

# Integration of Cellular Automata -Markov (CA-Markov) Model and Logistic Regression to Land-Use/Cover Change Prediction (Case Study: Gamasiab Basin)

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## Abstract

Land use modeling is very vital for decision makers and plays an important role in environmental planning and management. The CA-Markov model has strong ability to project the spatial pattern and to evaluate land use and land cover changes. In This Study, a series of satellite images of Landsat TM, ETM+ and OLI data of 1987, 2002, 2016 were used to produce classified land use maps. Land use maps of Gamasiab basin were prepared using maximum likelihood classification. Area change and spatial distribution of land use were calculated using GIS technology. The transition area among different land use types were analyzed to obtain the transformation matrices. The transition probability matrix shows from 1987 to 2002, barren land, grassland and urban expansion are the most stable classes. In other hand, the most dynamic classes are water and cultivated land. Based on the success of the models for 2016 using 1987 and 2002 maps, simulated future land use map for 2030 was prepared. Suitability image collection was prepared by using logistic regression and then its results were used in CA-Markov model. The high agreement between predicted and the actual map demonstrated that the suitability image collection derived from logistic regressions has high precision. It also proved that the selected factors could adequately represent the influencing processes of land use changes. The coefficients of the distance to current land use classes had the highest values among all impact factors. The distance from the road and river shows a high impact on urban development. The results showed that the greatest change in grassland has turned them into farmland and then barren land. The barren land has also turned into farmland.

**Keywords:** Cellular automata Markov, Impact factors, Transition suitability image, Land use/cover change Prediction.

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## Assessment of Educational Courses and Different Tools on the Environmental Attitudes of Villagers (Case Study: Villages in the Doreh Chegheni Township)

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### Abstract

The purpose of this study was quantitative and qualitative assessment of the natural resources education and the impact of different educational tools on the environmental attitudes of villagers. The research area consists of four forest villages Champalk, Khanesorkh, Samoq and Shorab in the Doreh Chegheni Township and the statistical population of the study was villagers living in the four villages (N = 2306). The sample size was determined using Cochran's formula as 208 people. The data were collected by questionnaire that its validity and reliability were confirmed by content validity and computing Cronbach's alpha coefficient (0.813), respectively. Data analyzed by SPSS software. According to the results, villagers presented the highest scores of assessment of the quality of the provided trainings to the following components: increase awareness of the importance of forests and rangelands (4.33), change in the procedure of people in dealing with natural resources (16.4), impact on people's perspective on conservation of natural resources (4.14). 90% of the people believed that participation in these courses increased the awareness of the importance of forests and pastures and, according to 85% of the people; these courses have changed their behavior in dealing with natural resources. The results of mean comparison indicated that the use of educational tool excluding video viewing significantly improved the environmental attitudes of individuals. The results of the study indicate that participation in training courses and the use of appropriate tools can improve the attitude of natural resources and their desire for the protection.

**Keywords:** Environmental education, Environmental behavior, Natural resources degradation, Local communities.

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## Investigation and Evaluation of Thermal Island Status of Tehran Metropolis using Satellite Imagery

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### Abstract

The island's thermal city is one of the most prominent consequences of the expansion of urbanization and metropolitan development. The effects of the formation of thermal islands can play an important role in air quality and, consequently, in general health. The purpose of this study was to investigate the role of surface coatings on climate change in Tehran metropolis. In this study, the required data from bands 10 and 11 of OLI and TIRS sensors of Satellite Landsat 8 in the summer and winter of 2017 were used. To study the thermal island status, single-band classes were used to study the distribution of ground temperature in the Tehran area and determine the local effects of Thermal Island in the city. The relationships between surface temperature and other variables i.e. vegetation cover, city structural features and wasteland area were calculated in order to determine the effects of green, bare, blue and residential land on thermal island. The results showed that the effect of Isle of Man in the northern regions of the city is due to the existence of industrial activities and mountain topography. There is also a correlation between ground temperature and Tehran's vegetation index, as the surface temperature of the city increases with decreasing vegetation. Finally, according to research findings, practical proposals have been presented.

