**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 425-436**

# Evaluation of the Disintegration of Rayon Fabric under Composting Conditions

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(Received: 10.Apr.2018– Accepted: 29.May.2018)

## Abstract

The volume of fabric wastes throughout the world is constantly increasing. A significant proportion of these wastes are recoverable or compostable, but in Iran there is no other way except burning and landfill for the management of these wastes. Among the various types of fabrics, some have greater biodegradability and can be decomposed at the acceptable rates under controlled conditions. In this study, the disintegration of rayon fabric was investigated under composting conditions. During the composting process, temperature, moisture and aeration were controlled and by sampling at the certain times, changes in some operating parameters such as temperature, moisture and pH were investigated. Structural and morphological changes of the linen fabric before and after disintegration were investigated by FTIR spectra and scanning electron microscopy (SEM). At the end of the process, by measuring the weight loss due to organic matter conversion, the disintegration of this fabric was evaluated and the maturation of resulting compost was investigated by a germination test. The results revealed changes in hydrogen bonds in the fabric. The samples weight loss at the end of the test showed that the rayon fabric is biodegradable under composting conditions, and due to the germination test, the resulting compost maturity is at the acceptable level.

**Keywords:** Biodegradability, Composting, Rayon fabric.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 437-451**

# Application of Hydrological Methods for Estimating River Environmental Water Rights (Case Study: Gorganroud River)

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(Received: 19.Nov.2016– Accepted: 24.May.2018)

## Abstract

Water resource development plans (such as construction of dams) has numerous environmental effects, which altering the natural regime of river, among them river flow reduction is the most important. One of the most important environmental challenges in water resources planning is estimation of river water rights considering natural variables, understanding the importance of protecting water resources, biodiversity and ecosystems related to river flow. Environmental flow considers time, quality and amount of required current to protect freshwater, estuarine ecosystems, human welfare and livelihoods related to water. The main aims of this study was to estimate the environmental water right of Gorganrood river (Aq Qala station) based on 33-year period, using hydrological methods: Tennant, Tessman, aquatic base flow, flow duration curve and duration curve change in different months of the period. The results showed that the least the Gorganrood river flow (Aq Qala station) to provide environmental flow (class C) using the above methods should be equal to 2.27, 1.8, 5.51, 4.47 and 3.33 cubic meters per second, respectively. This study has shown that in the absence of ecological information, hydrological indices can be used for preliminary estimation of environmental flows.

**Keywords:** Stable development, Environmental water rights, Hydrological methods, Gorgan.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 453-463**

# Evaluation of the Performance of Natural Adsorbent of Stems, Leaves and Roots of Barberry in Removing Chromium from Wastewater

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(Received: 5.Nov.2017– Accepted: 24.Apr.2018)

## Abstract

One of the biggest needs facing most societies today is the lack of fresh water. Lack of safe water resources and high costs of treatment plans often prevent communities' access to this vital need. This study aimed to investigate the removal of hexavalent chromium from wastewater by adsorbing roots, stems and leaves of barberry. The initial pH, reaction time, absorption weight and initial concentration of chromium were the most important parameters that in this study examined for each adsorbent. The results showed that the removal efficiency of hexavalent chromium decreases by increasing pH and initial chromium concentration. Increasing the amount of particulate adsorbent and adsorbent contact time, increase removal rate and then it reaches a state of equilibrium. Using low-cost agricultural waste is very helpful in order to remove the heavy metals such as chromium and the treated water can be reused for agricultural purposes.

**Keywords:** Wastewater, Industrial wastewater, Heavy metal, Natural adsorbent, Barberry root.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 465-478**

# The Influence of Climatic Factors on Decomposition and Disappearance of Pellet-groups: Case Study of Persian Fallow Deer in Dasht-e-Naz Wildlife Refuge

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(Received: 20.Aug.2016– Accepted: 6.Apr.2018)

## Abstract

Fecal standing crop pellet group counts have been widely used in forested habitats to estimate deer population size. To convert pellet group density to deer density, knowledge of disappearance rate of pellet groups is necessary. The disappearance rate of pellet groups may vary in different environments and can affect the accuracy of abundance estimation. We estimated decomposition and disappearance rate of Persian fallow deer (*Dama mesopotamica*) pellet groups in Dasht-e-Naz wildlife refuge, northern Iran, over a 12-month period. Labeling and monitoring pellet groups for decay was conducted at strip transects. Mean time ± SD to pellet group decomposition and pellet group disappearance were 94.84 ± 5.59 SE and 45.79 ± 2.71 days, respectively. Pellet groups persisted longest in summer and shortest in spring. The time to pellet group decomposition was significantly correlated with daily evaporation, mean daily air temperature and mean wind speed. The deposition of pellet groups became equal to their decay from 70-140$^{th}$ days and from 270-310$^{th}$ days since the start of the experiment suggesting a steady state system of the dung on the ground.

