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## Water quality evaluation of Dez River in the Dezful hydrometric station

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### Abstract

The purpose of this study was to compare the Dez River water quality in the Dezful hydrometric station for human drinking water, industry and agriculture. This study by cross-sectional method used data from the period of 39 years. Sampling was carried out on the basis of physical and chemical parameters were determined. The results with World Health Organization standards, charts Schuler and agricultural standards for drinking water quality animals were compared. Most water quality variables with values in the range are the World Health Organization standards. The values of all variables was evaluated qualitatively EC, TDS, PH, Ca, Mg, Na, So<sub>4</sub> and Cl standards and TH and HCO<sub>3</sub> were exceeded. The average value of 5.189 milligrams per liter is difficult parameter. The average monthly change bicarbonate water equivalent dose of 158.023 mg per liter indicated in Dezful. Compared with World Health Organization standards can be found that the water quality of the river within the city of Dezful dose is 5.89% higher than the permissible limit. Dez River Hydrometric station Dezful has hard water. Water quality suitable for agriculture was evaluated on the basis of SAR. Schuler charts all variables are evaluated in good condition. Using the diagram wilkocs Dez River in category C2-S1 was evaluated as well as the quality of drinking water for livestock and poultry, and no problem is too good.

**Keywords:** Dez River, hydrology, water quality potential.

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## **Watershed measures impacts on surface runoff routing by use of multiple flow direction algorithm**

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### **Abstract**

One of the most important problems in schematization and watershed management is determining the watershed measures impacts on flow distribution. Flow distribution algorithms grouped into two main types include Single Flow Direction (SFD) algorithm and Multiple Flow Direction (MFD) algorithms. In many packages of GIS use the Single Flow Direction to runoff routing. In this research studied watershed measures impacts on surface runoff routing by use of Multiple Flow Direction Algorithm in Kakhk Experimental Watershed of Gonabad County. Moreover, explain the procedure of running and calculating this algorithm in the Geographical Information Systems (GIS). For this purpose, the runoff surface generated during the years 2009 to 2014 were simulate for the scenario under watershed measures and no measures. Result showed maximum 97.1 percent and minimum 64.3 percent the flow volume of rainfall events. The Multiple Flow Direction methods can be simulated and estimated the flow total volume in outlet. In addition, the results showed, in showers that rainfall and flow volume amounts are small, watershed measures reduced 100 percent of the flow total output. But in flow with large volume those reduced between 38.2 to 74.2 percent of the flow total output.

**Keywords: Multiple Flow Direction, Runoff Routing, Single Flow Direction.**

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## Effect of riparian vegetation on morphometric and morphological indices in braided part of Talar River

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### Abstract

In present study effects of riparian vegetation on morphometric and morphological changes have been investigated in a part of Talar River between 1955 and 2013. So, land use maps produced for 1955 and 2013 by aerial photos. Results show during study time riparian vegetation changed extremely and approximately 96% of riparian vegetation removed during 58 years. In additionally, results showed during study period riparian vegetation removed and converted to residential and agriculture lands. Morphometric and morphological parameters have been calculated for both times. Paired t test showed, there is a significant differences between River Network Change Index, Braided Index, Sediment Bar Length and River Width in 99 percent confidence level. ANOVA analyses used to investigate effect of riparian vegetation on changes in river parameters. Results showed also, there are significant differences between indexes such as RNCI, BI and river width in parts of river that have riparian vegetation and parts without riparian vegetation in 99% confidence level. Results showed RNCI in study area is about -4.1 (m/y) also, during study time BI have been decreased about 1.11 and width of river have been decreased 250 m, too. Since river have more variation at places that riparian vegetation have been removed and changed to other land use classes. The results showed that riparian vegetation in river sides has significant role on decreasing bank erosion.

**Keywords:** Bank erosion, Morphology, Morphometric, Vegetation cover.

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## Extension of nonlinear Muskingum model and compare with HEC-RAS software for flood routing in rivers