**Keywords:** Landsat8, Earth surface temperature, Urban Thermal Island, Tehran metropolis.

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## Removing Toluene from Atmospheric Air by Nano-Activated Carbon Adsorbent

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### Abstract

The extensive application of toluene in chemical industries has led to performing several studies on decreasing toluene vapors in the atmospheric air. This experimental study is focusing on toluene elimination from the air by using nano-technology and also nano-activated carbon as an alternative to NIOSH confirmed activated carbon. Nano-activated carbon adsorbent was synthesized and the elimination of toluene was investigated by activated carbon and nano-activated carbon in both static and dynamic systems. For identifying the adsorbents morphologies and determination of primary and final concentration of toluene, electron microscopy-model Zeiss and GAS chromatography through flame ionization detector were applied, respectively. The impact of factors such as temperature, humidity, toluene concentration, the amount of adsorbent and contiguity time was investigated. The adsorbance capacities of nano-activated carbon and activated carbon for removing toluene from the ambient temperature in the static system were 207.6 mg/g and 185.2 mg/g and their adsorbance efficiencies in the static system were 98.4% and 44.2%, respectively. Scanning Electron Microscope (SEM) images of nano-activated carbon showed particle size of less than 100 nm while Transmission Electron Microscope (TEM) images showed particle size of 30 nm. XRD images also showed cube structure of nano-activated carbon adsorbent. The structure of synthesized nano-activated carbon showed vast surface of this nanomaterial for adsorbing toluene. Adsorbance capacity in the constant humidity increases with the increment of congruity time and temperature. In optimal condition, adsorption capacity and efficiency of nano-activated carbon is more than activated carbon and also nano-activated carbon is more affordable in comparison to activated carbon.

**Keywords:** Activated carbon, Nano-activated carbon, Toluene, Adsorption, Desorption.

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## Application of the Hydraulic Method for Estimation of the Minimum Environmental Flow for Duab Samsami River

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### Abstract

Surface water withdrawals to meet the diverse needs of human, such as drinking, agriculture and industry, has endangered the functioning and health of the river ecosystem in recent years. Harvesting water from the river may be harmless to the river ecosystem, but, in order to properly exploit the rivers and prevent excessive harvesting, the environmental requirements of the river must be determined. There are various hydraulic, hydrological, and comprehensive methods for determining the environmental needs. In this research, the environmental demand of the Duab Samsami River (located in Koohrang, Chaharmahal and Bakhtiari) was calculated from the hydrologic method of the Tennant and the two methods of hydraulic slope and maximum curvature. The results showed that the maximum curvature method had better estimation than the curve slope method. The proposed flow of Tennant method cannot meet the needs of the river in dry months of year. In this study, the discharge rate of 0.94 cubic meters per second for the months of July to December and the amount of 3.82 cubic meters per second for the months of January to June was proposed as the minimum environmental requirement of the Duab Samsami River.

**Keywords:** River, Duab Samsami, Hydraulic methods, Environmental needs.

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## Evaluation and Zonation of Noise Pollution in Vakil-Abad Highway, Mashhad

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### Abstract

This study aims to evaluate and zone the noise pollution level of districts 9 and 11 (Vakil-Abad Highway) in Mashhad, using statistical methods and GIS software. For this purpose, the required sound data were collected from 25 selected high-traffic stations of the study area in spring, summer, autumn and winter during 2016-2017. The process involved 1 full day of work per month for 6 months, from 7:30 AM till 8:30 PM, using a TES-1358 sound level meter. Traffic data and measured sound indicators were analyzed statistically by MSTAT-C, SPSS, and Excel software. The data were inserted into the GIS software, the layers of information were obtained to provide the level of noise pollution and its distribution in the area. The comparison between the results at a significant level of 5% indicated that the highest sound levels 85.63, 80.72, 78.10 and 81.46 dB belong to station 20, October, morning time and commercial-residential use, respectively. Day-time zoning maps of Vakil-Abad Highway in Mashhad also showed that the intensity of noise pollution in the central parts of the mentioned region is more than the other parts and can provide an accurate analysis of how the sound is distributed in the desired area. Since the day-time average level obtained for Vakil-Abad Highway is higher than Iran's standard level, serious actions must be taken to control the noise and prevent its complications in the region.

**Keywords:** Noise pollution; Statistical techniques; Traffic; GIS software; Zoning map.

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# Effect of Trade Liberalization on Greenhouse Gas Emission in Iran: Application of Nonlinear Asymmetric Cointegration Approach

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## Abstract

This paper applied the nonlinear autoregressive distributed lag (NARDL) model to investigate the nonlinear asymmetric cointegration relationships between trade liberalization and greenhouse gas emission (GHG) in Iran. Also, the methane gas emission per capita was used as greenhouse gas emission index. The annual data from 1982 to 2013 was used. The bounds test of the NARDL specification suggests the presence of co-integration among the variables, which includes the methane emission per capita, trade liberalization, energy consumption per capita and GDP per capita. Furthermore, the analysis indicated that there is a long-run asymmetric relationship between trade liberalization and methane emission in Iran. But, the short-run relationship is symmetric. The long-run estimation showed that the positive and negative shocks arising from trade liberalization increase methane emissions by 0.22 and 0.9 percent, respectively. The empirical results revealed that the relationship between methane emission and GDP per capita in long and short run is N-shaped and statistically significant. Also, energy consumption has a significant positive effect on methane emissions and 1 percent increase in per capita energy consumption leads to 0.75 percent growth in methane gas emission.

