POSTFIRE SOIL EROSION IN BURNT MOUNTAIN SLOPES

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Generally, undisturbed forests in the mountains are stable systems as they have low erosion rates and are the source of high quality water to many watersheds. However, fires may suddenly change the environmental conditions of mountain forests. Hence mountain forest fires commonly cause an enormous loss of forest resources and change the physical and chemical properties of the soil. The effect of high-severity fires on mountains is mainly on the runoff and erosion. Hydrological changes in a burnt mountain increase not only the rates of rainfall runoff and soil erosion by water, but also the risk of flood damage. The objectives of this paper are to evaluate the characteristics of the postfire erosion from natural rainstorms on slopes in mountain forests and the applicability of the WEPP to predict the soil erosion. For this research, forty-one plots on the slopes were established in east coast area of South Korea. Investigations for rainfall runoff, soil runoff, geology, and vegetation were conducted in these plots. The vegetation coverage index is used to quantify the change of vegetation structure in mountain forests. It has been confirmed that soil erosion of burnt mountain forests depend closely on this vegetation index.

Sediment yield from the slopes is related to soil detachment and soil transportation. Soil detachment is caused by the raindrop impact on soil particles and the shear force of sheet flow. Soil transportation is caused by the energy of surface flow on interrill or rill like as turbulent force and shear stress. As sediment load in flow is greater than soil transport capacity of surface flow in the interrill or rill, soil particles in flow are deposited over surface slope. As sediment load in flow is smaller than the soil transport capacity of flow, erosion process occurs on the interrill or rill. To evaluate the characteristics of soil runoff parameters, the dimensionless rainfall intensity factor P_s for soil erosion is defined. The lower the vegetation coverage index is, the more the sediment yield may be dependent on the dimensionless rainfall intensity factor P_s for soil erosion as shown in Fig.1. The WEPP model is a physically-based soil erosion model that can provide the estimates of

soil erosion and sediment yield considering the specific soil, climate, ground cover, and topographic conditions. The observed results of soil erosion on slopes in burnt mountain forests are compared with predictions from the Water Erosion Prediction Project (WEPP). The WEPP model predicts very well the soil erosion on the slopes with the moderate vegetation coverage and rainstorms in burnt mountain forests. In the high vegetation coverage, however, the WEPP may overestimate or underestimate.

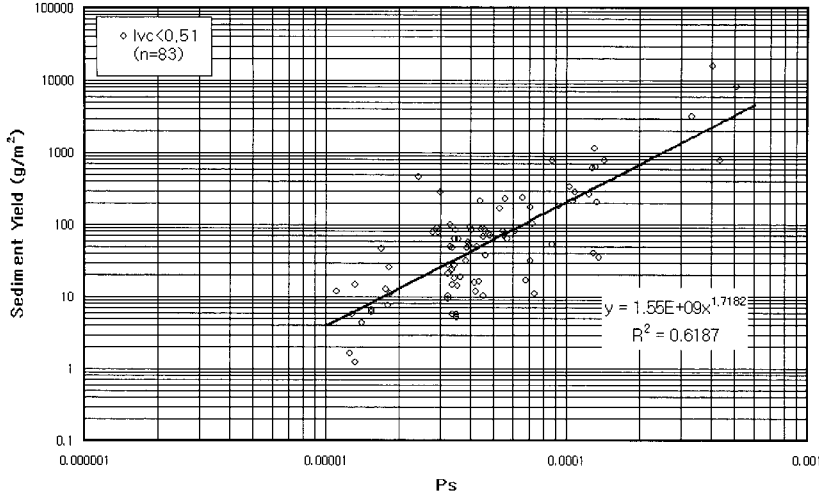

Fig.1 Sediment yield versus dimensionless rainfall intensity factor P_s for soil erosion.

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