Effects of the canopy of perennial plants and livestock utilization rates on the density of soil seed bank in an arid steppe rangeland

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Abstract

The study of soil seed bank provides useful information on management and restoration of natural ecosystems. In the arid environments ,some perennial plants may cause accumulation of seed bank under their canopy, thereby protecting them against the livestock herbivory and the other environmental factors. This study was conducted with objective to investigate effect of perennial plants on density of soil seeds bank, under different utilization levels in an arid steppe rangeland. Three adjacent rangeland sites were selected, i.e. intense grazing, moderate grazing and no grazing (enclosure), and three line transects were randomly located within each site. Along each transect, soil samples were taken from the depth of 0–5 cm under the canopy of perennial plants or the nearby open space. The seed bank density was determined by the technique for separating seeds from the soil. The density of soil seed bank in the moderate and intensive grazing sites was higher than in the enclosure. In addition, seed bank density under the canopy of perennial plants was significantly higher than in open space, in each of three sites. The highest and lowest seed bank density were observed under the canopy of *Rosa persica* and *Astragalus heratensis*, respectively. Generally, the results of this research indicate the key role of perennial range plants in protecting soil seed bank of other plants ,under the circumstances of high livestock grazing in the arid steppe rangelands.

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Study of the role of soil properties in making differences between plant communities

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Abstract

In this study, the role of soil properties in making difference between plant communities was examined. First, four plant types were identified, including *Pteropyrum aucheri-Salsola rigida* ، *Astragalus gossypinus - Acanthophyllum herateens* ،*Amygdalus scoparia – Achilla millefolium* and *Ephedra intermedia – Erigon capestra,* through randomized systematic sampling and field survey in representative area of each type. In each plant type, three 500-meter transects were selected and in each transect, ten plots were placed along each transect. Characteristics of vegetation such as type and percentage of cover, gravel percentage, litter percentage and bare soil percentage were determined within each plot. In addition, in order to study the soil properties, at the beginning and at the end of each transect, a profile was dug and soil samples were taken from the depths of 0-20, 20-80 cm. Soil physical and chemical properties (texture, pH, electrical conductivity, organic matter percentage, gypsum percentage, lime percentage, salts such as sodium, potassium, calcium and magnesium, sodium absorption ratio, sodium exchange percentage) were determined in soil laboratory. Then, the role of soil properties in making difference between plant communities was determined by using ANOVA statistical analysis, and the key factors making this difference were introduced as sand percentage, organic matter percentage, and electrical conductivity.

Key words: differences, Eshtehard rangelands, plant type, soil properties, vegetation cover.

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Estimating uncertainty and sediment yield contribution of forest roads in Ziarat Drainage Basin, Gorgan Province using geochemical tracers

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Abstract

Identifying sediment sources is one of important factors in selecting of appropriate method of erosion control and soil conservation. The main objective of this study is to estimate uncertainty and contribution of forest roads to sediment yield in Ziarat Drainage Basin, Gorgan city using geochemical tracers. For this purpose, 47 soil samples were collected from different sources with different land uses and 14 suspended sediment samples collected from basin outlet. In order to identify sources of basin sediment yield and determine individual contribution of each source, 11 geochemical tracers including OC (Organic Carbon), Sr, Ni, Na, K, Cu, Fe, Mn, Ca, Mg, and Pb were measured in sediment and suspended-sediment samples. By comparing the tracers in the sediment sources and using statistical analyses of Kruskall-Wallis test and discriminant function analysis (DFA), three tracers of OC, Cu, and Fe were selected as optimum set of tracers in separating sediment sources. Eventually, using Bayesian model, land uses of agriculture, road construction and forest with 67.1(61.6-71.8), 31.4(27.1-35.9), and 1.2(0.1-5.1) percent, respectively were determined as the relative contribution from each source in sediment yield, and the highest uncertainty is related to the agricultural land use. The results of this study can be used to select the best appropriate method of erosion control in the study area and similar areas.

