Why hazards science? (3) (Hazards and Law)

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Abstract

The hazards science is a relatively new in terms of legal concept and have talked less about its legal dimensions. Some of the questions raised in this domain include:

- What is the history of hazards science in terms of legal concept?
- What rules and laws have been made in this regard in other countries?
- Are the Iranian lawyers and judicial system familiar with this concept?
- Is there any relevant or irrelevant law in the civil laws of Iran in this regard?
- What research areas can hazards science create in law?
- What is the situation of hazards science in law?

This concept has legal usage in Iranian legal system too. Natural hazards such as flooding, earthquake, storms and similar natural catastrophes are classified under the general name of "Violence by Force or Force-majeure" in Iranian civil law or international general laws. This concept has been approached on two sides: one is related to compensation for loss and damages in property, life and the other relates to criminology, or punishment of the entity in charge of injury. Human hazards Laws related to usurpation, wasting, causation,… and laws related to civil liability and penal laws are few samples which have been made to punish the guilty person in this regard. There are codified laws on loss and damage caused by intentional or unintentional usurpation, wasting which are classified under the term "automatic guarantee". In this journal, we try to focus on these concepts to improve the current situation. We need to conduct more detailed research in Iran.

Keywords: force-majeure, hazard, law.

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Synoptic analysis of dust storm hazards in Iran
(July 30 to August 2, 2012)

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Abstract

The purpose of this research was to determine the synoptic patterns of dust storm occurrence in northwest and northeast of Iran; four types of data were used including hourly data of dust phenomena and horizontal visibility for 30 meteorological stations in northwest and northeast of Iran. Six-hourly global data analysis from NCEP/NCAR reanalysis, including air temperature, geopotential height, U-wind and V-wind components, relative humidity, soil moisture and omega from 1000hPa to 500hPa, were used for the preparation of maps and identify the synoptic patterns by using GRADS software. In order to identify the source of dust generation, tracing and simulating the path of dust particles, HYSPLIT model Lagrangian approach of backward trajectory was used. And to detect dust, the unreal images of METEOSAT-9 second generation for EUMETSAT satellite were used .Synoptic studies have shown that low and high pressure and the vertical motion of air are the main causes of dust storms in Iran. The circulation of atmosphere during dust storm shows that a low pressure cell has been stretched from Pakistan to the south of Iran and from there to the deserts in Iraq and Syria.This condition causes the formation of cyclonic circulation in the East of Syria and west of Iraq on 31 July. Wind speed increasing, cyclonic circulation, dry soil and lack of coverage, provided the conditions for removing the soil particles. Due to the extended ground surface's low pressure and weakening of the stable conditions of low level of troposphere, the approaching of trough has led to the beginning of a dust storm in Iraq deserts on 31 July and this unstable condition provides enough power to carry the soil particles away from its origin. Besides that, the stable location of ridge on Iran made anticyclone circulation in the wind blowing and it causes the dust storm cycle the northern part of Iran and enter from northeast in to the country.

Keywords: atmospheric circulation, dust storm, HYSPLIT, METEOSAT, Middle East.

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Analysis of the dynamism and hazards of tropical cyclone Nilofar

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Abstract

Tropical cyclone is a one of the major hazards that threat the southern coastal zones of Iran. Understanding such hazards and knowing when they will occur, could be useful in managing the accidents caused by them. The purpose of this study is analysis of the dynamism and hazards of recent tropical cyclone formed over the Arabian Sea, known as the Hurricane Nilofar. The data used include re-analyzed data of SLP (Sea Level Pressure), Geopotential Height, wind (U and V components), Omega, specific humidity, CAPE (Convective Available Potential Energy), Vorticity advection and SST (Sea Surface Temperature) for Nilofar cyclone activity during the ending days of October 2014 were obtained and analyzed. The results showed that the depth of the trough level of 500 mb with the axis southwest - northeast, creates a cut of low on 25 and 26 October on the Arabian Sea that resulted in a divergence in the eastern side of the cut of low on level of 500 mb and created a strong convergence zone in the lower levels of the atmosphere and on the surface of the sea. Eastward movement of trough on third day of the formation of hurricanes and out of the activity storm, also, its change the mechanism of action following the availability of energy from the ocean surface (conversion of thermal energy into mechanical) to strengthen the updraft and downdraft currents on the wall of the eye and eye of storm has helped, as of this day and the next day the storm activity, increase speed to low level jetstream than the upper levels of atmosphere, causing the energy source the storm is chanced from upper levels to the lower levels of the atmosphere, also the interaction of tongues and anticyclonic centers located on the Arabian Sea, direction and movement of the storm has created to overturn it on 31 October.

