

## Effectiveness evaluation of taxi fleet replacement scenarios to reduce air pollution; a case study of Karaj city

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### Abstract

Considering the importance of mobile sources in the release of air pollutants in the city, the need to develop and use public transportation is very important, for this purpose there are different approaches. Karaj city needs to replace the fleet with updated standards due to the outdated public transport fleet. Considering the economic and environmental dimensions, the effectiveness of the measures taken should be investigated. Therefore, evaluating the change in the release of pollutants based on each alternative scenario can help the authorities to adopt air pollution reduction strategies. The purpose of designing scenarios in this research is to estimate the effectiveness of scenarios in the field of replacing worn-out taxi fleets in reducing the emission of air pollutants. First, the classification of taxis based on parameters such as different systems, production year, emission standard, type of fuel consumed and vehicle class have been investigated. In the following, the scenarios of standard pollutant reduction were designed in two plans, the replacement of the worn-out fleet with a hybrid, dual-fuel fleet with consumable fuel, with the Euro 4 pollution standard, and finally, the scenarios were compared with the base scenario. The emission coefficients and design scenarios were calculated using the International Vehicle Emission Model (IVE) for roads, 1st grade arterials, highways and freeways, with slopes of zero and  $\pm 2\%$ . The results of the comparison of the scenarios showed that by replacing the entire fleet worn out in terms of age (to a new fleet, the second scenario), the highest reduction in standard pollutant emissions was 68% (CO), 85% (VOC), 53% (NOX), 100% (SOX) and 67% (PM). Also, the results of pollutant emission distribution in Karaj city, using Arc Map software, showed that the highest and lowest pollutant emissions are related to zone 10 and zone 1, respectively. Scenarios for reducing pollutant emissions and the solutions to increase air quality are useful and largely operational for politicians and researchers to better understand the current conditions of air pollution in the region, which require timely provision of funds and principled and detailed planning for implementation.

**Keywords:** Air Pollution, Replacement of worn-out fleet, IVE Model, Karaj

## **Analysis of participatory behavior of tourists in the protection forest based on the theory of planned behavior (Case study: Qaleh gol forest area of Khorramabad city)**

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### **Abstract**

Nature-based tourism is one of the important types of tourism that is considered as a suitable tool for natural resources protection. The present descriptive-survey research using the theory of planned behavior, was conducted to analyze the participatory behavior of tourists in forest protection in the Qaleh Gol, Khorramabad city. For this purpose, 364 tourists who had visited the study area were surveyed by available sampling method. A researcher-made questionnaire was used to collect data. The content validity of the questionnaires was confirmed by experts and the validity of the structure and the reliability of the instrument were obtained by examining the fit of the model at two levels of the measurement model and the structural model. Findings showed that the initial model of planned behavior (TPB), which explains 63% and 52% of the intentions and environmental behavior of tourists in forest protection, respectively. The three main variables of the theory of planned behavior included attitude (ATT), perceived behavioral control (PBC), and subjective beliefs (SN), all of which had positive effects on tourists' intentions to protect the forest. Extended planned behavior with the inclusion of the environmental concern (EC) variable increased by 4% the power to explain the variable of tourist behavior. In the present study, the attitude of tourists was identified as the most important factor, so policymakers can maintain it by emphasizing it. Natural resources and forests are effective. On the other hand, it is necessary to formulate and implement supportive policies for forest protection with an emphasis on tourist participation.

