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Developing Models of Daily Sediment Yield Estimation for Kojur Forest Watershed

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ABSTRACT

Todays, dynamic models are supposed as the most important tools in erosion and sediment phenomena due to their complexities and existence of many affecting factors. Towards, the present study was conducted in the Kojour watershed for daily sediment modeling using daily rainfall, discharge and sediment during 2007 to 2010. The modeling process was carried out all data and the monthly and seasonally classification data in linear and nonlinear models. The results indicated that daily linear and non-linear models did not indicate a suitable model. The monthly and seasonally classification of the data led to achievement of better models with determination coefficient significant at 5 percent level and relative error less than 40 percent as compared with those obtained from no classification. It was also found out that daily sediment of Kojour watershed was affected by discharge occurred event day and before four days. The discharge occurred event day is the most effective factor in 80% selected models in the study watershed. The nonlinear models were better estimation than linear models in July, September, December and March and autumn but linear models were better than nonlinear models in other months and seasons.

Keywords: daily discharge, Kojour forest watershed, sediment yield, statistic model.

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Prediction of Landslide Hazard in Sikan River Basin Using Logistic Regression Model

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ABSTRACT

Landslides and slope instabilities are major hazards for human activities often causing economic losses and property damages. Sikan River Basin (Ilam province) due to the topography, tectonic, lithology, and climate has enough potential for occurrence of this phenomenon. The objectives of this study were to determine effective parameters controlling the landslide occurrence and to prepare zonation map of landslide risk in Sykan River Basin. In view of this, 11 geophysical characteristics including (height, slop, slop direction), geomorphologic (the slop of land surface), geology (lithology, the distance from the fault), hydrography (the distance from the river), coverage, land use (land use and the distance from road, the distance from village), pedology (soil texture), and dependent variable (landslide distribution) were selected an independent variable and were analyzed using logistic regression model. The results showed that the influential factors on landslides occurrence in the basin are the distance from river, land use, the distance from village, the materials (lithology), slope, and the shape of land surface. Finally, the study area was classified into five major area based on landslide occurrence risk which 19.1 km^2 of total area had very low risk, 15.9 km^2 had low risk, 14.9 km^2 had average risk and 14.6 km^2 had high risk and 9.1 km^2 had also very high risk. The model evaluation showed a high accuracy 74.2% in the study area. The results of this study can be useful for landslide risk management and for controlling the accelerated parameters.

Keywords: Darrehshahr City, landslides, logistic regression, risk zonation, Sikan River Basin.

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The Comparison of Soil Loss and Sediment Yield of Some Geology Formations in Plant Vegetation Gradients (Case study: Summer Rangelands of Balade in Mazandaran Province)

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ABSTRACT

Vegetation cover as the main factor affecting the water erosion plays an important role in preventing soil loss. To this end, for better understanding the impact of vegetation cover on soil erosion and sediment yield over the major existing geological formations in the summer rangelands of Balade in the Mazandaran province, rainfall simulation studies have been carried out using a portable rainfall simulator. Among many geological formations across the study area, the three major lithological units of mica sandstone, clay and shale sandstone with coal seams of "SHEMSHAK", structures of tuff shale and dark gray to green shale with volcanic rocks of "KARAJ" and limestone of "LAR" have been selected as lowly, moderately and highly resisting formations to degradation. For each combination of geological formation and vegetation cover (low, moderate, and high density) three sampling plots of 1x1m have been selected and rainfall simulation has been conducted over them. For each plot, the surface characteristics including the vegetation cover, runoff and sediment yield and soil texture were measured. The measured data were statistically analyzed. Results showed that "SHEMSHAK", "KARAJ" and "LAR" formations were respectively ranked from highest to lowest with respect to the volume and weight of sediment yield. Also, there was a strong inverse relationship between vegetation cover percentage and volume of runoff and sediment for all investigated geological formations specially in poor vegetation situation that indicate interaction effects between vegetation cover and type of geological formations.

Keywords: geological formation, lithological units, Nour-rud, rainfall simulator, vegetation cover.