Key words: Ziarat basin, Geochemical tracers, Bayesian model, uncertainty, sediment tracing.

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Trend analysis of temperature and precipitation variability using homogenization time series (Case study: Khazar Region)

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Abstract

Temperature and precipitation are among important atmospheric parameters for watershed planning. Assessment of temperature and precipitation trends is very important for future watershed planning. In this paper, trends of atmospheric parameters such as seasonal and annual temperature and precipitation were examined for the synoptic stations of Bandar Anzali, Rasht, Ramsar, Babolsar and Gorgan. In order to detect temperature and precipitation trends, homogeneous time series are needed. Expert judgment, metadata and standard normal homogeneity test (SNHT) were used to assess homogeneity of seasonal and annual time series. Some seasonal and annual time series were heterogeneous which were adjusted to homogeneous time series. The results show positive trends of annual and seasonal maximum and minimum temperature, and negative trends of annual and seasonal maximum and minimum precipitation. Also the trend of minimum temperature is higher than the trend of maximum temperature. Mean trends of annual minimum and maximum temperature and annual precipitation are 0.39 ∘c/decade, 0.05∘c/decade and -31/8mm/decade, respectively. The highest average trend of seasonal maximum and minimum temperature is related to the summer season, whereas the highest of average trend of seasonal precipitation is related to the winter season. The lowest of average seasonal trend of minimum and maximum temperatures are related to the winter and spring seasons, respectively. Mean of seasonal precipitation trends of spring, summer and autumn are almost similar each other.

Keywords: Trend analysis, Homogenized time series, Temperature, Precipitation, Khazar Region.

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Grazing Behavior of Makuyi Sheep Breed
(Case study: Mountainous Rangelands of Kelid Daghi, Jolfa)

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Abstract

Investigation of the grazing behavior of grazing animals on the rangeland is one of the basic necessities of grazing management in different climatic regions. The current study with the aim of exploring the grazing behavior of Makuyi sheep breed was conducted in the mountainous rangelands of Kelid Daghi of Jolfa as representative rangelands for Makuyi sheep breed dispersion in East Azerbayjan Province. For this purpose, a herd with 300 sheep including three mature ewes (3 years old) was chosen and tagged. In the next stage, by attaching GPS to each of them, their travelled distance, the movement speed of the sheep while grazing, grazing duration of particular plant species, period of rest and rumination during grazing months were derived. The results indicated that the time spent for grazing, at the final stages of the grazing season is longer than at the earlier stages of the grazing season. Nearing the final stages of the grazing season, distance travelled by the sheep during the day increased. The average speed of the sheep movement at the earlier stages of the grazing season was less than their speed at the final stages of the grazing season, due to the day length change and, consequently, the daily temperature change, and the change in the vegetation composition of the rangeland and, consequently, the change in forage quality and quantity. Based on the obtained results, the movement path of the sheep, the elevation profile of the path for the livestock movement during the grazing season months had the same trend and considerable changes were not observed in it. The small area of the study site, and also livestock lead by shepherd along a specified path during the grazing season are effective factors in this regard. Awareness of the mentioned cases is helpful for determining appropriate areas of livestock movement and proper dispersion of livestock in the rangeland, and that if the current dispersion of livestock by shepherd in the rangeland is properly carried out, and leads to livestock efficiency improvement.

Keywords: Makuyi sheep breed, grazing behavior of livestock, grazing season, Kelid Daghi pastures of Jolfa.