**Keywords:** Nature-based tourism, Theory of Planned Behavior, Attitude, Mental norm, Perceived behavioral control

## Investigation and analysis of land use dynamics and its impact on urban Heat islands (Case study: Mashhad)

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### Abstract

The purpose of this article is to study and analyze the land use dynamics and its impact on the heat islands of the city. This research was conducted for the city of Mashhad and a 10 km wide strip around it with the help of Landsat satellite images in the period 1988 to 2018. The process used includes supervised classification of images, investigation of land use changes during the mentioned period and investigation of changes in land surface temperature (LST) and vegetation density (NDVI) was in land uses and their relationship with land use. The results showed that by 2018, the area of agricultural-garden use decreased by 9.38%, the area of urban and residential areas increased by 12.19%, urban green space increased by 2.11% and other areas increased by 4.93%. The decrease in the level of agricultural-garden areas has been due to their conversion into urban and residential areas. It was also found that changes in man-made land use have led to changes in land surface temperature (LST). An increase in surface temperature and a decrease in the difference between the average temperature of urban areas and areas around the city was observed, which indicates the expansion of the urban heat island phenomenon in the city of Mashhad. The results of this study showed that the use of multi-temporal satellite data and the combination of common methods for studying thermal islands (study of temporal-spatial distribution changes of urban thermal islands compared to changes in urban development, the relationship of thermal islands with vegetation and land use and coverage Lands) can provide a comprehensive view of how urban thermal islands are formed and expanded.

**Keywords:** Land use changes, NDVI, Surface temperature, Urban heat islands, Mashhad

## Predicting habitat suitability of sand cat (*Felis margarita*) using Bayesian network approach

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### Abstract

Sand cat *Felis margarita* (Felidae) is a small cat distributed in deserts of North Africa, Arabia, Central Asia, Pakistan and central Iran. This species is listed as Least Concern (LC) by IUCN and categorized on appendix II of the CITES. Successful conservation of this species demands for a comprehensive understanding of its habitat requirements. In this study, a Bayesian Belief Network (BBN) habitat suitability model was developed for sand cat through a practice of knowledge elicitation, calibration, sensitivity analysis and verification. Denning possibility, prey density, distance to Haloxylon woods, and soil stability were recognized as the most important variables determining habitat suitability of sand cat. Overall accuracy of the model was calculated at 96.7% using 120 presence/absence points collected across the species habitat in eastern Isfahan province. The results of model evaluation by sensitivity analysis and using data from fieldwork showed that the prepared model works well to determine habitat suitability. The results of this model not only combined the expert opinion and quantitative data obtained from land use maps, but also provided a good basis for use in adaptive management for the management of sand cat habitats.

**Keywords:** Sand cat, Decision support tool, Sensitivity analysis, Bayesian Belief Network, Habitat suitability modeling

## Evaluation of tourism sustainability in the Hyrcanian region of northern Iran using holiday climate index

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### Abstract

Tourism as a major global industry is affected directly and indirectly by climate change. The aims of this study were (i) to introduce the most suitable months for tourism activity using the holiday climate index (HCI), and (ii) to investigate the HCI trend during the period 1989-1397 in the Hyrcanian region of northern Iran. HCI consisting of climatic variables of temperature relative humidity, cloudiness, precipitation, and wind speed was calculated and classified for the synoptic meteorological stations of Astara, Anzali, Rasht, Ramsar, Nowshahr, Babolsar, and Gorgan in the 30-year period. The HCI trending was investigated by Mann-Kendall (MK) test. Throughout the Hyrcanian region, the average HCI value was found to be 48 (low class), ranging from 29 (unacceptable class) in Astara in January to 74 (acceptable class) in Babolsar in May. Forty eight percent of the monthly HCI values were greater than 50 (acceptable class) while 12% were between 40 and 49. The most suitable months for tourism in the Hyrcanian region were from May to October. The MK test showed 13% of the 30-years HCI monthly trends in the meteorological stations were significant concluding that tourism in the region was less affected by climate change. The HCI is a worthy tool to introduce the most appropriate month for tourism in this attractive region of Iran with eye-catching views. Examining the HCI long-term trend can successfully reflect the impact of climate change on tourism sustainability.

