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

L. Kashi Zenouzi, H. Ahmadi, H. Saadat, A.A. Nazari, M. Namdar
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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 45ْ, 12' to 46ْ,05, E and the latitude of 38ْ,18' to 38 ,47' N. This watershed is located in a moderate mountainous

Author(s)

l. Kashi Zenouzi(✉)
Watershed Natural Resources Engineering, Sciences and Research Branch, Islamic Azad University, Tehran, Iran
email: zenouzi@yahoo.com
H. Ahmadi
Professor of Natural Resources, Tehran University, Tehran, Iran
H. Saadat
Professor of Natural Resources, Tehran University, Tehran, Iran
A.A. Nazari
Professor of Natural Resources, Tehran University, Tehran, Iran
M. Namdar
M.A. in Remote Sensing of Forest, Rangeland and Watershed, Tehran, Iran

area with very cold winters and moderate summers. Cold and wet climate and the annual precipitation 300 $^{mm}/_{y}$ 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^{pu}, E^{a}, E^{c1}, E^{c2}, Ol^{d}, Ol^{v}, Q^{tr}, Q^{al}, D^{l}, D_s, C_s, Q^{th}, Qt^{1}, Qt2, E^{sm}, E^{mg}

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 usSed 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.

Refrences

Aqajanloo,F and Mousavi, A. 2006.Investigation of exclosure effect on qualitive & quantative cover changing of rangelands, Journ of Natural Resources of Iran,Vol:4, No:59.

Ahmadi, H. 2007. Applied Geomorphology, Vol: 1 Water erosion, Published byTehran Univ.686 p.

Ahmadi, R. Heshmati, GH and Abedi, M.2008. Investigation about effects of range improvement on healthy indexes. (case study: Jahan nama Park's rangelandes of Golestan province), Journ of Range & Desert of Iran, NO: 16, pp: 55-65.

Baghestani Meybodi, N.Zareh , M & Abdollahi,J.2006. Effect of exclosure on qualitive & quantative land cover changing of steppe rangelands in Zazd province for two decade ago, Journ of Range & Desert of Iran. No:13, pp: 337-346.

Chavoshi Brojeni, S and Khodagholi, M.2003.Final report of project of investigation about effect pitting for establishment of several range species.Research center of soil conservation & watershed management of Isfahan.No:128/82.58p.

Gintburger, G.1987.The effect of soil pitting on establishment and growth of annual Midcago spp on degraded rangeland in Western Australia. Journ of The Australian Rangeland .No9.pp 49-52.

Khodagholi, M. Esmaili Sharif, M.Feizi, M. Shahmoradi, A and Jaberolansar,Z.2010. Investigation of effect of cultivation methods on germination of Astragalus Caragana. (Case study: Watershed research station of Zayandehrood basin), Journ of Watershed Management researches , No: 86,pp:8-14.

Makhdoom, M.2001.Fundamental of Landuse Planning,Published by Tehran Unive, No2203.289p.

Makhdoom, M.1991.Assessment of ecological capacity in Gilan & Mazandaran for urban and industrial and tourism development.Journ of Environmentology, N0: 16.

Marshal, R. Haferkamp, J. Voleski, M. Borman, M.Rodney Heithsch,K and Currie Pal,O.1993. Effect of mechanical treatments and climatic factors on the productivity of Nothern Great Pain rangelands, Journ of Range Management, No: 46, pp 346-350.

Pawar, PB., 1998. Prospect and problems in use of vetiver for watershed management in submountain and scarcity zones, Maharashtra. India.

Phiroozeh, M and.Heshmati, GH.2008. Investigation about effects of flood spreading on some land cover & surface soil's characteristics , Journ of Watershed Management Researches,No 79.

Qodousi,J .Tavakoloi,M .Khalkhali,S and Soltani,M. 2006. Effect of rangeland exclosure for soil erosion and sedimentary decreasing , Journ of Watershed Management Researches,No 73. Pp: 136-142.

Rafahi, H. 2006.Water and Conservation, University of Tehran Press, 671p.

Sadeq zadeh, E. Mehrvarz Moghanloo, K and Mohseni,SH. 2007. Investigation about complex watershed management operations on increasing landcover, Sixth National Sience & Watershed Managment engineering Confrence of Iran, 8p.