Investigation of Interception and its Importance in Ecohydrology Studies in Rangeland Plants

Nasrin Kolahchi[1*], Mohsen Mohseni Saravi[2], Ali Tavili[2] and Ghasem Asadian[3]

1. Department of Environment, Faculty of Science, Islamic Azad University (IAU), Hamedan, Iran
2. Department of Reclamation of Arid and Mountainous Regions, Faculty of Natural Resources, University of Tehran, Iran
3. Faculty of Agriculture and Natural Resources Research Center, Hamedan Province, Iran

Abstract

One of the main components affecting the ecohydrology is interception or loss of rainfall by plant canopy. interception of reduced effective precipitation and dry areas to prevent soil moisture. Low level of abstraction is considered as important factors in managing rangeland resources. In this study, the vegetative form, some broad-leaved plants and plant selection and method of abstraction in weight was calculated. Plants studied, based on morphological structure, following percentage of rainfall received and soil moisture levels have no impact on the hydrological cycle were returned. Cousinia sp (%0.322), Hulthemia sp (%0.348), Acanthophyllum sp (%0.939), Verbascum sp (%1.092), Sophora sp (%1.476), Astragalusparrowianus with a large volume (%1.85), Acantholimon sp (%2.52), Astragalusparrowianus with a small volume (%4.42).

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[*] Corresponding Author: Nkolahchi@iauh.ac.ir

Economic Valuation of Water Regulation Function by Central Alborz Rangeland Ecosystems

Seyed Alireza Mousavi[1]* and Hossein Arzani[2]

1. Assistance Professor, Department of Natural Resources, Isfahan University of Technology, Isfahan, Iran
2. Professor, Faculty of Natural Resources, University of Tehran, Karaj, Iran

Abstract

Natural ecosystems provide many goods and services for human beings via their multiple functionalities. One of these important functions is the role of natural ecosystems in regulation of hydrologic cycle and increasing the infiltarion and retention of water in soil context and preventing from water runoff which may cause in unfavorable consequences like soil erosion and flooding. Quantification and economic valuation of these functions is of high importance to regulate the utilization process from these resources. This research is trying to quantify and economically valuate the role of Mid-taleghan rangelands as a representative ecosystem of Central Alborz region in water regulation and conservation function. Curve Number methodology was applied and effective data layers were overlaid to prepare CN map of the study area. Supposing the lack of rangeland vegetation cover, its effects on hydrologic cycle and runoff and infiltration quantities were studied, followed by estimating economic value of the function using replacement cost method. Results show the value of 960628 Rials per acre as the average annual economic value of this function. The importance of this value is especially due to the location of the study area which covers the upper areas of Taleghan reservoir dam and could be useful for water resources management and policy making.

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* Corresponding Author: sarmousavi@cc.iut.ac.ir

An Evaluation of Accuracy of Intelligent Methods and Sensitivity Analysis of Reference Crop Evapotranspiration to Meteorological Parameters in Two Different Climates

Masoomeh Najafi[1], Vahid Azimi[2] and Mohammad Shayannejad[3*]

1. M.Sc. Student, Water Engineering Department, Agriculture Faculty, Isfahan University of Technology, Iran
2. Former Student, Water Engineering Department, Agriculture Faculty, University of Tabriz, Iran
3. Associate Professor, Water Engineering Department, Agriculture Faculty, Isfahan University of Technology, Iran

