Evaluating impact of teleconnection indexes on river flow forecasting (Case study: Hablehrud River Basin)

❖ **Mohammad Reza Yazdani**[*]**;** University of Semnan Assistant professor, Department of desertification, University of Semnan, Iran.
❖ **Ali Asghar zolfaghari;** University of Semnan Assistant professor, Department of desertification, University of Semnan, Iran.

Abstract

Watershed outflow has influenced by different factors such as climatic, human and physical aspects and this Variability of effective factors can cause complex conditions, difficulty of flow forecasting and it mainly originates by different local and temporal scales of these factors. Also, some remote meteorological signals can cause changes in meteorological conditions in different regions. Hablehrud river flow has a vital role in regional development, especially for agricultural section. Thus research of river flow forecasting should be done for water resources management especially when there are drought and climate change conditions in order to facilitate sustainable development. In this study four nonlinear models of artificial neural networks including Generalized Feed Foreward Networks (JFNNs), Jordan/Elman Networks(JENs), Time Lag Recurrent Networks(TLRNs) and Radius Basis Function Networks(RBF) was used to modeling Hablehrud river flow(Bonkuh station) during 1982 to 2011. Input variables after sensitivity analysis were used in 4 models and 4 scenarios. Ten teleconnection indexes were used as input of the model to evaluate their roles in model capability. Results indicated that in the test stage Jordan/Elman Networks represented lower error compared with selected models (RMSE for 4 scenarios are5.57, 4.9, 5.35 and 4.62 respectively). In general error showed decreasing trend from first scenario to the last. Error was decreased of 15 to 31 percent by using teleconnection patterns as inputs (GFFN=%26, JEN=%15.8, TLRN=%25.5 and RBF=%31.7). Totally using teleconnection indexes as inputs in the modeling stage can diminish error of flow forecasting, although selected models indicated different results due to its variable topologies.

Key Words: River flow modeling, teleconnection index, sensitivity analysis, flow forecasting, artificial neural networks.

* Corresponding Author: Tel: +989131078249
  Email: m_yazdani@semnan.ac.ir

Reconstruction of Daily Discharge using Artificial Neural Network and Neuro-Fuzzy Methods
(Case Study: Upstream of Karoun Watershed)

❖ **Mojtaba Nassaji zavareh**[*]; Assistant Professor, Institute of Technical & Vocational Higher Education Agriculture Jihad, Agricultural Research, Education and Extension Organization (AREEO), Tehran, I.R.IRAN.
❖ **Bagher Ghermezcheshmeh;** Assistant professor, Soil Conservation and Watershed Management Research Institute, AREEO, Tehran, I.R.IRAN.
❖ **Fatemeh Rahimzadeh;** Faculty Member of Atmospheric Science and Meteorological Research Center, I.R.IRAN.

Abstract

Daily constant discharges are needed estimating daily discharge in the hydrological model. The different number of statistical years, statistical deficiencies, and measurement error leads to the formation of time series with an uncommon time base. Hence the reconstruction of daily discharge data is of paramount importance. In this research, daily discharge was reconstructed in two stages in one of the upstream of Karoun River. In both stages of research, daily discharge data from two upstream stations were used to reconstruct daily discharge of the downstream station using artificial neural networks, neuro-fuzzy and two variables regression methods. In the second stage, the magnitudes of discharge, based on dry, normal and wet years was used to reconstruct the daily discharge. The results showed higher accuracy in the artificial neural network and neuro-fuzzy methods compared to two variable regression methods in the reconstruction of daily discharge. Multi-layer perceptron model has better potential among all different method of artificial neural network and neuro-fuzzy models. Classification of discharge into dry, normal, and wet years decreases error in the reconstruction of daily discharge. Based on the mean relative error (MRE), error in reconstruction of daily discharge is the least in normal, wet, and dry years, respectively.

Key Words: reconstruction, daily discharge, artificial neural network, neuro-fuzzy, Karoun.

* Corresponding Author: Tel: +982166940777
  Email: n_mojtaba@hotmail.com

Comparison of Different Geostatistical Methods for Estimating Rainfall in Hajighoshan Watershed

- ❖ **Yusef Nabipour;** M.Sc. Student of Watershed Management, Faculty of Natural Resources, Tarbiat Modares University, I.R.IRAN.
- ❖ **Mahdi Vafakhah**[*]**;** Associate Professor, Department of Watershed Management, Faculty of Natural Resources, Tarbiat Modares University, I.R.IRAN.