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Plant Species Distribution Modeling Using Logistic Regression Models in the North East of Semnan

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ABSTRACT

The aim of this study was providing plant species predictive habitat models by using logistic regression method. For this purpose, study area conducted in north east rangelands of Semnan modeling vegetation data in addition to site condition in formation including topography, and soil was prepared. sampling was done within each unit of sampling parallel transects and 1 vertical transect with 750m length, each containing 15 quadrates (according to vegetation variations) were established. Quadrate size was determined for each vegetation type using the minimal area method. Soil samples were taken from 0-20 cm and 20-80 cm in starting and ending points of each transect. Logestic regression (LR) techniques were implemented for plant species predictive modeling. To plant predictive mapping, it is necessary to prepare the maps of all affective factors of models. To mapping soil characteristics, geostatistical method was used based on obtained predictive models for each species (through LR method). The accuracy of the predicted maps was tested with actual vegetation maps. In this study, the adequacy of vegetation type mapping was evaluated using kappa statistics. Predictive maps of *Astragalus spp.* (κ=0.86), *Halocnemum strobilaceum* (κ=0.51), *Zygophylum eurypterum* (κ=0.58) and *Seidlitzia rosmarrinus* (κ=0.6) with narrow amplitude is as the same of actual vegetation map prepared for the study area. Predictive model of *Artemisia sieberi* (κ=0.33), due to its ability to grow in most parts of north east rangeland of Semnan with relatively different habitat condition, is not possible.

Keywords: geostatistical method**,** Kappa statistics, logistic regression**,** predictive map**,** Semnan rangelands.

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Effects of Agricultural Activities on Land Degradation in the Khatam City

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ABSTRACT

Need to Increasing agricultural land in order to improve food resources in the past two centuries recent lead to widespread changes in land use and improper management of these lands. Continue this process can lead to land degradation and desertification, and improve such soils is very costly; Therefore, prevention of land degradation is more desirable. This function requires to research on the utilization of land agricultural and how to use. With this aim, the Khatam city was selected as the study region and various maps of the region, including soil, land use and height maps was prepared to help ArcGIS9.3 and ENVI software. Four dominant land region mention mono cultivated and multi cultivated systems under irrigation, garden lands and range lands as control treatments were considered as the treatments. The soil was sampled and soil factors in two corrective factors, including correction factors N, P, K, CO, $Caco_3$, Mg and damaging factors Hco_3, Cl, Na, pH, EC and SAR at depth 0 to 30 cm of the soil surface horizons were studied. Factors the design of split plots showed that there are significant differences between treatments in the region and soil of region is relatively poor from CO, N, K and P in soils Rdhy. The comparison of treatment means with Duncan Mean Comparison indicated that the garden lands as the most suitable treatments and range lands as the most unsuitable one.

Keywords: agriculture, Khatam city, land degradation, split plot scheme, suitable and unsuitable treatment.

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Effects of Shrubs on Preserving Understory Plants against the Livestock Grazing

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ABSTRACT

Rangeland shrubs may provide mechanical facilitation on their understory plants, by protecting them against the livestock grazing. However, such a facilitation effect may vary depending on the rangeland utilization rate. In a field research, mechanical facilitation of rangeland shrubs was compared in a highly grazed, a moderately grazed and an enclosure site; in an arid rangeland, Kakhak, Gonabad, Iran, during spring to summer 2011. Twenty line transects were established in various directions and slope aspects. Forage production was measured by clipping method within the paired plots, i.e. under the canopy of nursing shrubs and their nearby open areas. In the enclosure site, forage production was similar under the canopy of shrubs and in open areas, whereas in the highly and moderately grazed sites there were more forage under the canopies. These results indicate increases in mechanical facilitation of rangeland shrubs by increasing the grazing intensity. The mechanical facilitation was also varied depending on the life forms of understory species. In the enclosure, the greatest facilitation was on annual forbs, whereas in the highly grazed site it was on perennial grasses. Results of this study show important role of rangeland shrubs on preserving understory forage plant against the intense livestock grazing.

