
Ahmed Sefelnasr

Abstract:

Erosion hotspots within a drainage basin refer to an area that erodes more rapidly than anticipated or more rapidly than adjacent portions. Or, areas having high erosion rate as compared to the adjacent places. Since erosion can adversely affect ecosystems on-site as well as off-site, the estimation of runoff and soil loss in catchments is becoming more important. The main objective of this work is to: (1) delineate the hotspot areas (areas of erosion/sediment source) within the Abbay/Blue Nile Basin, (2) generate vulnerability maps to assess the risk possibilities at these areas as well as to support the watershed management approaches for the whole basin, (3) determine the environmental impact, and (4) evaluate sediment and water resources. The area under consideration is located to the northwestern of Ethiopia and to the East of Sudan, directly on the political boundary separating the two countries. The basin area is about 314458 km² and is fully dissected by streams that form the Blue Nile River. The majority of mentioned area is considered one of the most important highlands feeding the River Nile with both water and sediment. Therefore, Assessment of the erosion hotspots within this basin is essential for the management of the whole system. The Splash and sheet erosion are most widely observed within the highlands of the Blue Nile basin in Ethiopia, which generate noticeable amounts of sediments that induce and increase the erosion rate when the rills and gullies start to form. The slope, runoff intensity, and soil types are the most factors that play an essential rule in the erosion hotspots. The Digital Elevation Model (DEM) was used to derive the slope angels, shapes (concavity and convexity), profile curvature, as well as the flow direction vector. Approximately 65% of the area has a slope gradient less than 15%. However, very steep slopes (up to 65%) are also present, increasing the risk of erosion in these mountainous areas. Climate maps, runoff maps, soil maps, land use maps as well as satellite images were also used in the spatial calculations and modeling. For the modeling phase, the Water Erosion Prediction Project (WEPP) Model along with the Geo-Spatial Interface for WEPP (GeoWEPP), integrated with the GIS, were used. The potential reading of the resulted maps showed that the most affected areas with erosion lie within the highlands of Ethiopia where there are very steep slopes, soft soil cover, and intensive runoff. Also, down from the highlands in Sudan, there are several hotspots formed due to the erosion by mass movement which due to the existence of specific soil types.

Keywords:

hotspot delineation, watershed management, Blue Nile Basin

Published In:

ANGLISTICUM. Journal of the Association for Anglo-American Studies , 3 , 493-505