Abstract

Rainfall spatial analysis methods are very helpful since there are not enough rainfall gauge stations and watersheds are scattered in large extent. There are many different methods for estimating average precipitation such as; arithmetic method and Thiessen polygon. However, the arrangement and location of data and their correlations are not considered by classic methods. Thus, geostatistical techniques are applied instead. In the present article, 22 meteorological stations from within and around the basin with data collection period of 30 years were selected for the analysis. The geostatistic analysis methods including ordinary kriging, simple cokriging, ordinary cokriging, standardized ordinary kriging, moving average using inverse distance with powers of 1 to 5 were applied for spatial analysis of annual, monthly and 24 hourly maximum rainfall data in Hajighoshan watershed located in northeast of Iran. For this reason, rainfall data were fitted to different methods and compared using cross validation by removes rainfall values of each station, one at a time, and predicts the associated data value. The results of geostatistic analysis showed that ordinary kriging is the best method with MBE=34.26 for annual rainfall while moving average using inverse distance with power of 5 is the best method for monthly and 24 hourly maximum rainfall. According to the results obtained through analysis of variogram model, gaussian model are supposed as the best models for annual, monthly and 24 hourly maximum rainfall data.

Key Words: Isohyetal map, 24 hourly maximum rainfall, Kriging, Cokriging, Weighted inverse distance, Hajighoshan

* Corresponding Author: Tel: +981144553102
  Email: vafakhah@modares.ac.ir

Daily Rainfall Temporal Distribution Patterns and its Relations with Short-Term Precipitations in Coastal – Forest Areas (Case Study: Nowshahr Station, Northern Iran)

- ❖ **Maryam Moradnezhadi;** MSc. Student of Forest Engineering, Faculty of Natural Resources, University of Tehran, I.R.IRAN.
- ❖ **Arash Malekian;** Assistant professor, Faculty of Natural resources, University of Tehran, I.R.IRAN.
- ❖ **Meghdad Jourgholami[*];** Assistant professor, Department of Forestry and Forest Economics, Faculty of Natural Resources, University of Tehran, I.R.IRAN.
- ❖ **Ali Ghasemi;** MSc. Student of Watershed Management, Faculty of Natural Resources, University of Tehran, I.R.IRAN.

Abstract

24 hour precipitation distribution pattern and its relationship to short-term rainfall is an important issue in hydrology studies such as in flood simulation and in design of hydraulic structures. Accordingly, this study made an attempt to investigate the relationship between daily precipitation and hourly and minute precipitation using data from rain gauge station of Nowshahr in a coastal-forest region in north of Iran. The patterns of daily rainfall temporal distribution were examined using Pilgrim and Huff techniques. Finally, the obtained regional pattern using statistics were analyzed to evaluate absolute percent relative error, mean absolute error, root mean squared error and mean square error. Results of the relationship between 24 hour precipitation and 5 and 30 minutes and 1, 2, 3, 6, 9, 12, and 18 h rainfall showed that in all cases an exponential relationship can better explain this relationship than linear regression equations and logarithmic relations. Study of the rainfall temporal distribution pattern showed that in all extracted 24 hour events, the highest rainfall occurred in the lower quartile and in all rainfall events constant decrease in rainfall intensity occurred from the moment it started till it ended so that no fluctuation was observed in precipitation over time signaling that rainfall intensity would increase again. The results indicated that in similar areas, l SCS-type IA model could show reasonably better estimation in comparison with other models.

Key Words: Nowshahr station, SCS pattern, Huff pattern, Rainfall Temporal Distribution, 24 hour precipitation, riparian forest.

* Corresponding Author: Tel: +982632249312
  Email: mjgholami@ut.ac.ir

Evaluation of GOCART Scheme for Simulating PM$_{10}$

❖ **Hossein Mohammad Asghari**[*]**;** Assistant Professor, Faculty of Natural Resources, University of Marine and Technology of Khoramshahr, I.R.IRAN.

❖ **Shramkhalighi Sigarodi;** Assistant Professor, Faculty of Natural Resources, University of Tehran, I.R.IRAN.

❖ **Parviz Irannejad;** Associate professor, Geophysics Institute, University of Tehran, I.R.IRAN.

❖ **Hasan Ahmadi;** Professor, Islamic Azad University, Science & Research Branch, I.R.IRAN.

❖ **Arash Malekian;** Assistant Professor, Faculty of Natural Resources, University of Tehran, I.R.IRAN.

Abstract

Aerosol impact on people health, social and economic activities, land and water ecosystems and meteorological parameter. The GOCART scheme was evaluated for simulating PM$_{10}$ in this study. GOCART was run into WRF model as a host model. Reanalysis data from FNL for every 6 hour was used for initial conditions. One domain and two nests were used to cover region from West Africa till East Asia, Iran and Khuzestan Province. Primary results shown that the model overestimate surface moisture and the results was weak for simulating PM$_{10}$,so we modified surface moisture using welting point of soil texture in desert region for summer. In addition, erodibility index was defined using surface moisture and threshold wind velocity and coefficient of this index modified using Tir and Day PM$_{10}$ data at 1387. Results of modified model were compared with observed data in environmental station in Ahwaz for one week from 25, 3,1388 till 31,3,1388. Statistical analyses shown that, GOCART has a good capability for simulating PM$_{10}$.