**Keywords:** Meteorological station, Climate change, Mann-Kendall

## Adsorption of malachite green from aqueous solutions by magnetic graphene nanocomposite

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### Abstract

The entry of chemical compounds into the environment is considered a serious threat to humans and other living things. One of these compounds is malachite green, which enters water resources and causes problems for humans and public health. The use of Nano sorbents is a new, high-performance method for removing pollutants from aquatic environments. Graphene, due to its unique properties, is one of the materials that can be used to remove some materials. In this study, graphene was prepared from rice straw residue, which is considered as a waste material, and then magnetized by heat solvent method. SEM, BET, Raman and FTIR analysis were performed to detect and evaluate the properties of the synthesized nanocomposites. The nanocomposite was then investigated to remove malachite green from aqueous solutions in a batch system. Effective factors in adsorption such as pH, adsorbent amount, contact time, initial concentration of malachite green and temperature were investigated. The results showed that the maximum adsorption capacity is 993.33 at concentrations of 50 mg/L and the adsorbent is 5 mg/L for 20 minutes. Also, two types of isothermal adsorption models of Freundlich and Langmuir were investigated and since the correlation coefficient of Langmuir model was higher than Freundlich model. Various models have been developed to evaluate the rate of adsorption process. In this study, pseudo-first-order and pseudo-second-order kinetic models were used. Due to the higher detection coefficient of the pseudo-second-order model, the rate of malachite green adsorption process on G/Fe<sub>3</sub>O<sub>4</sub> was well matched with the pseudo-second-order model. Also, thermodynamic studies showed that the adsorption process is spontaneous and the adsorbent collides with malachite green is random. In this study, four types of solvents were investigated. The adsorption-desorption process was repeated over 5 cycles, with a slight reduction in adsorption capacity and the removal efficiency of malachite green from these steps. Finally, considering the suitable adsorption capacity of the synthesized G/Fe<sub>3</sub>O<sub>4</sub> nanocomposite as well as the adsorption capacity of the adsorbent, it can be concluded that this adsorbent can be a suitable adsorbent for removing malachite green from aqueous solutions.

**Keywords:** Magnetic graphene, Malachite green, Nano sorbent, Wastewater treatment, Kinetic studies

## Investigating the capability of Ardakan desert areas in order to dispose of industrial waste by hierarchical method abstract

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### Abstract

With the growth of population and expansion of urbanization followed by the rapid development of industry, one of the most important issues that has occupied city managers is the optimal management of industrial waste. The aim of this study is to investigate the capability of desert areas to dispose of industrial waste in Ardakan city which was done in 2021. To achieve this goal, the method of hierarchical analysis was used. Selection criteria are soil characteristics including clay percentage and sand percentage, geology, land use, population density, distance from water sources, distance from four environmental zones, distance from waterway, distance from road, groundwater level, slope, and distance from fault. The questionnaire was completed by 30 experts and Expert Choice software was used. After determining the weights of the criteria, fuzzy overlap of the layers was performed using Arc GIS software. The results showed that land use has the highest weight and share in assessing the potential of land for waste disposal. After this, slope criteria, distance from water sources, population density and water level and soil science have the highest weights, respectively. Finally, the land capability map was divided into five classes. Spatial distribution of areas with very high potential for waste disposal showed that some areas in the west, a small part of the central areas and southeastern areas with a total area of 769.21 square kilometers have the best potential for waste disposal. These areas cover about 6% of the total area of Ardakan city. The results showed that the specific characteristics of desert areas such as poorly covered and barren lands is the most important feature of these areas in terms of waste disposal and the method of hierarchical analysis with fuzzy overlap can determine suitable areas for waste disposal to an acceptable level.

**Keywords:** AHP, Fuzzy membership, Fuzzy overlap, Gamma method

## Balance assessment of irrigated agriculture development in Alborz province

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### Abstract

Sustainable management of land is possible through planning its use within the framework of suitable spatial balance for human activities with environmental capabilities. Therefore, adequate identification and understanding of the balance and imbalances of the spatial structure, and also understanding of the concept of consistency and its required resources, are the basis for optimal planning toward reducing Incompatibilities and spatial conflicts. In the current study, the spatial balance of land uses is measured after evaluating land capability, and three options including balanced development, unbalanced development, and possible development are presented for decision-making. The evaluation of the ecological potential of the land is based on the capability assessment of ecological components, and the present study is focused on this assessment for the development of irrigated farming. Capability assessment is based on 9-factor criteria (slope, height above sea level, average annual temperature, soil suitability class for agriculture, land unit, soil depth, soil fertility, soil drainage, and programmable agricultural water) and 8 constraint criteria (cover type and production Pasture, forest habitat, soil salinity, soil erosion, flooding, culturally sensitive areas, ecologically sensitive areas, and incompatible land use). According to the results obtained, about 32 thousand hectares of the province's area can be developed for irrigated farming, of which 78% is currently allocated to irrigated agriculture and has a balanced development. Results indicate that currently about 6100 hectares of the province lands (1.2% of the province) still have a natural capacity for the development of irrigated farming, but the land use has not been allocated to it, and about 14% of the province's lands are covered by the development of unbalanced irrigated agriculture, and does not have the sufficient ecological capacity for agricultural development.

