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LONGITUDINAL PROGRESS PREDICTION OF GULLY EROSION WITH FAO MODEL (CASE STUDY: A PART OF ABDAN WATERSHED, BUSHEHR PROVINCE AND SOUTH OF IRAN)

[1]HAMID REZA KHERADMAND, [2*]SEYED MASOUD SOLEIMANPOUR

1- M.Sc. Student of Natural Resources-Watershed Management Engineering, Department of Natural Resources, Arsanjan Branch, Islamic Azad University, Arsanjan,Iran.

2- Ph.D. of Science and Engineering Watershed Management- Inviting Teacher Department of Natural Resources, Arsanjan Branch, Islamic Azad University, Arsanjan,Iran.

***Correspounding Author:** *Seyed Masoud Soleimanpour

ABSTRACT

Soil erosion due to environmental degradation, is one of the important issues and inhibitor to realization the economic, social development and attain food security in the world. Gully erosion is one of the most destructive kinds of water erosion that is removed considerable volume of available soil with growth and advancement of it that to combat it, the development mechanism of gullies demonsionsespecialy their longitudinal development must be properly underestood. Therefore, this study attempted to ediction of longitudinal development of gully erosion by the FAO a part of the watershed Abdan, located in Bushehr, in south Iran. results showed that the average length of estimates by the FAO model in the study period (1996 to 2014), 2.21 meters per year calculated that the average real rate measured in this period (2.44 meters per year), calculated that the average real rate measured in this period (2.44 meters per year), 0.23 meter is different. This demonstrates the suitability of the FAO model to predict the spread of longitudinal gully erosion.

Keywords: Abdan watershed, FAO Model, Gully erosion, longitudinal progress

INTRODUCTION

The lower area can be found on the ground at risk degredation and erosion is not and why it is now one of the most problematic and yet the most sensitive human problems has become so that the 1500 million hectares of arable land in the world, 430

million hectares of land in the years 1960 and 2000, lost to erosion (Soleimanpour, 2012). Gully erosion is one of the most devastating type water erosion that a considerable amount of land available to grow it out. Gully erosion channel to a depth greater than 30 cm (Soil Science Society of America, 1984) or a cross-sectional area greater than 929 square centimeters (Poesen et al., 2003) that the earth is not by normal plowing (Bradford and Piest, 1978). This study attempted to predict the length of gully erosion by the FAO in part of Abdan watershed, located in the Dayer city in Bushehr, south in Iran.

Geographical location of the region under study

Abdan watershed has the coordinates 27° 51' 27", to 28° 14' 48" east longitude and 51° 36' 34" to 52° 4' 13" north latitude is located (Figure 1). The watershed area is 91238 hectares. The scope of the study 3 sub catchments, an area of 3595.5 hectares (Kheradmand, 2015).

METHODOLOGY

- Ddetermine the scope of the studies on topographic map and Aerial photo.
- Choice 25 gullies in the study area to assess longitudinal growth between 1996 and 2014 (Figure 2).
- Extraction position in 1996 through the gully heads topographic maps and aerial photos of this year, and move it on the map by using software Arcview and ArcGIS.
- Measuring the elongation ditch directly in 2014 (Figure 3).

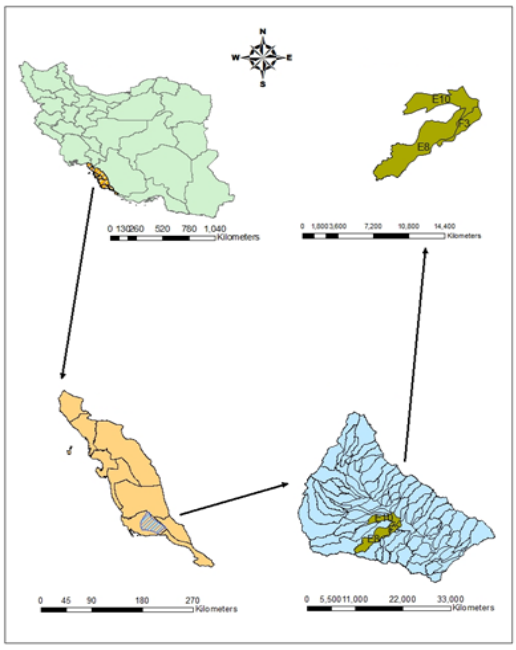

Figure 1: Location map of the study area

Figure 2: Select and set ditches to measure

Figure 3: Measuring the elongation ditch directly in 2014

- Analysis of rainfall data with 24 hour rainfall data from the meteorological station Dayer: For this purpose equal to or greater than 0.5 inch, 24 hour rainfall during the study period (1996 to 2014) for use in model extraction.