Key Words: aerosol, numerical model, atmospheric model, wind erosion, emission.

* Corresponding Author: Email: h_masgari@yahoo.com

Assessment of the Individual efficiency of Gabion and Cement-Masonry Check Dams in some Basins of Chaharmahal-va-Bakhtiary Province

❖ **Ahmad Ghanbari;** MSc. Graduate of Watershed Management and Expert in Natural Resources and Watershed Management of Chaharmahal-va-Bakhtiary Province, Shahrekord, I.R.IRAN.

❖ **Rafat Zare Bidaki**[*]**;** Assisstant Professor, Faculty of Natural Resources and Earth Sciences, Shahrekord University, I.R.IRAN.

❖ **Afshin Honarbakhsh;** Associate Professor, Faculty of Natural Resources and Earth Sciences, Shahrekord University, I.R.IRAN.

❖ **Vafa Mahmoodinejad;** Senior Expert of General Office of Natural Resources and Watershed Management, Chaharmahal-va-Bakhtiary Province Shahrekord, I.R.IRAN.

Abstract

Check dam is the most costly watershed management practice. This research was an attempt to evaluate the effectiveness of individual check dams in different watersheds of Chaharmahal-va-Bakhtiari. 11 criteria impacting upon check dams' individual efficiency were considered: check dam location, check dam stability, longitudinal profile fixing, check dam's coefficient of sediment storage, check dam's crest to be perpendicular to channel's axis, spillway dimensions, check dam strength, anchorage, check dams built according to channels' cross section, consistency of spillway center with stream alignment and apron length. The importance of each criterion for each check dam's efficiency was measured using analytical hierarchy processes. 41 cement- masonry and gabion check dams constructed previously in different parts of the province were selected and were scored based on these criteria. Then by multiplying the weight of each criterion by the score each check dam received on that criterion, the distance of performance of each check dam from expected efficiency was computed. Results show that check dam's crest perpendicular to stream axis and consistency of spillway center with stream alignment averagely gained the highest score but longitudinal stream fixing and correct spillway dimensions gained the lowest score. And the location of check dams with the weight of 0.214 and apron length with the weight of 0.035 gained the highest and lowest weights, respectively. Economic assessment of check dams were done by comparing their final score in efficiency and the size of material used for that. It was revealed that small check dams constructed by consideration of designing principles showed more efficient and cost effective than huge check dams.

Key Words: check dam, Chaharmahal-va-Bakhtiari, AHP, watershed management.

* Corresponding Author: Tel: +989132534104
  Email: zare.rafat@nres.sku.ac.ir

The Effects of Geological Units' Characteristics and Slope Gradient on Runoff and Sediment Yield Using Rainfall Simulator (Case study: Senobar Watershed, Torbat-e-Heydarieh)

❖ **Parisa Farzi;** M.Sc. Student of Watershed Management, University of Torbat Heydarieh, I.R.IRAN.
❖ **Maryam Azarakhshi**[*]**;** Assistant Professor, University of Torbat-e- Heydarieh, Faculty of Agriculture and Natural Resources, I.R.IRAN.
❖ **Ali Rasoulzadeh;** Associate Professor, University of Mohaghegh Ardabili, Faculty of Agricultural Technology and Natural Resources, I.R.IRAN.
❖ **Mehdi Bashiri;** Assistant Professor, University of Torbat-e Heydarieh, Faculty of Agriculture and Natural Resources, I.R.IRAN.

Abstract

Characteristics of stones forming the earth's surface contribute significantly to environmental changes such as soil erosion and movements of soil particles. This study seeks to investigate the main and reciprocal effects of geological units and slope gradient on runoff and sediment production in *Senobar* watershed using rainfall simulator. To this aim, the geological map was created in Arc GIS 10 software and three dominant units i.e. green tuff, sandstone, marl (E^t), Orbitolina Limestone (K^l) and Conglomerate, Sand stone (Ng^{cs}) were identified. Besides, to study the effect of slope gradient, the slope map was provided in three classes: 0-10, 10-30 and more than 30%. Then, the rainfall intensity equal to 0.9 mm min^{-1} (10- years return period) was created by rainfall simulator. Analysis of variance showed significant differences between geological units for runoff, sediment yield and sediment concentration at 5% significant level. It was found out that there is significant difference between different slope gradients in runoff and sediment production; however, there was no significant difference regarding sediment concentration. The results of interaction between geological units and slope gradient for runoff volume was significant at the 95% level of confidence but regarding sediment yield and sediment concentration interaction effects were not significant. Generally, it was found that the type of geological units and slope of the study area impacted on soil erosion process. Also, the impressibility of runoff variable was more than that of the sediment.