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Land Use /Cover Change Monitoring and Prediction Using Markov Chain (Case Study: The Abbas Plain)

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Abstract

Remote sensing is a key technology for assessing expansion and rate of land cover changes that awareness of these changes as the basic information has a special importance for various programs. In this study, land use changes were examined over the past 24 years, and the feasibility of predicting it in the future was evaluated by using the Markov chain model of the Abbas Plain. Landsat TM, ETM+, and OLI satellite images for the years 1968, 2003 and 2013, respectively; along with topographic and vegetation maps of the study region were used in this research. The images for three periods were classified into five land-use classes of rangeland, agricultural land (irrigated and rain-fed)), residential land, riverbed and barren and hilly land. According to the results, agricultural land is the most dynamic land-use class in the study area and its area has followed an upward trend during the period 1968 – 2003, so that 4337 ha (7.12%) has been added to this land-use class during this period. The trend of rangeland use change has had a descending trend during the period 1968 – 2003, so that has caused its area to be decreased by 3.19% (6573.6 ha) during this period. The results obtained from Markov chain analysis in the period 1968-2003, for model calibration; the maps for the years 1968 and 2003, and its matrix for predicating land use changes of the year 2023 indicate the Kappa coefficient equal to 80 percent. Based on the obtained results, in the year 2023, 49.1 and 10.1 percent of the study region are comprised of agricultural land and rangeland, respectively.

Keywords: Land use Change, Satellite Images, Forecast, Markov Chain Model, Abbas Plain.

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Studying phenology stages Bromus tomentellus Boiss. Species in different years in Kordan rangelands of Alborz province

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Abstract

Rangelands have been composed of different plant species that emergence of phenological stages in every one of them will be influenced by environmental and genetic factors. In order to exploit the time and achieve acceptable performance in each plant species, it is necessary that the emergence of biological phenomena are recorded and studied. The objective of the present study is to survey the different phenological stages of *Bromus tomentellus* in order to achieve proper management programs in the study area and similar areas. For this purpose, this study was conducted in semi- steppe rangelands of Kordan located in Alborz province for a 4-year period (2007- 2010). Among the plant species under consideration, ten plant bases were selected and recorded in special forms, during 4 years in the growing season, in 15-day intervals at the vegetative stage and in weekly intervals at reproductive stage, occurrence date of plant critical stages including the stages of the growth and vegetative growth, flowering, seed maturation and drying of the plant, along with the information related to the total height of plant in centimeter. In addition, the meteorological data and information relevant to a four- year study include; average monthly temperature and monthly rainfall from the meteorological station closest to the study area were prepared, and by noting the dry period, the Ombrothermic curves for the years 2007-2010 were separately drawn to adapt to the phenological stages of the study plant. The results indicated that this plant species begins its growth by noting the weather conditions, especially environment temperature (degree-day), in different years of the study period. Different phenological stages also have almost constant temperature demand (GDD), which the emergence of the stages is observed after obtaining the required temperature.

Key words: Correct management, Rangeland, Precipitation, Vegetative stages and temperature.

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The Effect of Grazing on Soil Surface Indicators Using Landscape Function Analysis (LFA) method (Case Study: Dona rangelands, Siah Bisheh Watershed)

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Abstract

For the scientific and accurate management of rangeland ecosystems, having information about ecosystem as indicators of ecosystem health and function is needed. The aim of this research is to study the effects of grazing on soil surface indicators and rangeland functional properties by using Landscape Functional Analysis (LFA) method. For this purpose, the present study was conducted in two regions, including the enclosure and outside the enclosure, Donna rangelands of Siah Bisheh watershed. Systematic sampling was carried out by three 100 m transects with 100 m interval. Along each transect, ten $1m^2$ plots with 10 m interval were placed. In order to compare triple indices including infiltration, stability and nutrient cycling in two regions of the enclosure and outside the enclosure, the independent T test was employed in this study. The results showed that there are significant differences among soil surface indicators except soil surface cover, perennial plants, trees and shrubs canopy, surface roughness and erosion type and severity ($P < 0.05$). Therefore, there are significant differences among three functional attributes of rangeland in these study regions.

Key words: LFA, Stability, infiltration, grazing, Siah Bisheh Watershed.

