshinaga,S.,Yamada,T.,2003.Protective effect of .oor cover against soil erosion on steep slopes forested with Chamaecyparis obtusa (hinoki)and other species.Journal of Forest Research 8,27 –35.

5. Porto, P., Walling, D.E., Collegari, G., 2009. Investigating the effects of afforestation on soil erosion and sediment mobilisation in two small catchments in Southern Italy. Journal of Elsevier no:1393 p.8.