**Keywords:** Abundance estimation, *Dama mesopotamica*, Standing crop pellet group count, Decomposition rate of pellet-groups, Disappearance rate of pellet-groups.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 479-493**

# Climatic Zonation of Forest Comforts Ecotourism in Chaharmahal and Bakhtiari Province (Case Study: Monj Customary Unit)

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(Received: 10.Mar.2018– Accepted: 9.May.2018)

## Abstract

Climatic conditions play an important role in tourism planning. Tourists are looking for favorable climates (i.e. comfort climate). The most suitable time to have recreation is when climatic indicators reach the levels of comforts and satisfactions of the human beings. In this study, climatic conditions of Monj customary unit in Chaharmahal and Bakhtiari province were studied in order to find locations with climatic comfort zone in this area. Furthermore, a recreational suitability map was provided for the area. In this investigation the environmental cooling power index, (i.e. Baker's index) was calculated by using the average monthly temperature and wind speed. The measurement of wind speed in Lordegan meteorological station was examined by considering the nearest station to the case study. The results of current investigation indicated that the highest temperatures belong to July and August, while January and February have the lowest temperatures. Also, the amount of Baker's index regarding bioclimatic conditions ranges from 10 to 20 in April, October, November, December, and March, respectively. Also, the highest suitability is in the elevation ranges consisting of 1894-2094, 2294-2494, and 2494-2694. In all of the three elevation ranges, 9 months of the year have natural suitable bioclimatic conditions in the case study. In eight months of the year 3065.90 hectares and 64.4 percentage of the region have the highest recreational suitability.

**Keywords:** Baker's index, Monj customary unit, Monthly average temperature, Bio-climate.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 495-508**

# Environmental Drivers of Elevational Distribution of Lizards in Iran (Case Study: Family Lacertidae)

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(Received: 17.May.2018– Accepted: 15.Jul.2018)

## Abstract

Little is known about elevational distribution of lizards in Iran. In the present study we studied distribution pattern of members of the family Lacertidae Linnaeus, 1758 along the elevational gradient in Iran. This was to determine environmental drivers of distribution pattern of 48 lizard species, along elevational gradient in Iran. Firstly, we classified Iran digital elevation model (DEM) based on 100m intervals, that resulted in 56 elevational bands and number of species in each band was recorded. Secondly, we extracted mean value of the following variables; altitude, slope, area, solar radiation index (SRI), normalized differences vegetation index (NDVI), annual precipitation, precipitation of wettest month, precipitation of driest month precipitation, precipitation of wettest quarter, precipitation of driest quarter, and precipitation of warmest quarter. By the use of variance inflation factor (VIF), correlated variables were removed. Finally, we performed a multiple regression analysis and found that area and precipitation of warmest quarter were the most important drivers of distribution pattern of family Lacertidae along elevational gradient in Iran. General distribution pattern of family Lacertidae was unimodal and the maximum number of species was recorded from the elevation range between 1475 to 1675 m.

**Key words:** Reptiles, Distribution, Area, Precipitation of warmest quarter.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 509-521**

# Investigating Performance of the Conceptual Models in Hydrologic Simulation

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(Received: 10.Feb.2017– Accepted: 18.Apr.2017)

## Abstract

Rainfall-runoff hydrological models are important tools in water resources projects. Generally, performance of this group of models is dependent on the proper selection of parameters. Accordingly, several methods have been developed to estimate hydrological parameters. The present study aimed to compare the performance of conceptual hydrologic models such as TANK, SIMHYD and AWBM which benefit from the indirect model parameters estimation approach in discharge simulation of Babolroud watershed, Mazandaran province, Iran. The automatic calibration process of these models was designed using genetic evolutionary search algorithm and objective functions (NSE and RMSE) as error thresholds determinants. Hence, meteorological and hydrological data consist of temperature, evapotranspiration, precipitation and discharge (in daily scale) were gathered from authorities. Input data was also divided into warm-up, train and test steps after preliminary validation and recovery. Based on the results, NSE metric introduced TANK model as the best simulator for train and test step (0.59 to 0.72), respectively. According to RMSE metric, SIMHYD (0.83) and TANK (0.15) models were introduced as the best simulator for train and test step, respectively. According to the catchment flow signatures, general simulation of low-flow (excluding the Model TANK), mean-flow and high-flow were conducted with acceptable agreement. While simulation of the flow duration curve slope which represents an intensity of changes (excluding TANK model in train step), did not provide acceptable results. Given the weaknesses and strengths of the proposed models, after preliminary verification in different climatic conditions, they can be used as an acceptable simulator in water resources management especially in terms of ungauged basins.