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Determining the potential habitat of Ferula ovina (Boiss) using Generalized Additive Model in Fereidonshar rangelands- Isfahan

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Abstract

In this study, the ability of Generalized Additive Model (GAM) for mapping potential distribution of *Ferula ovina* Boiss, and the description of species response curves to environmental variables were examined in Fereidonshar region with area of 1000 square kilometers located in West of Isfahan province. The presence and absence data of the species were collected from 278 sites (including 138 presence sites and 140 absence sites) by random systematic method, and 9 soil variables, 22 climate variables and 3 physiographic variables were mapped with pixel size of 72*72 square meters by using interpolation techniques (krigging, Inverse Distance Weighting) for the entire studied area. Then, the relationships between presence and absence of the species with the environmental variables were examined by GAM method. According to the results, the presence of *Ferula ovina* was inversely correlated with some environmental variables including soil silt and clay contents and also its distribution was directly correlated with slope, distance from sea level, organic matter content, soil saturation percentage and average annual temperature. The model evaluation conducted by the separate data gave Kappa coefficient equal to 0.64 and ROC area under curve equal to 0.86. According to the produced potential habitat map and the response curves of the species, *the presence of Ferula ovina* is more likely in the habitats with mean annual temperature: 9-11 degree centigrade, slop: 25-50%, elevation: 1950-3000 meter (Above sea level), CaCO3 content of soil: 10-30%, organic matter: 4-6%, silt: 10-30% and soil saturation percentage: 45-60%. The GAM enables managers to identify appropriate areas for rangelands rehabilitation and protection programs. The produced model has a suitable performance in identifying regions with high growth potential and rangelands rehabilitation and protection programs.

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Indigenous Knowledge and Local Traditions for Sheep Dairy Products and Management
(Case study: Takor village, Noor city)

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Abstract

Indigenous knowledge of each land is the manner of understanding and attitude of people towards world that shows the outcome of ancestors' experiences for years on optimal utilization of resources around human beings. Emphasis on technology transition and disregard for indigenous knowledge cause not only destroys the relationship between humans and the environment, but also causes disruption in sustainable development programs. This research with the overview of some part of indigenous knowledge of the *Baladeh* region of *Noor* city, emphasizes on local traditions on manufacture and management of sheep dairy products in *Takor* village. The study method of this research is based on filed studies, that qualitative methods including directs observations, cooperative observation and organized interviews with target groups have been used to generate information and data. The results of this research include analysis of pastoralists' knowledge for livestock management and evaluation of different aspects of milk derivatives processing and dispensation in the form of traditional cooperatives named "*Ayargiri*" and "*Shakhupi*". Based on the research results can be stated that pastoralists in the study village have found a social organization based on local traditions and customs toward dairy products management. This organization will be a kind of social capital for stakeholders. Eventually, it can be stated that stability of subsistence economy of residents in the study area depends on sustainability and improvement of social cohesion and capital in social network of rangeland utilizers.

Key Words: Local traditions, indigenous knowledge, Takor village, Ayargiri, social cohesion, Shakhupi.

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Optimizing the rate of contribution of different sources in sediment yield of loess areas (Case study: Kechik Catchment)

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Abstract

Sediment fingerprinting is a method for identifying sediment sources and determining the rate of contribution of each source. In this method, the natural tracer technology is used, that combined from samples collection, laboratory analyzing and statistical modeling. The natural tracers are measured in both the sources and suspended sediment to determine the rate of contribution each sources. The suspended sediment traps were constructed and used for the first time in country. In this research sediment fingerprinting was used in the loess area. 27 tracers were measured in all samples. Data were evaluated about outlier. The capability of each tracer in separating the sources was evaluated with kruskal-wallis test. All tracers were accepted. Then the best combination of tracers was determined with discriminate analysis. This combination is total carbon, Na, organic carbon, Pb, Co, Sr, Al, C/N and Rb. Then, the rate of contribution of each source was determined with normal method and optimized method. Among all the sediment sources, Gully and forest have the highest and lowest rates, respectively. The field observations were confirmed the results. The use of genetic algorithm increased the accuracy of determination of contribution of each source in comparison to normal method.