Abstract

In this study, climatic parameters are used to evaluate the sensitivity of reference evapotranspiration in Isfahan and Rasht with two semi-arid and moderate climates using two intelligent methods during 1970-2010. In this research, multi-layer precpetron e (MLP) and gene expression programming (GEP) intelligent models are used in order to analyze the sensitivity of reference evapotranspiration to meteorological parameters. Results of correlation of the parameters showed, in Isfahan and Rasht, maximum and minimum temperatures have the highest correlation with correlation coefficients of 0.968 and 0.926 with other parameters, and in Isfahan wind speed and maximum temperature with a coefficient of 0.067 and in Rasht, minimum humidity and wind speed with a coefficient of 0.001 have lowest correlations. The results of the survey indicate that in Isfahan using MLP model and the maximum and minimum temperature, humidity, wind speed and number of sunshine hours as inputs, with the root mean square error (RMSE) equal to 0.418 mm/day was the best results for estimating reference evapotranspiration. The application of MLP model in Rasht, with the inputs of maximum and minimum temperature, the maximum humidity and the number of sunshine hours has less error and higher correlation coefficient and the values of reference evapotranspiration are much more similar to reality. Also, about the evapotranspiration of reference plant in relation to parameters that are used in this study the results showed that in two study places, the correlation coefficient between wind speed and reference evapotranspiration are 0.3 and 0.061 in Isfahan and Rasht, respectively which are the lowest coefficients.

Keywords: gene expression programming, meteorological parameters, neural networks, reference evapotranspiration.

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* Corresponding Author: shayannejad@cc.iut.ac.ir

Evaluation of Climate Change Impacts on Runoff Changes Trend in Barandoezchay Watershed in West Azerbaijan Province Using General Circulation Models (GCM)

Mohammad Mohammadlou[1], Ali Haghizadeh[2*], Hossein Zeinivand[2] and Naser Tahmasebipour[2]

1. MSc Student in Watershed Management Engineering, Department of Range and Watershed Management Engineering, University of Lorestan, Khorramabad, Iran
2. Assistant professor, Department of Range and Watershed Management Engineering, University of Lorestan, Khorramabad, Iran

Abstract

Climate change is a natural phenomenon that occurs in the long time scale. The most important factors that intensify climate change are changes in reflected radiation from the sun, changes in Earth's orbit, greenhouse gases and continents drift. In this research the Barandoezchay watershed in West Azerbaijan Province with an area of 1088 km^2 was investigated. Due to the lack of Synoptic station in the area, neighbor stations and Thiessen Polygons method were used and the weights of each station was incorporated in the climatic parameters include minimum temperature, maximum temperature, rainfall and solar radiation that are the requirement of downscaling LARS-WG model. Then, using the weighting method, among nine general circulation models, two models were selected which had the highest weight and were performed for production of climate data until 2040 using the scenarios studied in these models. In the next step using Multilayer Perceptron Network, daily runoff was predicted until 2040 under five scenarios of two models. The results showed that under five scenarios of two GCM models, there are changes in the average of runoff from watershed in base period compared to future period. Such that the average of river discharge in the future in spring and summer compared to the base period will be changed and will be reduced, however in autumn and winter, the runoff average will increase compared to the base period, overall total runoff volume will be more in future period.

Keywords: Barandozchay watershed, general circulation models, LARS-WG, runoff changes.

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[*] Corresponding Author: alihaghi20@gmail.com

Calibration and Zonation of Palmer Index Climatic Coefficients for Drought Risk Management in Natural Ecosystems (Wetlands) of Iran

Sara Azadi[1] and Saeid Soltani[2]*

1. MSc., Faculty of Natural Resources, Isfahan University of Technology, Iran
2. Associate Professor, Faculty of Natural Resources, Isfahan University of Technology, Iran

Abstract

According to the importance of obtaining accurate informations on drought conditions and it risk management for water right of major wetlands in Iran, in this study climatic coefficients of Palmer Index for 17 watersheds in country was calibrated and zonation and their range in basins containing international wetlands were investigated. Results showed that in wet conditions, in basins such as Caspian, Karoon, Gavkhooni, Bakhtegan this coefficient in cold months was obtained less than 10 and in Bandarabbas, Oroumiye and Hamoon basins was between 20 to 30 and in warm months was between 20 to 30 and the maximum value (30 to 40) was obtained in Hamoon basin. In dry conditions this coefficient in cold months, almost in most basins was less than 5 and in Bandarabbas, Oroumiye and Hamoon basins was between 5 to 10. Also, coefficient value in warm months was obtained 5 to 10 in Gavkhooni, Karoon, Bakhtegan basins, and in Bandarabbas and Balouchestan basins, compared to other areas the maximum value (15 to 20) was obtained. Generally, in dry and wet conditions, the coefficient value on the Caspian coastal regiones was less than and in Hamoon was higher than of other areas, and incresaed in humid toward dry climates. This coefficient in wet conditions was higher than dry conditions and in cold months was higher than warm months. According to agreement of this results with the Iran climate conditions, this index can be used to estimate of the minimum water necessary for wetlands life in drought risk management.