Keywords: grazing stress, mechanical facilitation, nurse shrubs, understory.

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The Study of Biological Soil Crust (Mosses) Roles in Protection of Surface Soil in front of Water Erosion (Case study: Rangelands around Torogh Dam in Khorasan Razavi Province)

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ABSTRACT

Soil erosion is a main hazard in most area of the country specially in arid and semi-arid regions and it is very important because of sedimentation, pollution, increased flooding and its negative effects on soil productivity. One of the features of arid and semi-arid areas is the presence of low cover of vascular plants. These empty spaces are usually good niches for biological soil crusts or cryptogams like mosses. These crusts contribute to a variety of ecological functions and have different effects on soil features and vascular plants. The present study was carried out in the rangelands of Torogh dam basin of Khorasan- Razavi province in order to find the effects of such kind of plants (mosses) on water erosion. For this purpose, artificial runoff streams in plots with two intensity (low and high) for 30 minutes. In order to study the effects of different amount of mosses on sedimentation and specific erosion, four different density of mosses in the same experimental situation were studied: high (60-75% of plot), medium (35-50% of plot), low (10-20% of plot) and control (0%). The results of analysis of variance and tukey method by the use of Minitab software showed a significant difference in 95% level between the four considered density of mosses and the two intensity of water. As mosses density decrease, sedimentation and specific erosion increased consequently. But there were no significant differences in infiltration between the different treatments.

Keywords: biological crust, infiltration, moss, sedimentation, water erosion.

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Comparing the Accuracy of Soil Map Prepared by Geopedology and Usual Method of Iran (Case Study: Kouhin)

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ABSTRACT

Today, extensive improvements in fields of soil mapping have increased the purity and accuracy of soil maps. Usual mapping methods moreover depend on skills and experience of surveyor in identifying and delineating the boundaries, also need the high cost and time consuming that face the soil mapping with restrictions. In this study, aerial photographs with 1/40000 scale were used in order to preparation of the initial interpretive map and determination of sample region. Then, the numbers of 24 profiles were described in determined units. After sampling and necessary physicochemical tests, soil map of Kouhin (Qazvin) was prepared and accuracy of map was calculated in two methods in all levels of taxonomy. The first method was formation of error matrix and calculation of kappa index and second was comparison the geopedological map with described profiles and evaluation the results of each. Then a part of a geopedological map that had overlapping with map prepared by usual method was compared with this map. Results showed the overall accuracy of 67.5, 90.5 and 98.5 percent in levels of family- subgroup and great group- suborder and order of soil for geopedological method respectively.

Keywords: accuracy of soil map, geopedology, soil map units, usual method of Iran, validation.

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Suitable Species Diversity Abundance Model in Three Grazing Intensities in Dizaj Batchi Rangelands of West Azerbaijan

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ABSTRACT

Species diversity is one of the important characteristics shows rangeland ecosystems changes, which is already under effects of management practices. Thus, this research was conducted to study species diversity variation and assess suitable distributive abundance model in three rangeland sites in West Azerbaijan. These sites were almost similar in environmental properties and differ in view point of grazing intensity (light, moderate and heavy intensities). After selecting sampling areas in each of the sites, species cover were recorded in 60, one square meter quadrates with 10 meter far from each other which established along 100 meter transects in sites and then richness, evenness and diversity (heterogeneity) indices were calculated. Thus, rank-abundance curves were plotted and four distribution models such as log-normal, geometric, log-series and Brocken stick were fitted to each of these sites and then best model was selected in 0.05 level of confidence. Means comparison test showed that richness, evenness and heterogeneity indices have significant differences ($P<0.01$) in sites. Highest diversity is observed in the light grazing intensity site and lowest diversity is in heavy grazing intensity site. Species rank-abundance curves point out that low-abundance species are seen lower in light grazing site and its curve have gentler slope than moderate and high grazing intensity sites thus its diversity is higher. There is lowest species number in high grazing intensity site and evenness is lowest too due to its high number of rare and dominant species. Log-normal model was fitted to light site implying on sustainable community and high grazing intensity site is fitted with geometric model which point out on distractive communities with low diversity. Overall results showed that implementing light grazing can protect species diversity and heavy intensity declines species diversity that this shows the need considering of management on implementing light grazing intensity in the rangeland.