- Calculate the elongation by the FAO.

- Comparison of linear expansion measured by the amount estimated by the FAO model.

FAO models

This model in 1977 by the "Food and Agriculture Organization of the United Nations" has been introduced. Growth rate as a function of longitudinal trench or ditch longitudinal trend in previous years, the total area of the ditch, the ditch upstream catchment area and height of a 24 hour rainfall More than 0.5 inch and considered the following formula to predict the length of the gully provided.

$RF=Rp\ (A)^{0.46}(P)^{0.2}$

RF: The average rate of growth in future years, trench length (feet)

Rp: The average rate of growth in the years preceding the trench length (feet)

A: rather than the watershed area upstream of the watershed area of the ditch to ditch the spout is (Iker).

P: towards a 24 hour rainfall is expected to average annual precipitation.

It should be noted that in this model the maximum 24 hour precipitation equal to or

more than 0.5 inches in length used for the statistical period.

RESULTS

P values used in the model were estimated by 2.48 inches by the ratio of the maximum 24-hour rainfall or more than 5.0 inches in length statistical period 27.9 inches) in average annual rainfall in the statistical period (11.24 inches), respectively. Estimated value of the longitudinal extension of the gully in the period 1996-2014 using FAO model is presented in 1 Table.

According to this table, most of the length of the gully number 4, the amount of 14.86 meters per year, and the minimum length of the gully number 11, in a 0.38 meter per year.

Table 1: Estimates of the length of the trench by using FAO

Gully number	A	P (In)	Rp (ft)	Rf(ft)	Rf (m)
1	0.19	2.48	6.52	3.63	1.11
2	0.39	2.48	4.13	3.20	0.98
3	0.18	2.48	33.76	18.43	5.62
4	0.33	2.48	67.94	48.73	14.86
5	0.26	2.48	5.34	3.42	1.04
6	0.34	2.48	7.96	5.84	1.78
7	0.45	2.48	2.37	1.97	0.60
8	0.23	2.48	9.45	5.77	1.76
9	0.21	2.48	6.72	3.95	1.20
10	0.06	2.48	10.94	3.62	1.10
11	0.15	2.48	2.55	1.26	0.38
12	0.22	2.48	7.96	4.78	1.46
13	0.12	2.48	13.24	5.90	1.80
14	0.15	2.48	7.54	3.74	1.14
15	0.09	2.48	3.60	1.46	0.45
16	0.10	2.48	20.72	8.56	2.61
17	0.26	2.48	5.79	3.75	1.14
18	0.26	2.48	13.04	8.40	2.56
19	0.10	2.48	50.70	21.44	6.54
20	0.26	2.48	5.64	3.63	1.11
21	0.07	2.48	9.10	3.31	1.01
22	0.13	2.48	6.50	3.00	0.91
23	0.13	2.48	13.55	6.26	1.91
24	0.32	2.48	5.63	3.97	1.21
25	0.44	2.48	3.79	3.12	0.95
Average					2.21

The average length of estimates by the FAO model in the period 1996-2014, 2.21 meters per year is calculated the average real rate measured in this period (2.44 meters per year), 0.23 meter is different. This demonstrates the suitability of the FAO model to predict the spread of longitudinal gully erosion. The reasons for the high number of longitudinal extension of the gully in the study area compared to other similar studies (Martinez, 2003 and Malik, 2008), can be sensitive to the soil (sediment formations of destruction Fars Group), 24 hour rainfall with high intensity, Gullies area corresponding to the area, a large network of drainage ditches linked watershed area.

SUGGESTIONS

It is recommended to estimate the length of the trench in addition to models or methods in which only the characteristics of rainfall and upstream watershed area is considered gully If possible models in which environmental factors such as climatic factors and land and vegetation and used to be used.

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