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The Impact of Landuse Changes on overflowing Zones Using Remote Sensing & GIS

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Abstract

Predicting the hydraulic behavior of the river and flood zone determination to reduce probable damages, are among measures which in recent years has been the attention of many researchers. Mazandaran province, especially the city of Neka, each year is affected by the floods with different return periods; therefore, land use changes and the role of these changes were evaluated in flood zones. In this study, with integration of river system analysis, GIS and Remote Sensing, images of the years 2000 and 2011 were processed and Neka river hydrological response was determined in specified return periods. The results showed Pearson type 3 distribution, roughness coefficient determined by Cowan's method and IRS image in comparison with ETM+ image, have good accuracy. With determining land use changes in the years 2000 and 2011, the area of each land use class was specified in GIS, and then attached to the HEC-GeoRAS. By determining two flood maps with return periods of 2 to 200 years, the difference of each layer was determined. Many studies determined land use only; but according to the results of this study and impact of the 14.60-percent increase in flood area, the role of changes is noticeable. This study suggests that in the flood zone determination, addition to land use designation, we should pay special attention to its changes and hydrological response of the total area to these changes, and its role in the flood zones. The simulation of river bed and flood zone in forest areas depends on land use, and deforestation in this river is one of the most important factors.

Key words: Flood, Land use, Nekarood, Remote Sensing, ETM+, IRS.

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Change detection of land cover in recent three decades using RS and GIS in Sabzkouh protected area

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Abstract

Sabzkouh protected area, with the variety of natural ecosystems and landscapes, is very rich from the point of diversity in climate, topography, habitats and wildlife that is located in central Zagros. Evidences show that its ecosystems such as other Iranian semiarid natural ecosystems, undergone changes in their vegetation structure over the past years. Obtaining multi-spectral and multi-temporal data via Satellite Remote Sensing (RS) with Geographical Information System (GIS) would be able to identify type, quantity and location of land use/land cover changes. The aim of present study is to detect land cover changes in recent three decades by RS in Sabzkouh region. Therefore, the images of Landsat MSS (1975) and Landsat ETM+ (2003), Digital Elevation Model (DEM) and Transformed Soil Adjusted Vegetation Index ($TSAVI_1$) were used as ancillary data to obtain land cover maps. These maps were produced by applying supervised maximum likelihood classifier and included five classes namely: agriculture, herbaceous rangeland, shrub and brush rangeland, barren land and forest. To detect changes, Post Classification Comparison approach was used. The net change calculations indicated that were added to shrub and brush rangelands and forest. On the other hand, herbaceous rangeland and barren land have been converted to the other classes.

Keywords: land cover, remote sensing, change detection, satellite images classification, Sabzkouh.

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Identification of appropriate rangeland restoration methods based on environmental data (Case study: Taleghan rangeland)

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Abstract

Overgrazing and inappropriate use of Taleghan rangelands has led to poor and very poor condition for almost all vegetation types. Taking the importance of rangelands in forage production and other benefits into consideration, management of these rangelands and improving their condition seems essential. The present research was conducted using data integration of vegetation, condition, slope, soil, precipitation, etc. in a Geographic Information System (GIS) environment. Our study area was located in 50˚, 36́, 43̋ -50˚, 53́, 23̋ longitude and 36˚, 5́, 19̋ -36˚, 19́, 19̋ latitude in the middle area of Taleghan watershed with the area of 37977 hectares. According to the results, improving methods and reforming activities could be suggested including prevention of livestock grazing (enclosure), sowing, inter seeding, broad casting and hoe sowing in areas which have poor and very poor condition (in 6621.325, 1274.381, 694.561, 1215.254 and 2368.101 hectares (areas), respectively). Such activities may improve livestock grazing management as well as watershed conditions, wildlife habitat or other similar purposes.

Key words: artificial range management method, condition, improving and reforming methods, Taleghan.