Key Words: sediment, runoff, geological unit, slope, rainfall simulator.

* Corresponding Author: Tel: +989125636659
Email: Maryam.azarakhshi@yahoo.com

Effect of Different Grazing Intensities on Soil Carbon Sequestration and Nitrogen Stabilization (Case Study: Shahriar)

❖ **Mohammad Jafari;** Professor, Faculty of Natural Resources, University of Tehran, Karaj, I.R.IRAN.
❖ **Hosein Azarnivand;** Professor, Faculty of Natural resources, University of Tehran, Karaj, I.R.IRAN.
❖ **Ahmad Sadeghipour**[*]**;** Assistant Professor, Faculty of Desert Studies, Semnan University, I.R.IRAN.
❖ **Nadia Kamali;** PhD of Rangeland Management, Faculty of Natural resources, University of Tehran, Karaj, I.R.IRAN.
❖ **Ahmad Heydari;** Associate Professor, Faculty of Agriculture Engineering and Technology, University of Tehran, Karaj, I.R.IRAN.
❖ **Hasan Maddah Arefi;** Associate professor, Institute of Rangeland and Forest Researches, I.R.IRAN.

Abstract

Global warming and climate change have drawn special attention to soil and its potential for stable carbon sequestration. Soils are the largest stores of carbon in terrestrial carbon cycle and contain about three times more carbon than vegetation cover and two times more than that of atmosphere. Studying the effects of grazing on soil carbon storage is important because of the major role soil organic carbon has in production. Grazing is potent for changing the carbon storage of rangeland ecosystems. In this research, the effect of different grazing intensities on carbon sequestration and nitrogen stabilization in pastures cultivated with *Atriplex canescens* in Shahriar was studied. Soil and plant samplings were done in low, moderate and high grazing intensity areas as well as exclosure, using randomized – systematic method. Soil samples were taken from 0-10, 10-30 and 30-100 Cm depths of 20 soil profiles. In each soil sample, stone percent, bulk density, organic carbon and nitrogen were calculated. Data analysis was done using one – way ANOVA and Duncan test in SPSS 17 software. Results showed that all three grazing intensities have caused significant reduction in carbon and nitrogen of soil.

Key Words: Climate change, Carbon sequestration, Nitrogen stabilization, Grazing, Shahriar.

* Corresponding Author: Tel: +982333323088
  Email: a.sadeghipour@profs.semnan.ac.ir

Economic Evaluation of Converting Non- Irrigation Farms to Amygdalus Gardens and its Impact on Soil Properties (Case Study: Dezhkord Village, Eqlid District)

❖ **Somaye Sharifi**[*]; MSc. Student, Watershed Management, Yazd University, I.R.IRAN.
❖ **Fateme Mohamadzade;** MSc. Student, Watershed Management, Yazd University, I.R.IRAN.
❖ **Aliakbar Karimian;** Assistant Professor, Faculty of Natural Resources, Yazd University, I.R.IRAN.
❖ **Seyyd Hamidreza Mirghaderi;** Head of the Office of Natural Resources and Watershed Management of Eqlid District, I.R.IRAN.

Abstract

Population growth and more demand for food have imposed pressure on natural resources, one of which is conversion of lands to farming land. For example, in some areas people convert slope rangelands around their village to non irrigation farms since they receive enough rain. This factor accelerates the decomposition of organic matter and changes other physical and chemical properties of the soil and impacts upon productivity of lands. To protect the soil of these areas, government has implemented many watershed management projects, one of which is conversion of non irrigation farming into the *Amygdalus* gardens. This study aimed to investigate the impact of non irrigation farming on some physical and chemical properties of soil and economic evaluation of non irrigation wheat and *Amygdalus* gardens was conducted. For this purpose, soil samples were selected out of three types of lands i.e. rangelands, non irrigation wheat land, and *Amygdalus* gardens and from the depths of 0-30 and 30-60 cm soil with 3 replications. The results showed that the plan of converting inefficient non irrigation farming to *Amygdalus* gardens improves soil quality (fertility) in this region. . The results of economic evaluation of different land uses showed that the benefit to cost ratio for non irrigation wheat is 0/57; while that of *Amygdalus* gardens project is from 2 to 3/7; that is about 4 to 7 times much more. So the project of *Amygdalus* gardens has increased rural financial power.

Key Words: Economic evaluation, soil conservation, rain gardens, Dryland farming, Watershed Project.

* Corresponding Author: Tel: +989178518771
  Email: somaye.sharifi77@gmail.com

Application of CANFIS Model in Prediction of Soil Cation Exchange Capacity in Some Arid and Semi-Arid Regions of Iran

❖ **Fereydoon Sarmadian**[*]**;** Assistant Professor, Department of Soil Science, Faculty of Agricultural Engineering & Technology, University of Tehran. I.R. IRAN.