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### Abstract

Flood routing in rivers is a mathematical procedure to determine flow hydrograph at a point in a river. One of routing methods is to solve Saint-Venant equations for non-uniform flows. As solving this equation has complex calculations, using computers and extended models are needed. On the flip side, other methods with simple calculations and reasonably accurate results are extended and from the hydrologist's point of view, generally give satisfactory results. Muskingum model is one of these methods that accuracy in evaluation of its parameters effects on predicting flood hydrograph, especially peak rate of flow. As far as genetic algorithm is an appropriate solution to determine optimized nonlinear Muskingum's coefficients, in this study we used this method to determine optimized coefficients in MATLAB and for a wide range of hydrographs getting from HEC-RAS software. By getting optimized values of these coefficients and by having physical and geometrical characteristics of rivers, the effects of changes of these characteristics and also Muskingum-Cunge's coefficients on nonlinear Muskingum coefficients were discussed. Then, equations were obtained for nonlinear Muskingum's coefficients,  $x$ ,  $k$  and  $m$  as a function of rivers' characteristics and incoming floods' hydrograph. Then flood routed solving differential equations using rung-kutta order 4. To determine the accuracy of extended equations, measured hydrographs of 5 floods in a reach, were compared to hydrographs computed by extended equations and HEC-RAS software and the results were analyzed using RMSE factor and correlation coefficient. Results indicate that the accuracy of extended model is almost like HEC-RAS software, so this model can easily be used in future studies to route floods.

**Keywords:** Flood routing, Genetic algorithm, HEC-RAS, Nonlinear muskingum model, Optimization.

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## Using GIS and linear programming to manage water distribution in irrigation networks and cropping pattern allocation (Case study: Downstream lands of Aq-chay Dam)

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### Abstract

In the traditional systems of irrigation and exploitation of water sources, especially the water sources behind dams, there isn't regular and consistent plan for their management and this can be caused the weakness of irrigation performance. In this connection, using both of optimization methods and Geospatial Information System (GIS) together can improve the performance of irrigation projects. On this basis, this paper uses Linear Programming (as an optimization method) and GIS in downstream lands of Aq-chay dam to allocate optimal area for cultivation of any agricultural product that will be caused the improvement in the performance of irrigation projects. In this regard, a program in Microsoft Excel was developed based on Linear Programming with respect to type of products, decision variables, constraints and objective function. Then according to its output, another application was developed using Arcobjects capabilities in ArcGIS software and hereby the optimal areas for the cultivation of any agricultural product in downstream lands of Aq-chay dam was determined. The result indicates that the efficiency has been improved up to 30 percent in arable surface and type of products in the region of case study, using the Linear Programming and GIS in comparison with traditional systems.

**Keywords:** Geospatial information system, Irrigation networks, Linear programming, Water distribution management.

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## **Anabasis aphylla and pteropyrum aucheri canopy cover Effect on generating stemflow in arid regions**

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### **Abstract**

Stemflow is a part of precipitation which enters in to the soil through stem and branches. In this paper, we studied the stem flow features of *Anabasis aphylla* as a bush and *Pteropyrum aucheri* as a shrub in Northwest of Isfahan. Stemflow production mechanism as well as the effects of canopy cover on this system was investigated during precipitation seasons in 2013 and 2014. A rain simulator was used to achieve this aim. Three individual for each species with different canopy coverage were selected. The results showed 13.4% of gross precipitation as stemflow for *A. aphylla*. However, it is 18.4 for *P. aucheri*. Furthermore, the mean funneling ratio was calculated 29 and 40 for *A. aphylla* and *P. aucheri*, respectively. Totally, results clearly showed the positive role of stems and brunches in producing stemflow for both species. In addition, small and large plant showed significant different amounts of stemflow for both species indicating the effect of crown canopy on stem flow. Concerning bushes and shrubs, this study proves that stemflow changes in a large amount inter and intra various vegetative forms with different canopy cover.

**Keywords:** *Anabasis aphylla*, Canopy crown, *Pteropyrum aucheri*, Rain simulator, Stemflow.

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## **Analysis of the effects of precipitation amounts on daily runoff in Gharesou basin in Kermanshah Province, Iran**

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### **Abstract**

Study and research on natural processes related to water including droughts and floods is necessitate for Iran. Due to difficulty to measure meteorological and hydrological elements effective on rainfall runoff processes in basins, selecting a suitable model, which is able to simulate these processes with the minimum input data, is necessary. In addition, understanding basin reaction to the precipitation amount and intensity can help water researchers and managers to implement appropriate measures that reduce drought and flood damages. The main objective of this research is analysis of precipitation amount and intensity effects on rainfall runoff, and daily streamflow in Gharesou basin in Kermanshah Province (area: 5287 km<sup>2</sup>), Iran, using spatially hydrological WetSpa model. The model was applied to simulate daily runoff for about 9 years data. Results of the simulations showed a good agreement between calculated and measured hydrographs at the outlet of the basin. The model predicts the daily hydrographs with a good accuracy, 0.830 for about 6 years of calibration and 0.834 for 3 years of validation periods according to the Nash-Sutcliff efficiency criteria. Then, the model was applied to two scenarios of different amounts of precipitation in order to find the responses of the basin to them.

**Keywords: Gharesou, Hydrologic simulation, Rainfall- runoff, Watershed reaction, WetSpa.**

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