Geography and Development 10<sup>nd</sup> Year- No. 27 – Summer 2012 Received : 2/9/2011 Accepted : 9/5/2012 PP : 30- 32

# Comparison of EPM, MPASIAC and PESIAC Models for Estimating Sediment and Erosion by Using GIS (Case Study: Ghaleh-Ghaph Catchment, Golestan Province)

Dr. Reza Ghazavi

Assistant Professor of Rangeland and Watershed Management University of Kashan

Yaser Maghami

M.Sc of Geomorphology University of Tehran

### Siyamak Sharafi

Ph.D Student of Geomorphology University of Tehran **Dr. Abbasali Vali** Assistant Professor of Rangeland and Watershed Management University of Kashan

Jaleh Abdi M.Sc of Geomorphology University of Tehran

## Introduction

Soil erosion is an important challenge in the recent century. Water resources pollution, decrease in water storage capacity of dams, and decrease in environmental potential are the results of erosion.EPM, MPSIAC and PSIAC are the general methods that used for erosion evaluation. These models need the exact information and their output depends on the number and correctness of this information.

Lack of information is one of the most important problems for statistical analysis and studies of erosion and sedimentation. This problem is important especially in developing countries such as Iran. In the recent years, GIS with a large capacity, helps the researchers for classification, storage and update the important information as layers or tables and decreased the human errors. The main goal of this study is evaluating the sedimentation and erosion ability of a catchment via EPM, MPSIAC and PESIAC models using GIS.

## **Research Methodology**

In this study, GIS and Rs were used for evaluation of sedimentation potential and erosion ability of a catchment via EPM, MPSIAC and PESIAC. The main factors important in erosion evaluation were estimated using all three models. Based on this information, erosion and sedimentation potential was evaluated for any sub-basin.

## **Discussion and Results**

The results of all three methods were generalized to all sub-basins and to the under study watershed. Based on the results, sub-basin number one, in view of qualitative erosion, is average based on EPM model, high based on MPSIAC model, and average in PSIAC model. Qualitative erosion was very low, high, and low in sub basin two, based on EPM, MPSIAC and PSIAC respectively. Qualitative soil erosion in studies watershed generally is evaluated extend, high, and moderate based on EPM, MPSIAC and PSIAC models respectively.

Based on RMSE method, smallest values of RMSE indicate that model is better. Results shows that PSIAC model have smallest value compared to EPM and MPSIAC and so is the best model for soil erosion and sediment evaluation.

## Conclusion

Water and soil resources management in each watershed need to a good recognition of its sediment delivery ratio. Study about soil degradation also need to exact basic information. With new models and exact systems and tools, researchers can save and evaluate this base information. The main goal of this study is evaluation of sedimentation and erosion ability of a catchment via EPM, MPSIAC and PESIAC models using GIS. For this study, equal parts maps were designed using land use, slope and geological maps. Soil erosion and sedimentation rate was calculated in each sub-basin by different models. Land-use maps was designed using ETM Land sat satellite images. Results of RMSE index showed that PSIAC method is more suitable method for sediment and erosion evaluation in this area.

## Refrences

- 1- Ahmadi H (2008). Applied Geomorphology. Tehran publication.
- 2- Borzo A, Momayezi M,Nikandish A (2008). Evaluation of EPM, MPASIAC and PESIAC model for sediment and erosion estimation Fars province. Iranian journal of Agriculture knowledge.5.
- 3- Dadkhah M, Najafinejad A (1997). Evaluation of EPM model for erosion estimation in Letyan Dam watershed. Iranian journal of natural resources .5.
- Gobin A, Govers G (2003). Pan-European Soil Erosion Risk Assessment. Third Annual report. Europian commission funded fifth framework project – contract QLK5-CT-I999-01323. Available at: ttp://www.pesera . JR C.it
- 5- H ill J (1993). Land Degradation and Soil Erosion Hazard Mapping in Mediterranean Environment With Operational Earth Observation Satellites. Proceedings of the international symposium of Operationalization of remote sensing, 9, 19-23 April, Enschede, The Netherlands.
- 6- Hudson, N.W (1987). Soil and Water Conservation, Semi arid and arid area. FAO, Soil Bulletins, No. 57.
- 7- Jalili k, Hadid M (2005). Quality and quantity evaluation of soil erosion and sedimentation by MPSIAC model using GIS. 3th conference of sedimentation and erosion.
- 8- Rangzan K, Moradzadeh M (2006). GIS and RS application for preparing information layers of land use and land cover for MPSIAC model. Sedimentation conference. Khozestan, Iran.

31

- 9- Rangzan K, Zarasvandi A, Haydari A (2008). Evaluation of EPM and MPASIAC model for sediment and erosion estimation using GIS and RS.(A case study: Pegah sorkh catchment, Khozestan Province.64.
- 10- Rastgo S, Ghahreman B, Sanieenejad H, Davoodi K, Khodashenas S (2007). Sediment and erosion evaluation of Tang konesht watershed via EPM and MPASIAC model using GIS. Journal of Science and Technology of Agriculture and Natural Resources. 7.
- 11- Refahi H (1996). Soil erosion and by water conservation.
- 12- Tajgardan T, Ayobi S, Shataiee S (2007). Sediment and erosion evaluation by MPSIAC model using GIS and RS.( A case study: Ziyarat watershed). Journal of Pajohesh and Sazandegi.79.
- 13- Tangestani, M.H (2001). Integration Geographic Information System in Erosion and Sediment Yield Application Using the Erosion Potential Methd of (EPM) Proceeding of the GIS Research UK.
- 14- Tangestani, M. H (2005). Comparison of EPM and PSIAC models in Gis for erosion and sediment yield assessment in a semi arid environment: Afzar catchment, Fars Province, Iran.
- 15- Ziai H (2002). Principales of engineering watershed management.
- 16- Ziaiesfandarani H (2009). GIS and RS application for sediment and erosion estimation of Shahid Abbaspour dam watershed. MS thesis.Shahid Chamran University.