❖ **Ali Keshavarzi;** Professor, Department of Soil Science, Faculty of Agricultural Engineering & Technology, University of Tehran. I.R.IRAN.

Abstract

Data mining enables generalization of data of soil to remote areas and which is able to up/down scale of data in wide ranges of level that facilitate the decision-making process of executives. Cation Exchange Capacity (CEC) is one of the most important parameters in soil database and shows the ability of a soil to retention of minerals and pollutants. Due to low organic matter and specific mineralogy of soils in arid and semi-arid regions, measurement of CEC is time consuming and expensive. The objective of this study was to evaluate Coactive Neuro-Fuzzy Inference System (CANFIS) in prediction of CEC in soils of arid and semi-arid regions. A total of 85 soil samples from target area were selected among 440 soil sample database (available reference database) with a ratio of 1:5. Correlation test was conducted to assess the co-linearity of independent variables. Forward regression model was used to determine the most important and influential input parameters on the output results. The results indicated the reliability and high performance of the CANFIS approach in estimation of CEC using easily measurable characteristics, organic material, and satellite images.

Key Words: soil database, data mining, CEC, easily measurable characteristics, CANFIS.

* Corresponding Author: Tel: +982632321787
  Email: fsarmad@ut.ac.ir

The Potential of Species Richness and Diversity in Soil Seed Bank under Exclosure and Grazing

* **Fatemeh Salarian;** MSC in Rangeland Management, Faculty of Natural Resources, Agricultural Science and Natural Resources University of Sari, Sari, I.R.IRAN.
* **Jamshid Ghorbani[*];** Associate Professor, Faculty of Natural Resources, Agricultural Science and Natural Resources University of Sari, Sari, I.R.IRAN.
* **Ghodratolah Heydari;** Assistant Professor, Faculty of Natural Resources, Agricultural Science and Natural Resources University of Sari, Sari, Iran.
* **Nosratolah Safaeian;** Professor, Faculty of Natural Resources, Agricultural Science and Natural Resources University of Sari, I.R.IRAN.

Abstract

Conservation and restoration of biodiversity is very important for degraded rangeland ecosystems. It is necessary to assess the potential of soil seed bank as a major source of species. In this study, the soil seed bank size and composition were compared between exclosure and grazed areas. This was done in *Chahar-Bagh* rangelands in *Golestan* province. Soil was sampled in Exclosure and Grazing from 0-5 and 5-10 cm depths in 90 quadrates of 1 m^2. Then seed bank composition was identified after seed germination in glasshouse. A total of 28 species from 15 families were found in soil seed bank flora of both exclosure and grazed areas. Compositae, Gramineae, and Rosaceae were dominant in soil seed bank. Also, hemicryptophyte, Forbs and perennials were abundant in the seed bank of both areas. Exclosure significantly increased the seed density of *Digitaria sanguinalis, Potentilla canescens, Stellaria media, Sonchus oleraceus* and *Galium verum* in the seed bank. The species richness and diversity indices were not significantly different between two areas. These indices significantly increased in upper soil layer in exclosure while these indices were not significantly different between two soil depths in grazed area. The result of this study showed that exclosure influenced the soil seed banks, however, there was no evidence of positive changes in species richness and diversity indices and also an increase of grasses in soil seed bank.

Key Words: rangeland degradation, biodiversity, species pool, grazing gradient, *Chahar-Bagh* rangeland.

* Corresponding Author: Tel: +981133882985
  Email: j.ghorbani@sanru.ac.ir

Analysis of the Integrated Institution–User Network in Co-Management Action Plan of Rangeland (Case Study: Ghasr-e-Yaghoub, Khorram Bid, Fars Province)

❖ **Sareh Rasekhi**[*]; PhD student of Rangeland Management, Faculty of Agriculture and Natural Resources, Science and Research Branch, Islamic Azad University, Tehran, I.R.IRAN.

❖ **Ali Akbar Mehrabi;** Professor, Department of Watershed Management, Science and Research Branch, Islamic Azad University, Tehran, I.R.IRAN.

❖ **Seyed Akbar Javadi;** Assistant Prof., Department of rangelan Management, Science and Research Branch, Islamic Azad University, Tehran, I.R.IRAN.

❖ **Mehdi Ghorbani;** Assistant Prof., Faculty of Natural Resources, University of Tehran, Tehran, I.R.IRAN.

Abstract

Renewable natural resources are national capital and are of paramount importance in each country. Preservation and developing these resources is incumbent upon relevant institutions and all people especially the beneficiaries. In this regard, various approaches have been recommended for optimum use and sustainable preservation of natural resources especially rangelands among which co-management is highly emphasized. To pinpoint challenges and barriers before co-management, the integrated institution-beneficiaries network (institutions related to rangeland management and rangeland users) of *Ghasr-e-Yaghoub* village in *Safashahr* was analyzed applying social network analysis method. Results demonstrated that cohesion level among rangeland users and institutions related to rangeland and also network sustainability in the study area was moderate and Village Islamic Council and *Jihad-e Keshavarzi* (Agricultural Development Agency) were the two most influential institutions. In other words, they were core actors among all institutions. Therefore, reinforcement of cohesion among actors and recognizing key actors in different levels are necessary approaches for implementation of co-management action plan. Additionally, it helps natural resource managers for sustainable management of rangelands.