Keywords: coefficient of climatic characteristics, Iran, Palmer Drought Index, wetland, zoning.

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* Corresponding Author: ssoltani@cc.iut.ac.ir

Numerical Evaluation of Maximum Flood Discharge Using SCS Method for Land Management on Watersheds of Kan Area

Mohammad Hossein Jahangir[1*], Saeideh Sadeghi[2] and Hadis Soleymani[2]

1. Assistant Professor, Faculty of New Sciences & Technologies, University of Tehran, Iran
2. Mcs. Student of Natural Engineering, Faculty of New Sciences & Technologies, University of Tehran, Iran

Abstract

Flood is one of the major hydroecological phenomena that in each period causes damages to human achievements. Therefore, controlling this phenomenon is the subject of many researchers' works and studies specially hydrologists who have tried to predict the flood`s possible behavior by modeling it. This paper is trying to help one of the most widely used methods to estimate the maximum discharge in one of important catchment basins in Iran. So using the Dimensionless Unit Hydrograph method that is released by the Soil Conservation Organization of America, and according to the history of rainfall in each region, the likely quantitative estimates of flood volumes can be presented in each season. Although parameters in this method are diverse and frequently correlative, the results give accurate estimates of the flood discharge that are consistent with the input data. So in this study, to calculate the maximum discharge based on SCS method, numerical modeling has been used in a Matlab program and for this purpose, the 24-hour flood data at a four-year time period has been imported. At the end, to link the precipitation of maximum discharge using a weight-bearing function, a mathematical equation with the best adaptation with each subbasin's data was extracted which can substitute with the lengthy equations in the intended area.

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* Corresponding Author**:** mh.jahangir@ut.ac.ir

Affective Environmental Factors on Temporal Variations of Water Quality Properties in Zard River in Khuzistan Province

Maryam Mousavian[1*], Ali Haghi Zadeh[2], Somayeh Dehdari[3] and Zeynab Hazbavi[4]

1. Ph.D Candidate, Watershed Management Sciences and Engineering, University of Lorestan, Iran
2. Assistant Professor, University of Lorestan, Iran
3. Assistant Professor, Behbahan Khatam Alanbia University of Technology, Iran
4. Ph.D Candidate, Watershed Management Sciences and Engineering, Tarbiat Modares University, Iran; Member of Watershed Management Society of Iran

Abstract

Todays, the world development is facing serious water quality issues. Since protect of water quality and ecosystem healthy is an important aspect of ecohydrology. The present research aimed to analyze the temporal trends of water quality parameters of Mashin Zard river station in order to planning long term management approaches. In this research, trend of some significant factors of water quality such as K, Na, Mg, Ca, So_4^2, Cl, HCo_3, pH, Ec and TDS during 1970 to 2013 in Iran calendar by the Mann-Kendall nonparametric statistical test, Liu method and Piper diagram has been studied. The results showed that four factors such as K, Ca, Mg and So_4 had increasing trends in the study period. Whereas, Na and Cl had decreasing trend. The results of this study showed that there are serious challenges related to water and land management issues. So, these results are essential basis for achieving the important goals of region ecohydrology.

Keywords: Liu method, Mann-Kendall test, piper diagram, water quality, water resources management.

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[*] Corresponding Author: ma.mousavian@gmail.com