**Keywords:** Rainfall-Runoff Process, Discharge Simulation, Conceptual Hydrological Models, Automatic Optimization, Babolroud Watershed.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 523-536**

# Study on Social and Cultural Factors Affecting Vulnerability of Local Communities (Case Study: Wolf Attacks in Hamadan Province)

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(Received: 23.Apr.2017– Accepted: 24.Apr.2018)

## Abstract

One of the most conflict species in Iran is the grey wolf (*Canis lupus pallipes*). Unfortunately, conflict between grey wolf and local communities has been increased in Hamadan province in recent years. So that, recently, 60 incidents of wolf attack on local communities, mostly children (70 %), and more than100 incidents of wolf attacks on livestock were documented. One of the effective management methods for conflict mitigation is determining local communities' attitude and structure (Social, Cultural, etc.). However, most mitigation studies investigated only the technical aspects of conflict reduction. In this research, we studied an important factor that affects vulnerability of local communities towards wolf attacks in Hamadan province. We designed 400 questionnaire and interview with local communities in counties of Hamadan province. Using binary logistic regression we analyzed these data. Our results showed that most important factors on vulnerability of local communities included: number of guarding dogs, herd size, releasing of domestic carcass near rural area, waste management and translocation of wolves to remote area (wild zoo or protected areas). With increasing the number of guarding dogs, risk of wolf attacks to local communities would be decreased. Local communities that do not leave domestic carcass near the rural area will not attract wolves, and this leads to less vulnerability. Empirical results indicated that local communities managing their waste will reduce risk of wolf attacks. Larger herd size leads to high encounter rates with wolves. People that agree with translocation of wolves from areas of high livestock density to remote area will be less vulnerable. Management implications to mitigate conflicts between wolf and local communities were discussed.

**Keywords**: Conflict, Hamadan province, Vulnerability of local people, Wolf attacks.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 537-548**

# Optimizing Lead(II) Removal from Aqueous Solution by a Carbon Nanocomposite using Taguchi Method

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(Received: 8.Apr.2018– Accepted: 12.May.2018)

## Abstract

Water pollution with heavy metals is considered as a serious health problem in terms of human health risks. Therefore, it is important to remove these contaminants from polluted environments. In present study, a carbon nanocomposite was produced using graphene oxide and activated carbon prepared from lignocellulosic waste. The optimum conditions for lead removal were investigated using Taguchi method and the effect of four effective factors on adsorption, including different adsorbent doses, pH values, initial concentrations and contact times were investigated at 5 levels. The iodine number of the nanocomposite was determined 920 mg $g^{-1}$. The maximum efficiency of lead removal by carbon nanocomposite was determined at a 0.5 g $L^{-1}$ of adsorbent dose, pH=6, initial lead concentration of 50 mg $L^{-1}$ and contact time=60 min. The produced nanocomposite in this study has a high potential for removal of lead from aqueous solution and can be proposed as a cheap absorbent for treatment of lead contaminated wastewater.

**Keywords:** Carbon nanocomposite, Optimization, Taguchi, Lead removal.

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**Journal of Natural Environment**
**Iranian Journal of Natural Resources**
**Vol.: 71, No.: 4, Winter 2018**
**pp: 549-563**

# Comparison of Logistic Regression and Neural Network Methods in Fire Susceptibility of Forest and Rangelands of Mazandaran Province

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(Received: 5.Aug.2017– Accepted: 3.Apr.2018)

## Abstract

Fires in natural areas are one of the factors decreasing forested area of northern Iran. In this study, forest and rangelands susceptibility to fire were analyzed using data-driven methods over Mazandaran Province. Fourteen important environmental and anthropogenic parameters influencing forest and rangelands susceptibility to fire were used to model probability of fire susceptibility. Binary logistic regression and artificial neural network, as two well-known data driven methods were then used to evaluate environmental and anthropogenic performance on land-fire. The map of forest fire susceptibility estimates was prepared in GIS environment. The area under the successive rate curve (AUSC) showed that ANN method modeled forest fire susceptibility with an accuracy of around 88% and BLR with 85%. 21.6% of the total area of Mazandaran Province is located in areas with high and very high susceptibility levels of forest and rangeland fire. Overall, ANN method showed promising results to estimate land-fire susceptibility. The forestry and rangelands fire susceptibility map presented in this study can be used as a basic map of the strategic planning in Mazandaran Province to reduce probability of fire damages.

**Keywords:** Fire susceptibility, Binary logistic regression, Artificial neural network, Geographic Information System, Mazandaran Province.

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