**Keywords:** Land capability, Irrigated Farming, Balanced Development, Ecological criteria, Alborz Province



## Evaluation of sustainable management of urban transportation with environmental sustainability approach (Case study: district 12 of Tehran metropolis)

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### Abstract

Transportation is one of the main aspects of urban life, and organizing transportation is one of the basic needs of a healthy city. Dealing with sustainable development in transportation is very important due to human's basic concerns in the field of loss of resources, environmental pollution, and dangerous phenomena such as global warming, greenhouse effect, and air inversion. In this regard, the present study was prepared with the aim of evaluating the sustainable management of intra-city transportation with the approach of environmental sustainability. The research method is analytical-descriptive and the data was collected through library and field studies. The components of the research include economic, social, environmental-ecological, and functional-physical, which have been operationalized in the form of a survey questionnaire. Descriptive statistics (frequency distribution, mean, standard deviation, and dispersion coefficient) and inferential statistics (one-sample T-test) were used to analyze the data. The statistical population is the total population of the citizens of District 12 of Tehran municipality (240,720 people), and a sample of 400 people was randomly questioned. The average of the sustainable management variable of intra-city transportation is 2.96 with a stable level, the average of the economic component is 3.31 with a semi-stable level, the average of the social component is 3.01 with a semi-stable level, the average of the environmental-ecological component is 2.49 with an unstable level, and finally, the average of the physical component is 2.8 performance has been evaluated as a semi-stable level. Also, the results in the inferential part indicate that the sustainable management of intra-city transportation in the economic and physical-functional components is not in line with the sustainability of the urban environment and the social and environmental-ecological components are not in line with the sustainability of the urban environment. The sustainable management of transportation in the 12th district of the Tehran metropolis is not in line with the sustainability of the urban environment. In this regard, the suggestions presented in this research can be effective in the decision-making of urban transportation management to achieve environmentally sustainable transportation.

**Keywords:** Sustainable intercity transportation, Sustainable development, Environmental sustainability, Tehran metropolitan area 12

## Evaluation of environmental effects caused by Covid 19 and factors affecting the improvement of resilience of Makran coastal areas, Sistan and Baluchestan province

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### Abstract

The COVID-19 crisis was first regarded as a threat to public health, but it gradually started to threaten different sectors. One of the sectors influenced by this crisis, which is the topic of this research on the effects of COVID-19, is the fisheries sector in the coastal cities of Sistan and Baluchistan province. Diverse hazards jeopardize these cities and most have environmental origins. The present research was an applied study in terms of the goal and aimed to investigate the factors related to the improvement of environmental resilience in the coastal cities of Makran. The statistical population was composed of all residents of the studied areas (Chabahar, Konarak and Dashtiari), Fisheries experts, and environmental activists. The factors underpinning the improvement of environmental resilience were determined with factor analysis, and the environmental resilience of the study site was assessed with a combination of maximum entropy and analytic hierarchy process (AHP). Based on the results of factor analysis, the factors were divided into three categories named “pollution control”, “waste management”, and “access to services and conservation of resources”. “Pollution control” was found to be the main factor in accounting for the variables of coastal pollution, so it was recognized as the first factor in improving the environmental resilience of the coastal cities against COVID-19. The next factors were “waste management” and “access to services and conservation of resources” with the weights of 0.347 and 0.141, respectively. Also, the results of the combined maximum entropy and AHP revealed that the coastal areas of Makran were, in total, lowly resilient and that among the coastal cities, Konarak had the highest environmental resilience (0.46).