Key Words: institutional cohesion, Social network analysis, *Ghasr-e-Yaghoub* Village, Key Actors, Rangeland Co-Management.

* Corresponding Author: Tel: +989171211376
  Email: sarer2351@gmail.com

Investigation of Relationship between Vegetation Factors and Soil Properties (Case Study: Khojir National Park)

❖ **Seyed Akbar Javadi**[*]; Assistant professor, Islamic Azad University, Science and Research branch, I.R.IRAN.
❖ **Alireza khan Armuyi;** M.Sc. Student, Islamic Azad University, Science and Research Branch, I.R.IRAN.
❖ **Mohammad Jaffari;** Professor, Faculty of Natural Resources, University of Tehran, I.R.IRAN.

Abstract

The relationship between vegetation and soil properties in *Khojier* National park, located in Tehran province was investigated. For this purpose, vegetation data was recorded in each plot, based along 3 tansects in each vegetation type. Minimal area method was used for plot size. Density and vegetatin cover were determined. TWINSPAN and DCA tests were used to classify vegetation. Soil sample was taken from 0-20cm of soil depth then transferred to laboratory and prepared for analysis including soil texture, percentage of $CaCo_3$, $CaSo_4$, and pH, EC, P, Ca, Ma and N. For analysis of soil properties in relation to vegetation changes, a multivariate analysis method such as canonical correspondence analysis (CCA) was used. These analyzes were conducted using PC-ORD software. Results showed a significant correlation between vegetation and environmental factors. The most important soil properties affecting on vegetation types were gravel, clay, silt, sand, caso4, caco3, pH, EC, K and elevation. Statistical analysis of the results showed that the vegetation types had a significant difference in terms of percentage of Gravel, $CaCo_3$, $CaSo_4$, Sand, Clay.

Key Words: Khojir National Park, Canonical correspondence analysis, Detrended Correspondence Analysis, Two Way Indicator Species Analysis.

* Corresponding Author: Email: sadynan@yahoo.com

Using Halocnemum Strobilaceum, Prosopis Juliflora, and Alfa-alfa Silage for Providing Forage of Livestock in Arid Areas

❖ **Bahram Amiri*;** Assistant Professor, Department of Agriculture and Natural Resources , Islamic Azad University, Firoozabad Branch, I.R.IRAN.
❖ **Nahid Takin;** Faculty of Agriculture and Natural Resources, Islamic Azad University, Arsanjan Branch, I.R.IRAN.
❖ **Hosein Garadaghi;** Faculty of Agriculture and Natural Resources, Islamic Azad University, Arsanjan Branch, I.R.IRAN.
❖ **Behrouz Rasouli;** Assistant Professor, Faculty of Agriculture, Islamic Azad University, Rasht Branch, I.R.IRAN.

Abstract

In this study, a new and valuable forage source was introduced with combination and silage of alfa-alfa, *Halocnemum* and Mesquite via chemical, gas production and in vivo methods. To perform this research, first the right amounts of the species were collected. Then they were cut by chopper to the dimensions of less than 5 cm. Then, *Halocnemum*, mesquite fruit, alfalfa and molasses were silaged according to dry matter weight in 4 treatments with three replications in a RCBD. These treatments include: 50H-10K-30U-10M, 50H-20K-20U-10M, 50H-30K-10U-10M, 30H-30K-30U-10M. At the end of experiment (28 d) the amounts of silage qualitative factors were measured using standard methods suggested by AOAC. 3 Ghashghaee yearlong sheep (45+2.5 kg) and 3 Toodeh siah yearlong goats(30 +2.5 kg) used in a split-plot scheme with 3 replications for estimation of silage consumption. According to the results, 50H-20K-20U-10M and 50H-10K-30U-10M treatments have the most digestibility at 12 hours of incubation. Study of silage nutritional value by gas production methods indicated that 50H-20K-20U-10M treatment has the greatest amount of DOM, OMD. DMD and ME were consumed more by the livestock. Therefore, we can recommend it as an appropriate combination with economic and feeding benefits.

Key Words: gas production, silage, forage quality, Halocnemum, Mesquite.