**Keywords:** Trade Liberalization Shock, Methane gas emission, Asymmetric effects, NARDL.

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## Determining Drivers of Natural and Cultural Tourism Development in Sistan by Structural Analysis

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### Abstract

Tourism industry affects comprehensive development including the economic development. Therefore, using futures studies are an appropriate tool for predicting the future of tourism and hence the orientation of management practices at the present time. This study was conducted to find drivers of development of natural and cultural tourism by descriptive- analytical method in Sistan region. For this purpose, 100 drivers were identified as barriers to tourism development in the region using the fieldwork, literature review, and brainstorming. Subsequently, drivers were classified in five domains and, if necessary, corrected or merged. The most important drivers were selected using Delphi method which contains 55 variables in the infrastructural, political, institutional, social and natural domains. These variables were screened using Structural Analysis to get influential drivers with high influence and low dependence capacity. The state of the dispersion of variables in the dependence and influence axes showed that the system is stable in both direct and indirect methods of Structural Analysis. The political factor followed by the institutional factor with six and four variables in the direct method and five and two variables in the indirect method were identified as the most important factors in the undeveloped tourism industry in Sistan, respectively. Among the influential drivers, weak planning, lack of long-term planning, and lack of integrated management include 6.16, 5.98, and 5.36 percent of total values respectively; and they were identified as the most influence drivers. The lack of investment in the region has also been identified as a key dependent driver to assess the tourism status in Sistan.

**Keywords:** Tourism development, Structural Analysis, Sistan region.

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## Ecological Characterization of the Breeding Habitat of Luristan Newt (*Neurerguskaiseri*) at Local Scale

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### Abstract

Characterizing habitats has a long history in conservation ecology of species. In spite of high sensitivity of amphibians to environmental changes, habitat associations of many of these species are unknown. *Neurerguskaiseri*, native to Iran, is a threatened newt species that breeds in springs of Zagros Mountains. There is a lack of information about its ecology and habitat. We compared ecological characteristics of 20 occupied with 20 unoccupied springs by Kaiser's newt to identify key factors affecting the breeding site selection by this species. In total, we investigated and measured 13 habitat variables in occupied and unoccupied water-bodies during the breeding season, April to June. We applied principal component analysis (PCA) to identify the most important factors in discriminating occupied from unoccupied sites and a logistic regression model based on penalized likelihood ratio to estimate the logit parameters in R. Bed type, water flow rate, shading area, and dissolved oxygen were the most important factors in occupying water-bodies by Kaiser's newt. The likelihood of species presence was comparatively higher in sites with slow water flow, high dissolved oxygen, cobble substrate, and high shading area. Habitat alteration may highly affect physical-chemical characteristics of the species breeding habitat, and hence the probability of its occurrence. This study provides insight into breeding habitat use by this threatened species and can be used as a basis for further studies on the species habitat ecology.

**Keywords:** Breeding habitat, Logistic regression, Amphibian, Kaiser's newt, *Neurerguskaiseri*.

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## Evaluation of Sulfur-bentonite Granules Enriched with Iron as Replacer of Chemical Fertilizers in Calcareous Soils

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### Abstract

Extensive use of chemical fertilizers has caused various mounting problems for the environment including pollution of cultivated products, soil and water resources. Calcareous soils face issue of low solubility and availability of nutrient elements for plants which increases use of chemical fertilizers and its environmental consequences. Hence, methods capable of healing such deficiency and decreasing use of chemical fertilizers are vital. Although sulfur-bentonite granules as replacer of mass consuming chemical fertilizers have environmental priority; improvement of their efficiency requires further research. Objective of this research is evaluating sulfur-bentonite granules enriched with iron as one of the plants' nutrient elements having broad insufficiency across farmlands in Iran. Therefore, sulfur-bentonite-iron granules compared to sulfur-bentonite alongside with iron powder dispersed into the soil mass throughout simulating real environment by soil columns inoculated with *Thiobacillus thioparus* were evaluated for 19 two-weeks leaching periods. The results revealed that application of sulfur-bentonite-iron has acceptable effect on iron availability while it brings efficient solubility of sulfate, nitrate and phosphate into calcareous soils.

**Keywords:** Chemical fertilizer, Environmental pollution, Sulfur-bentonite granule, Iron, Soil column.

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