ABSTRACT

The influence of climate change and land use on soil erosion has been identified as a severe threat for human sustainability. This study integrates Revised Universal Soil Loss Equation (RUSLE) approach with Analytical Hierarchy Process (AHP) to model the extent of soil erosion risk in the Eastern Hindu Kush Region, Pakistan. Soil erosion susceptibility and Risk was determined by the integration of environmental variables such as land use/land cover, slope, relative relief, curvature, aspect, drainage density, fault density, elevation, geology, rainfall, normalized difference vegetation (NDV, normalized difference water (NDW) and Bare Soil (BS) indices after determining their contribution towards soil erosion risk using the Pairwise Comparison and AHP technique. The annual average soil loss rates were calculated using the RUSLE approach, considering five parameters i.e., rainfall erosivity (R), slope length and steepness (LS), soil erodibility (K), cover management (C) and conservation practice (P) parameters. The final soil erosion risk zonation was done in a raster-based GIS environment by analyzing the final outputs generated from the AHP and RUSLE Modelling techniques. This research concluded the results by generating final Soil erosion susceptibility map indicating 29% of the area is under a very low susceptibility zone which shows that this part of the area has no risk of soil erosion. Areas under low, moderate and high are 28%, 33%, and 25%. The magnitude of soil erosion was estimated by calculating the annual average soil loss rates in the Eastern Hindukush, which ranged between > 50 to more than 276 Tons/ha/year presented by low and high values. Severity of the soil loss is represented by five different classes. The percentages of the area lie under soil loss rates, concerning its severity, are 37% in insignificant, 16% in slight, 22% in moderate, 11 % in severe 6% in very severe, and 8% in the catastrophic severity zone. It is generated by accumulating weightage of causative factors and frequency of each class using AHP and quantifying the RUSLE approach by integrating and analyzing in GIS software. River channel and barren land with steep slopes are highly susceptible to soil erosion. High erosion Risk was observed in areas where there are steep slopes having bare soil with minimum vegetation cover. The complex terrain and improper agricultural measures makes eastern Hindu kush more susceptible to soil erosion. (Ctrl)