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Externalities of Nomadic Livestock's Utilization on Khafr-Sivar Rangelands from Water Regulation Perspective

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Abstract

Natural resources are valuable capitals for all nations. Rangelands as the most extensive natural ecosystems in Iran provide numerous services, including fodder production and red meat supply, soil conservation and water regulation. Although uncontrolled exploitation of these resources has imposed much pressure and caused many losses within the ecosystems. Impacts of overutilization of nomadic livestock on Semirom rangelands from runoff control perspective has been the core objective of this study. Considering the utilization conditions, vegetation cover was measured within the vegetation types before and after livestock grazing during 2013 grazing season. Curve Number method was selected to evaluate the runoffs originating from rainfalls with different return periods before and after livestock grazing and the difference was considered as the grazing impact. This externality was valuated using replacement cost method. Results showed that utilization pressure is extremely more than grazing capacity which has distorted water regulation function of the rangelands, e.g. it has increased the runoff volume from a rainfall with 2-year return period from 1660884 to 2600487 m^3. In other words, it has diminished the potential of rangelands in controlling water runoffs. Economically speaking, the external damage to water regulation function of rangelands was calculated at the rate of 25391 million Rial/year. This information on the externalities of nomadic livestock will provide the useful basis for economic appraisal of the utilization process and adjustment or rectification of economic activities which entail social costs on their way towards private profits.

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Impact of land use changes from rangeland to horti-agriculture on soil total carbon and particulate organic matter in micro- and macro aggregates (Case study: Salavatabad, Sanandaj)

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Abstract

This study aimed to determine the effect of land use changes from rangeland to horti-agricultural lands on the most important qualitative characteristics of soil such as total soil carbon and particulate organic matter, in Salavatabad region, Sanandaj. In the present study, one rangeland, two cultivated pea lands, two cultivated wheat lands and two gardens were selected in growth season in the end of spring, 2014. Forty two soil samples were taken randomly and systematically from the study region. Then, soil micro- and macro aggregates were separated using 0.25 mm and 2 mm sieves. Total soil carbon and particulate organic matter of soil samples were measured in the laboratory. The results showed that land use changes from rangeland to horti-agriculture significantly decreased total carbon and particulate organic matter in micro-aggregates. While total carbon and particulate organic matter in macro-aggregates was not changed by land use changes from rangeland to horticultural land. We suggested that if rangeland will be converted into agricultural land, horticultural land is the best for land use changes.

Ke y words: Land use changes, Organic carbon, Particulate organic matter, Soil macro and micro aggregates.

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Comparing Ecological Functions of Northern and Southern landscapes of Darehkonari Khashab rangeland, Gachsaran County

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Abstract

To apply scientific and proper management of rangeland ecosystems, having information on health and functions indices of ecosystem is required. Using landscape function analysis, the present study deals with assessing and comparing of ecological indices in northern and southern landscapes, Darehkonari Khashab of Gachsaran. Length and width for ecological patches in northern landscapes in species *Astragalus fasciculifolius* Boiss, *Centaurea intricanta* Boiss, *Cousinia multiloba* DC, and inter patches(bare and litter), in southern ones on species *Cousinia multiloba* DC, *Stachys byzantina* C. Koch, *Stachys byzantina* C. Koch and *Cousinia multiloba* DC and inter patches were recorded along three 50 m transects across both southern and northern aspects. In addition, eleven soil surface indices were measured. These indices belong to three main characteristics of soil stability, infiltration and nutrient cycling. The results showed that the indices of stability and nutrient cycling in both landscapes have a significant difference ($p < 0.05$), but this was not case for infiltration index ($p > 0.05$). The main ecological indicator of northern and southern landscapes are *C. intricanta* and *S. byzantine + C. multiloba,* respectively.