Evaluation of the Effect of Probability Distributions on Suspended Sediment Prediction Accuracy using ANN and ANFIS Models (Case Study: Dez Basin)

❖ **Hamide Afkhami**[*]; PhD student, Faculty of Natural Resources, Yazd University, Yazd, I.R.IRAN.
❖ **Mohammad Taghi Dastorani;** Associate Professor, Faculty of Natural Resources and Environment, Ferdowsi University of Mashhad, I.R.IRAN.
❖ **Farzane Fotouhi;** PhD student, Faculty of Natural Resources, Yazd University, Yazd, I.R.IRAN.

Abstract

Due to the nature of the sediment data, selection of appropriate methods for processing the data before entering them to the artificial intelligence models can enhance the reliability of simulations results. In this study, the effects of sediment data processing procedures on ANN and ANFIS models outputs in 7 Dez Basin stations were evaluated. Accordingly, three scenarios were considered: In the first scenario, original data was used without exerting any processing technique; in the second scenario, the data was normalized; and in the third scenario, logarithm of data were used according to logarithmic distribution governing. The simulation results showed that using data logarithm leads to higher performance and lower error, especially in stations where the best fit probability distribution is one of the log family distributions. Finally, among applied models, ANFIS showed the best performance with coefficient efficiency of 0.95 and RMSE of 5.4, MSE of 1.4 and ME of 0.42 in Biatoon gauging station and using the third scenario.

Key Words: Probability distributions, Prediction, Suspended sediment prediction, Artificial Neural Network, Adaptive Neuro-Fuzzy Inference System.

* Corresponding Author: Tel: +989358920490
  Email: afkhami@gmail.com

Investigation of Vegetation Dynamics in the Semi-Steppe Rangelands of Isfahan Province (Case study: Doolat Gharin of Semirom)

❖ **Seyyed Morteza Abtahi**[*]; Assistant Professor, Research Division of Natural Resources, Isfahan Agricultural and Natural Resources Research and Education Center, AREEO, Isfahan, I.R. IRAN.

Abstract

The purpose of this study was to investigate vegetation dynamics and range conditions considering the climatic conditions and soil properties in *Doolat Gharin* in the South of Isfahan province of an area equal to 25 square kilometer. For this purpose, after determining vegetation types and associated species, the type of rangeland utilization, grazing season, the type of livestock and other relevant information, and vegetation data including canopy cover of annuals, perennial forbs, shrubs, total canopy cover, soil moisture and carbon were determined during four years. Data was collected along three transects in each vegetation types. For each transect 10 plots were established. The size of plots was 1 x 2 m, considering the life form of dominant species. Embrothermic diagram was drawn according to the monthly temperature and precipitation data of Semirom station. Data was analyzed of variance and means comparison were made using Duncan method. According to the results, significant differences were observed between years for canopy cover of annuals, shrubs, forbs, grass, soil cover and soil moisture and *Bromus tomentellus* ($P<0.01$) and total canopy cover, *Poa bulbosa* and soil organic carbon ($P<0.05$). In this site, the amount of vegetation and its variation are affected by precipitation changes.

Key Words: Climate, vegetation dynamics, canopy cover, Semirom, Soil condition.

* Corresponding Author: Tel: +989131634861
  Email: Morabtahi70@gmail.com

Secondary Compounds as Indicator of Plant Palatability (Case Study: Karsanak Rangelands of Chaharmahal-Va-Bakhtiari Province)

❖ **Ataolah Ebrahimi[*];** Associate Prof., Faculty of Natural Resources & Earth Science, Shahrekord University, I.R. IRAN.
❖ **Valiolah Raufirad;** Msc. Student of Rangeland Management, Shahrekord University, I.R. IRAN.
❖ **Hosein Arzani;** Professor, Faculty of Natural Resource, University of Tehran, I.R. IRAN.
❖ **Zahra Shojaei Asadeiye;** Assistant Prof., Faculty of Natural Resource & Earth Science, Shahrekord University, I.R. IRAN.

Abstract

Determination of rangeland species palatability has some functions such as defining the rangeland grazing capacity and plant composition estimation. Despite the importance of palatability in rangeland management, no appropriate palatability indicator has been defined yet. Therefore, developing an accurate, applicable, general, and simple indicator for plant palatability estimation seems crucial. This research is an effort in this regard. To investigate the relationship between plant secondary compounds and palatability, plant species composition in the study area and in the sheep and goat diet as well as selection index were measured using chronometric and filming method. In the next stage, main plants' secondary compounds in livestock diet were determined using GC/MSS. Then plants' secondary compounds were ordinated using principle component analysis (PCA) method. Quantitative value of each plant species Eigen values on each of the main axis of PCA was regarded as a criterion for differentiation of plant species based on its secondary compounds. Finally, correlation between selection index of each plant species by sheep and goat (as dependent variable) with each plant species Eigen values on PCA axis (as independent variable) was determined. The results showed that there is a significant negative relationship between the selection index of the species by sheep and goat with its secondary compounds ($P \leq 0.05$). So, it is concluded that secondary compounds are effective factors in animal's diet selection for grazing. Therefore, secondary compounds are recommended as an important factor for plant palatability determination.

