Comparison between Erosion Induced by Water and wind of Geomorphic Units in the Karoon River Catchment Using Irifer and PSIAC Models

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Introduction

Soil erosion is known as one of the most important environmental issue of the countries that are located in arid zones. Therefore, the aims of this study were designed in order to estimate effects of erosional parameters (Water and Wind) on the geomorphologic landforms and to compare their potential in sediment yield. Karoon River catchment in the Khuzestan Province was selected for such comparison wherein Aeolian and fluvial geomorphologic landforms are widely distributed. For this purpose, map of geomorphologic unit was prepared using satellite images (Land Sat, 2013), 30 m resolution and geographical information system (GIS), and ArcGIS 10 software. Empirical models (IRIFER and PSIAC) were used in order to estimate potential of sediment yield of each geomorphologic unit, separately. Application of these models in one of the Karoon River catchments showed that potential of sediment yield of appendage piedmont, erosional piedmont, and clayey plain were

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27.7%, 35.4 %, and 36.7 %, respectively. Furthermore, estimated data of PSIAC model showed the high compatibility (75%) with observed data. Simultaneously, the Irifer model has highlighted contribution of 72.7 % of appendage piedmont in sediment yield in the study area. Present research has confidently recommends simultaneous estimation of soil erosion induced by water and wind in the geomorphologic units in order to increase accuracy of soil erosion estimation and to improve effectiveness of management practices.

Numerous studies in order to determine contribution of water and wind erosion using empirical models by soil science experts has been carried out. Pacific Southwest Inter-Agency Committee (PSIAC) and IRAN Research Institute Forest and Ranglands (IRIFER) models are well-known methods for estimating water and wind erosion. The study area is part of the Karoon River catchment on the basis of Tamab classification which is located between 31˚15ʹ and 32˚07ʹ N latitudes, and between 48˚11ʹ and 49˚20ʹ E longitudes. The mean rainfall and temperature is 300 mm and 24C, annually. The objective of this research was to determine the potential contribution of wind and water erosion with an emphasis on general geomorphological types in the sub-catchments of Karoon, Dez and bahmanshir.

**Material and Methods**

The research method was designed based on the computational analysis and the field observations. Accordingly, statistical data of hydrometric stations and sediment, water and meteorological were analyzed. In addition, geomorphological maps include types and facies were developed using aerial photos (1993), satellite image (LandSat 7, 2007) with 30 m resolution and tools of ArcGIS software 10.2. Necessary variables for implementation of the empirical models (MPSIAC and IRIFER) were calculated using score determination modules. Consequently, the potential contribution of
water and wind erosion for each geomorphic landforms was obtained on the basis of cross layers technique.

**Discussion and Conclusions**

Resultant data showed the high capability of compound empirical models in estimation of the potential contribution of wind and water erosion. The potential wind erosion contribution in sediment production of the Karoon sub-catchment was obtained 23.8 percentage. Therefore, the potential wind erosion from special landforms such as mountain and pediment was calculated to be 1668 ton km-2. Furthermore, the potential water erosion from the karoon sub-catchment is accounted for 45.5 % sediment production of the study area. The potential wind and water sediment production of Dez sub-catchment were calculated to be 1802 and 301 ton km-2, respectively. The Bahmanshir sub-catchment was highlighted for its very high potential wind erosion in the study area. The potential sediment production of this sub-catchment is 3545 ton km-2 by wind erosion in the the study area. In comparison, the potential sediment production of this sub-catchment by water erosion was only 282 ton km-2. Present research showed that identifying and mapping of geomorphic landforms is suitable and practical tool for evaluating of erosional features and for implementing of management practices by decision makers.