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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, MPASIAC and PESIAC 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, MPASIAC 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, MPASIAC 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.

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