Key Words: Rangelands; Grazing; Plant palatability; Secondary compounds; Karsanak; Chaharmahal-Va-Bakhtiari Province.

* Corresponding Author: Tel: +983832324423
  Email: Ataollah.Ebrahimi@NRES.sku.ac.ir

Relationship between Aggregate Stability and Selected Soil Properties in Taleghan Watershed

* ❖ **Mohsen Armin**[*]; Assistant Professor, Faculty of Natural Resources, University of Yasuj, I.R. IRAN.
* ❖ **Hasan Rouhipour;** Associate Professor, Research Institute of Forests and Rangelands, I.R. IRAN.
* ❖ **Hasan Ahmadi;** Professor of Islamic Azad University, Science and Research Branch, I.R. IRAN.
* ❖ **Ali Salajegheh;** Associate Professor, Faculty of Natural Resources, University of Tehran, I.R. IRAN.
* ❖ **Mohammad Hossein Mahdian;** Associate Professor of Soil Conservation and Watershed Management Research Institute, I.R. IRAN.
* ❖ **Vajihe Ghorban Nia Kheybari;** Ph.D. Student of Environmental Science, University of Malayer, I.R. IRAN.

Abstract

Aggregate stability is a fundamental property influencing upon soil erosibility and main hydraulic and physical characteristics. Knowledge of soil components controlling aggregate stability is very important for soil structure conservation. Also, identification of the critical soil properties affecting aggregate stability is central to understanding where erosion might be located within a catchment as a result of natural patterns in aggregate stability. The objective of this study, carried out in surface soils of Taleghan, was to investigate the relationship between aggregate stability and some selected soil properties. In this study, based on homogeneity in slope, aspect, and lithology work units were prepared, and then by relying on results of geostatistical studies in homogeneous work units in soils of Taleghan watershed, with an area of 3260 hectares, 84 points were selected as the soil sampling points. The applied indices of stability were the mean weight diameter (MWD) and wet aggregate stability (WAS). Correlation between mean weight diameter and measured properties were extracted using Pearson correlation coefficient and evaluated in terms of their statistical significance. Then, based on the results of correlation and using stepwise regression, models of aggregate stability prediction were developed. The unexpected results have been obtained from correlation between soil properties and aggregate stability so that the correlation between aggregate stability and the percentage of Caco3, clay and saturation were negative while that of fine sand and very fine sand were positive. Thus, the improvement of aggregate stability and soil erosion control in Taleghan watershed depends on management of these soil properties and soil conservation projects in order to adjust and optimize them.

Key Words: Aggregate stability, Soil properties, Work unit, Stepwise regression, Taleghan watershed.

* Corresponding Author: Tel: +989177424144
  Email: mohsenarmin@ut.ac.ir

Identification of Homogenous Watershed Basins for Estimating Soil Erosion and Sediment Yield Applying Different Methods of Cluster Analysis (Case study: North Alborz)

❖ **Nasim Arman;** Assistant Prof, Faculty of Natural Resources, Behbahan Khatam Alanbia University, I.R. IRAN.

❖ **Ali Salajegheh*;** Associate Prof, Faculty of Natural Resources, University of Tehran, I.R. IRAN.

❖ **Sadat Feiznia;** Professor, Faculty of Natural Resources, University of Tehran, I.R. IRAN.

❖ **Hasan Ahmadi;** Professor, Faculty of Natural Resources, University of Tehran, I.R. IRAN.

❖ **Jamal Ghoddousi;** Assistant Prof, Department of Watershed Management, Islamic Azad University, Science and Research Branch, I.R. IRAN.

❖ **Ali Kiani Rad;** Assistant Prof, Department of Economic Science, I.R. IRAN.

Abstract

Identification of homogenous watershed sub basins allows generalization of environmental study results. For this purpose, first available data for 27 selected watersheds in North Alborz regarding 21 variables including physiographic and climatic characteristics was gathered. The most important factors impacting upon soil erosion and sediment yield were equivalent rectangular length, mean annual precipitation, rock susceptibility, aspect and drainage density which were identified using factor analysis (Principle Component Analysis : PCA) and a 80.72 percent variation of data was observed (KMO =0.516). For determination of homogenous region, different methods of cluster analysis (hierarchical, K-means and two step clustering) were used and three homogeneous regions were specified. Discriminant function analysis was employed and confirmed the results of cluster analysis in homogenous region. On the other hand, based on these five factors, a discriminant function was defined and canonical correlation, chi-square, wilks' lambda values revealed that three homogenous regions were quite separate.

Key Words: factor analysis, cluster analysis, homogeneity, discriminant function analysis, soil erosion and sediment yield.

* Corresponding Author: Tel: +989123842464
  Email: salajegh@ut.ac.ir