Developing a Plan Map with the Aim to Control Erosion, Based on the Geomorphology Model (case study: Zonouz Chai watershed)

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Extended Abstract
1- Introduction
Analyzing and summarizing data to map or demonstrate the extent, resources and watershed were carried out in a simple or complex series of ecological parameters. In the conventional methods in Iran, such series are called units or better environmental units. The method is based on a systematic analysis, and data analyzing and summarizing are conducted to perform a multivariate evaluation. In this method, considered parameters are integrated, so it will be possible to determine ecological boundaries on the map. In each ecosystem, existence of homogeneity among ecological resources formed the ecosystem elements (Makhdum, 2001).

Power-PB (1998) studied the role of vegetation and watershed management in mountainous and hill watershed of Maharashtra in India. He concluded that in wide areas with biological cultivation and maintenance operations (from 1992 to 1996), the plant survival was improved by 53.33%, and water waste and erosion were declined nearly by 47% in mountainous shallow areas. In semi-deep soil, this value was about 23%. The decreased value of erosion in mountainous and hill region and high areas was estimated from 42.68% up to 12.79. The amount of harvest through technical operations like Contour Farrow was achieved between 30-35% and 32.79% in hills and heights, respectively.

2- Methodology
2-1 Area study
Zonouz Chai watershed is a part of Aras River Basin in the longitude of 45°, 12’ to 46°, 05, E and the latitude of 38°, 18’ to 38.47’ N. This watershed is located in a moderate mountainous
area with very cold winters and moderate summers. Cold and wet climate and the annual precipitation 300 mm are the features of this region.

2-2 basic mapping
First, based on digital topographic map, digital elevation model at the scale of 1:25000 was prepared. Then, the average spacing between the lines was identified with the resolution of 10 m. According to the digital elevation model, maps for slope, aspect and height layers were prepared using the software Arc / GIS.

The lithology map was developed from the geological map at the scale of 1/100000. Lithology units present in the area include: E<sup>pu</sup>, E<sup>a</sup>, E<sup>c1</sup>, E<sup>c2</sup>, O<sup>l</sup>, O<sup>v</sup>, Q<sup>tr</sup>, Q<sup>al</sup>, D<sup>l</sup>, D<sup>s</sup>, C<sup>s</sup>, Q<sup>th</sup>, Q<sup>t1</sup>, Q<sup>t2</sup>, E<sup>sm</sup>, E<sup>mg</sup>

To develop the geomorphological map, scanning and orthophotometric quantification were applied on the aerial photographs using LPS module of the software ERDAS IMAGINE. In general, orthophotometry operation was carried out through the following six steps:
- Preparing a block file for the project
- Defining the internal justification parameters for each photograph
- Defining the external justification parameters for each photograph
- Introducing exact location of the land
- Radial block triangulation
- Orthoresamplig

Next, using the software ERDAS IMAGINE and Arc / GIS, also according to the principles of stereoscopy, the aerial photographs were interpreted and the digital geomorphology map was prepared. The accuracy of the geomorphology map was evaluated through statistical tests.

To determine and specify land units, three maps of slope, aspect and height were used for preparing an integrated map. The lithology and geomorphological facies maps were prepared and ultimately the land units were provided.

3-Discussion
In the region under study, 12 geomorphology facies were observed and their boundaries were determined by aerial photographs interpretation. Total accuracy value of the prepared map was 94% and the Kappa index value was 0.9.

In the studied watershed, about 123 land units were developed. However, in order to acquire more acceptable samples, land units with slope values of 0 to 20% and more than 20% were integrated. Then, to develop practical strategies, lithological units were ranked according to qualitative categories of erosivity using MPSIAC method. Finally, 50 land units were achieved in this watershed. After discussing certain criteria for each unit, practical programs were developed with the aim to control the erosion.

3- Conclusions
Sustainable development refers to taking benefits of the resources existing in a watershed according to their sustainability and lack of ruin. To achieve this, the land capabilities should be fully studied and evaluated. So, a comprehensive study is necessary. To exactly determine the problems and potentials is great importance to develop pattern designs and developing implementation policies. To do this, findings of all basic studies were analyzed through a comprehensive vision; among the critical physical criteria are topography, geomorphology, geology and components properties. Eventually, by integrating basic data
and their analysis, also regarding the limitations and capabilities of the watershed, proper techniques were suggested for controlling the erosion. Data were linked to a descriptive data table in land unit maps using the software Arc/ GIS. Based on the data, the plan map was then developed to control the erosion rate within Zonouz Chai watershed.

References