Keywords: abundance distribution model, Dizaj Batchi rangelands, livestock grazing, species diversity, West Azerbaijan.

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Determining of Effective Factors on Gully Longitudinal Advancement (Case study: Dareh Koreh Watershed)

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ABSTRACT

Gully erosion is one of the most destructive types of channeled water erosion that removes a considerable volume of soil as it develops. This type of erosion consists of complex a geomorphic process that has been known as an indicator of accelerated soil erosion. In this research the advancement of 25 headcuts were assessed through digital interpretation of multi-temporal aerial photos, field observations and GIS data analysis over the two periods of 1967-1995 and 1995-2008. Moreover, the stepwise regression analysis procedure was applied to extract the effective factors on gully head advancement (such as topography, physico-chemical soil attributes and morphology of gully). The results indicated that the mean of gully head advancement over the periods of 1967-1995, 1995-2008 and the mean of two periods were measured 1.36, 1.23 and 1.3 m/y, respectively. Further, regression analysis revealed that headcut's contribution area, distance of gully-head to ridge, height of gully head cut and SAR are the main factors on gully head advancement. Therefore, distance to ridge, headcut high and presence of plunge pool could use as suitable criteria to distinguish the active gullies in order to prioritizing the conservation activities.

Keywords: aerial photos, distance from ridge, erosion, gully, headcut advancement, regression.

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Application of Artificial Neural Networks in Simulating and Forecasting of Meteorological Drought Decile Percentage Index (Case study: Sistan & Balouchestan Province)

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ABSTRACT

Consecutive droughts in Sistan and Baloochestan province cause water resources restriction and this is a very significant problem for this region. In this study, in order to forecast the drought cycle in 9 climatological stations in the province, we used Artificial Neural Networks. The input data were average of annual rainfall data in all stations and also deciles precipitation index, which the first 30 years from 1971 to 2000 used for training the network and the last 8 years from 2001 to 2008 for simulating it. The network consists of Multilayer Perceptron (MLP) and Back Propagation Algorithm (BP) and also sigmoid transfer function. Number of Neurons in hidden layer was 10 with 1-10-1 structure and was calculated based on the lowest RMSE. Then drought prediction was done in neural network with the trained algorithm and without using actual and observed data in 2009 to 2012. Results showed that, the network was able to simulate and forecast DPI index with 97% regression and average RMSE error less than 5%. According to drought indices, results showed that the drought will have an increasing trend in all stations in this region in 2009 to 2011. Therefore, by using this method, drought can be predicted in later years without any need to have actual meteorological data and also can be used in water resources management, drought management and climate changes.

Keywords: artificial neural network, deciles precipitation index, drought, perceptron, prediction.

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Stakeholders' Analysis, Social Power and Network Analysis in Natural Resources Co-Management

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ABSTRACT

Nowadays, a lot of natural resource co-management plans due to lack of attention to stakeholders' characteristics and position in network of social relationships have failed. Actors or key personnel's recognition has been one of administrative requirement of natural resources co-management plans. The most influential actors in environmental decisions making can be identified based on stakeholders and network analysis. This study is aimed to determine the social powers based on network analysis approach and stakeholders analysis at the local users level of common rangeland of Nariyan village in Taleghan region. In this study, first, Rangeland users were identified based on survey methods then trust and cooperation matrixes are produced and then degree centralities index and betweenness centrality were computed by questionnaire finally each actor's topology has shown in the network. The result of this research is effective in identifying actors with central position that perform a key role in Nariyan rangeland co-management plan. Also, the result of this study can assist natural resource managers and planers in identifying social powers in order to organize and implement the sustainable landscape management plans.

Keywords: actors' centrality, natural resources co-management, social network analysis, social power, stakeholders' analysis.

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