ABSTRACT

Capakcur stream watershed located in the southwest of Bingol city, in Turkey, covers a 106 km² area. The watershed with higher slope degrees faces severe soil erosion due to vegetation destruction, lithological and climate properties, except for a limited area located in the west of the watershed. Settlements in the watershed are usually take place near the valley base due to the rugged surface, which may generate costly land-slide events. To describe the basin with high risks and to create sufficient preventative steps, erosion sensitivity maps were obtained using a statistical analysis by the superposition principle. Digital Elevation Model (DEM) was acquired from the digitization of topographic map of the watershed, then the used for calculations of slope degrees. The erosion risk maps were attained by using the parameters of the slope degree, precipitation, Normalized Difference Vegetation Index (NDVI), stream density and soil texture calculated from soil brightness index (SBI) by applying Tasseled Cap transformation to satellite images. During the calculation of the map risks, each parameter was initially divided into subclasses and given a weight point according to the degree of influence upon the erosion, the sensitivity map was then created by adding each parameter map. Results from the sensitivity map indicate that 50% of the watershed is under high and 15% is under severe erosion risk while only 11% of the watershed is under low or very low erosion risk. The rugged structure of the watershed has necessitated the establishment of the settlement to the valley bed. Materials transported by rivers in the watershed where the erosion is severe, are deposited in the stream bed. The reduction in carrying capacity of streams causes floods affecting settlements. The sensitivity maps clearly indicate that the precautionary steps such as protection of the vegetation cover, plantation or relocating settlements away from the valley base will be immediately undertaken for further soil erosion in the watershed.

KEYWORDS:
Bingol, Capakcur Stream Watershed, Erosion

1. INTRODUCTION

Erosion is removal of topsoil by water and wind after wearing by natural or manmade agents [1]. This removal is created by wind in arid and semi-arid zones, by glaciers in glacial zones and by streams in fluvial zones [1,2]. Bedrock erosion triggered by external factors is a usual geomorphological process, and the eroded topsoil can be compensated during the course of this process [2]. Soil in areas subject to degrading and erosion can be replaced with natural soil formation processes, and rejuvenate by the help of wind or runoff. Human interference in the natural erosion areas progressing with its own specific rules in the natural balance may cause natural destructions which cannot be reversed or corrected. Accelerated water erosion created by human interference may time to time result in costly floods associated with losses of lives and property [3].

The amount and severity of erosion are chiefly related to topographic features, drainage areas, vegetation type and cover, surface drainage development and geological layers [1]. The amount of eroded soil is also affected by these factors at different degrees. Thus, setting off the problem is possible only after effective factors which involve in erosion must be well surveyed and assessed [2].

Soil erosion may cause not only adverse social but economical outcomes as well [4, 5]. Erosion has a very strong effect upon water sources and protections [5, 6]. Therefore, the interest in producing erosion sensitivity maps of basins/watersheds have been recently increased [7]. Detecting high-erosion-sensitive areas with erosion sensitive maps is one of the preliminary steps taken towards to conservation [4].

Previous studies have indicated that erosion sensitivity may be generated by a variety of empirical or physical methods [7-12]. Empirical methods help to predict erosion by collecting physical parameters while physical methods with a mathematical base is used for determining the amount of eroded and deposited soil [4].

Recent literatures have also shown that there were some studies using geographical information technology and ero-