**Keywords:** Environmental resilience, Factor analysis, Entropy, Analytic hierarchy process, Sistan and Baluchestan province

## Predicting the decline of forest road pavement during the logging ban period in the north mountain forests of Iran

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### Abstract

The lack of allocation of sufficient funds after the implementation of the forest rest law, the restoration and maintenance of forest roads has disrupted the forestry projects and caused them to deteriorate. The purpose of this study is to predict forest road deterioration during the 10-year period of implementation of forest rest law using hidden Markov chain model and evaluate its effect on the cost of road repair and maintenance. In this research, along the 11.6 km forest road network series 3 of Aghuzchal (Nowshahr) in the educational-research forest of Tarbiat Modares University, according to the road condition information using PCI and FRPCI pavement indicators in a consecutive period of 3 years (2016-2019) the investigation and road deterioration process was predicted by the hidden Markov chain model in a 10-year period. The results showed that the process of deterioration of the road from excellent to good is much faster than the process of its changes from medium to poor. The highest percentage of road sections are broken and the lowest number are sections in excellent condition. It is predicted that due to the implementation of the breathing plan and the lack of budget allocation during a 10-year period, the road will go down a steep slope to complete deterioration. The results emphasize the need to accelerate the allocation of funds for the repair and maintenance of the existing road, and the Markov chain performance prediction model with an RMSE error of 0.01 has the necessary capabilities to accurately predict the actual road deterioration process. The use of other prediction and evaluation models in more time periods will bring more accurate results.

**Keyword:** Modeling, Markov chain, Hyrcanian forest rest, Forest road maintenance

## Investigation of richness, diversity and uniformity of plants in geomorphological zones of Adoroshk watershed (Yazd-Shirkuh province)

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### Abstract

Paying attention to vegetation preservation is one of the pillars of design and management of areas. For this purpose, in this study, the study of richness, diversity and uniformity of plants in the geomorphological zones of Adoroshk watershed was studied. In Arc GIS software environment, using georeferenced topographic map, the boundary of the area was drawn according to cartographic principles. Habitat geomorphological zones were identified by visual interpretation of Google Earth software images and mapped in Arc GIS software. During the spring and summer of 2019, Adoroshk plants were identified. In total, the amount of vegetation in the area was 16.56%. Biodiversity indices were used to calculate the richness, diversity and uniformity of plants and Kruskal-Wallis test was used to compare biodiversity indices in geomorphological zones. If the differences were significant, the groups were divided into two. The two were compared by Mann-Whitney test. The results of the Kruskal-Wallis test showed that the difference of geomorphological zones in terms of all indicators is significant at the level of one percent. The Mann-Whitney test showed that the deposit areas are richer in terms of richness than the rocky and alluvial areas.

**Keywords:** Adoroshk, Geomorphological zone, Biodiversity indicators, Kruskal-Wallis, Mann-Whitney

## The effect of tree species on carbon storage in biomass and soil; Study of Toos Nozar forest park, Sanandaj

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### Abstract

Urban green spaces, particularly trees, have great potential to sequester carbon from the atmosphere and mitigate the impacts of climate change in cities. The aim of this study was to estimate the carbon accumulation in the biomass and soil of *Robinia*, *Cupressus*, *Fraxinus* and *Chamaecyparis* tree species in Toos Nozar forest park in Sanandaj. For this purpose, the type of species, height and diameter equal to the chest for total trees in the permanent plots were recorded to determine the carbon biomass of the tree above and below ground and estimates of carbon storage were performed using allometric equations. The results showed that the total carbon storage in Toos Nozar forest park is 113.68 tons per hectare. Examination of the total density of stored carbon showed that the highest amount of carbon was stored in the soil and the lowest in the litter and grass cover of Toos Nozar forest park. The results emphasize the effect of tree species on carbon sequestration. *Cupressus* is more potent than other species in carbon storage. By recognizing the species that have more potential for carbon storage and also examining the management factors that affect the carbon storage process, it is possible to follow the improvement and rehabilitation of urban forests from the perspective of carbon sequestration index. The results of this study reveal the value of urban trees not only as ornamental and aesthetic lands but also in reducing the effects of climate change at the local level.

**Keywords:** Species Diversity, Biomass, Carbon Storage, Urban Forest