Keywords: landscapes, ecological indices, ecosystem function, Gachsaran, Khashab rangeland

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Net Primary Productivity in Kouhdasht, its Spatio-Temporal Patterns and Relation to Meteorological Variables

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Abstract

Nowadays, temperature increase, rainfall decrease and its effect on the time dynamics of carbon fixation cycle still are faced by many uncertainties. Net Primary Production (NPP) is one of the main factors of carbon cycle; precipitation and temperature measurement are known as two useful tools to study different ecosystems stability and resilience in terms of climate. Hence, in this study, NPP distribution affected by climate parameters of temperature and precipitation have been investigated in four ecosystems of forests, grassland, irrigated agriculture and rain fed agriculture during the period of 2003-2010. Considering climate conditions of biomes, NPP estimation at regional scale was done based on the NASA Moderate Resolution Imaging Spectroradiometer (MODIS) MOD17 NPP product. The results showed that the regression relation was weak between NPP and rainfall for four studied ecosystems, in the other words, low coefficient between these two variables has caused no justified relationship between them. The regression relation between temperature and NPP in forests, pastures and rain-fed agriculture ecosystems follows quadratic *equations* with determined coefficient over 0.55. The results of this study show that the forest ecosystem resilience to water and temperature tensions is more than other ecosystems, and irrigated agriculture has the least resilience.

Application of IUCN method in watershed sustainability condition assessment
(Case study: Talleghan-Zidasht1)

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Abstract

Sustainability is a concept that emphasizes substantially on investments conservation (natural, social and economic) toward intra-generation equity. When sustainable development is achieved an overlapping is created between ecological, economic and social classes. The goal of this study is to measure and evaluate watershed sustainability. In order to evaluate sustainability in Zidasht basin 1, an ecosystem approach has been used to create balance between three categories of economic, social and ecosystem. Selective variables were obtained by common assessment methods. The IUCN method was used to analysis and evaluate the sustainability of the study basin. By and large, two subjects of human welfare and ecosystem sustainability are dealt with within IUCN approach. Two criteria, six indices and 28 variables were measured in human welfare section and also four criteria and 10 indices and 35 variables were evaluated in ecosystem sustainability section. Above mentioned indices measurement using software Wellbeing Score has scored based on intervals 0-100.finall indices and criteria Arithmetic Mean method integration was completed and map was developed in GIS. Final scores for ecosystem and social and economic issues were derived equal to 51 and 49, respectively. Final results of this study based on the Barometer of Sustainability showed that sustainability of Zidasht 1 basin is moderate. This situation can be improved by ecosystem conservation and people life style quality enhancement.

Keywords: Ecology, Sustainability, Sustainable Development, Zidasht 1 Basin, IUCN.

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Comparison of two rainfall – runoff models for simulation of stream flow
(Case study: Doiraj river basin in Ilam province, Iran)

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Abstract

The runoff simulation in a watershed provides insight on the processes affecting runoff generation and the stream flow characteristics like spatial and temporal variability of stream flow. This insight helps managers and planners in informed decision-makings on water resources management and planning. The objective of this study is to compare the performances of the complex SWAT model and the simple IHACRES model for simulating runoff in the Doiraj river basin, Ilam province. For this purpose, SWAT model due to having many parameters affecting stream flow and the use of GIS, and IHACRES model due to the low and easy access data requirements, are very practical. In this study, the data over a period from 1994 to 2004 and the statistical criteria of R^2, bR^2, and NS were used to evaluate performances of IHACRES and SWAT models. For IHACRES model, values of R^2, bR^2 and NS were estimated equal to 0.34, 0.112 and 0.33, respectively for calibration period and values of 0.47, 0.235 and 0.43, respectively for validation period. In addition, for SWAT model, the coefficients were estimated equal to 0.41, 0.314 and 0.12 respectively, for calibration period and values of 0.68, 0.632 and 0.56, respectively for validation period. Final results of this study showed higher performance of SWAT model relative to IHACRES model for simulating daily runoff in Doiraj river basin and can be used to simulate runoff in the watersheds with limited data and similar natural conditions.

Key words: Runoff simulation, calibration, validation, Doiraj river basin, SWAT, IHACRES.

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