Basin Erosion Study of Fadami Salt River (Fars Province) by Using Entropy Model

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Extended Abstract

Introduction

Erosion is the process by which soil and rocks are removed from the Earth's surface by natural processes such as wind or water flow, and then transported and deposited in other locations.

Human activities have dramatically increased (by 10-40 times) and accelerated the rate of erosion globally. Excessive erosion causes problems such as desertification, decreases in agricultural productivity due to land degradation, sedimentation of waterways, and ecological collapse due to loss of the nutrient rich upper soil layers. Water and wind erosion are now two primary causes of land degradation; combined, they are responsible for 84% of degraded acreage, making excessive erosion as one of the most significant global environmental problems.

Water is the most important erosion agent and erodes most commonly as running water in streams. Raindrops (especially in dry environments) create splash erosion that moves away tiny particles of soil. Water affecting the surface of the soil as it moves towards tiny rivulets and streams and creates sheet erosion.

In streams, water is a very powerful erosion agent. The faster water moves in streams, the larger objects it can pick up and transport. This is known as critical erosion velocity. Fine sand can be moved by streams flowing as slowly as three-quarters of a mile per hour.

Entropy was born as a state variable in classical thermodynamics. But the advent of statistical mechanics in the late 1800's created a new looks for entropy. It did not take long for Claude Shannon to borrow the Boltzmann-Gibbs formulation of entropy, for use in his own work, inventing the "information theory". Our goal is to show how entropy works, in all of these cases, not as some fuzzy and ill-defined concept, but rather as a clearly defined mathematical and physical quantity with well understood applications.

Soil erosion is one of the most important factors that threatens large areas of Iran annually and decreases or eliminates the quality of agricultural lands and rangelands. Due to highlands of

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Iran in comparison with the grounds and surrounding plains (mean elevation of 1250 m), it has been affected by water erosion. So it is very important to study erosion and present management strategies to reduce the impacts of erosion in basins of Iran. This study aims to identify erosion level and effective parameters in Basin of Fadami Salt River in Fars province.

Methodology

This research is a descriptive-analytical study based on library, statistical and filed methods. First of all the most important erosion factors were recognized in the basin including (slope, land type, soil type end etc) and then the factors were weighted by using AHP method in order to be classified. Then the level of imbalanced distribution rate of effective parameters classes in basin erosion were determined using Entropy model.

Results and Discussion

The results indicate that among the slope classes, the one with slope of more than 15 percent which causes a higher level of erosion has a balanced distribution with entropy coefficient of 0.85, so it causesa high level of erosion.

And also among the geological formations in the basin, Quaternary formations with a high level of erosion have almost a balanced distribution in the basin with entropy coefficient of 0.7. Among the soil levels, light soils (coefficient of 0.89) had a balanced distribution and among the land uses, rangelands (coefficient of 0.97) also had a balanced distribution. Both of them have the high levels of erosions.

Conclusion

The Conclusion of this study stresses thatentropy models have high-performance for studying erosion in basins. GIS Software and AHP model has helped us to improve performance model. In addition indicators slope, geology, land use and soil are the best indicators to determine water erosion in the basins.

Management of soil for water erosion control is based on sensible soil conservation practices. The majority of these practices are recognized components of good soil, crop, and water management. For effective erosion control: maintain good soil structure, protect the soil surface by adequate crop and residue cover, and use special structural erosion control practices where necessary are the recommended procedures.

Keywords: Entropy, Erosion management, Salt River, Fadami.