Keywords: Arabian Sea, climatic hazards, sea surface temperature, storm dynamic, tropical cyclone Nilofar.

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Analysis of the relationship between Tehran air pollution, traffic and atmospheric conditions to mitigate hazards

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Abstract

Air pollution is one of the most important environmental hazards in Tehran metropolitan that awareness of the factors affecting that can reduce its adverse effects. In order to reduce these effects, detailed studies to identify variables that have the greatest impact on emissions is essential. The purpose of this research is to analyze the variation of air quality index (AQI) in relation to atmospheric conditions and traffic in Tehran. The Pearson correlation coefficient and regression analysis were used in order to compute the relationship between air quality indices (average and maximum) with traffic and meteorological variables. This study was conducted for 60 days (Novembe r6th to January 5th) for each year between 2010 and 2012. The results revealed that atmospheric instability index (k_i-index) has the most impact on air pollution variations. Multiple linear regression models for the year 2011 was the most accurate model to estimate maximum air quality index with the least relative deviation, RD (RD of -0.05 for first model and -0.1 for second one). An important achievement of this study wasindirect correlation between number of vehicle and air quality index which is not happened to the reality. It seems that pollutant production in two cases including car's movement or stop are quite different from each other and should be investigated using other methods.

Keywords: air pollution hazards, atmospheric conditions, Tehran, traffic.

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Modeling and predicting the time series of drought indices ssing machine learning methods in order to manage hazards (Case study: Eastern district of Isfahan)

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Abstract

Drought has been known as a complex and perilous phenomenon in the whole world, particularly in Iran. Determining and predicting its severity can be effective in managing the hazards caused by drought. To determine drought severity, the indices have been used that can be divided into two broad categories of meteorological (M) and remotely-sensed (RS) indices. The most important M index has been the standardized perception index (SPI), and the most important RS indices have been those extracted from the vegetation index (NDVI) and land surface temperature (LST) index. For modeling time series behavior of these indices and also predicting their future values, machine learning methods proved to be highly efficient. This paper also aims to evaluate the performance of four important machine learning methods, i.e. neural network (NN), support vector regression (SVR), least squares support vector machine (LSSVM) and also an adaptive neuro fuzzy inference system (ANFIS) for modeling the M and RS indices of Eastern district of Isfahan during 2000 to 2014 and predicting their values in 2015 and 2016. The data used in this paper are the NDVI and LST time series of MODIS, and the rainfall time series of TRMM satellite of study area. At first, the vegetation condition index (VCI) and temperature vegetation index (TVX) have been built by NDVI and LST and 12-month SPI has been built by rainfall data. Next, the time series behavior of three these indices has been modeled by four aforementioned methods that according to the results, SVR has a highest efficiency and NN has a lowest efficiency among these methods. The performance speed of LSSVM and then ANFIS have been higher than the other methods. Finally by designing a fuzzy inference system (FIS), the drought severity at spring and summer of 2000 to 2016 has been monitored and the results have shown normality of spring in all years except 2000 and 2011 and severe drought in summer in all years except for the four years 2000, 2010, 2011 and 2014. In fact, this research has aimed to present a strategy for modeling drought behavior and predicting and monitoring it in future using machine learning methods and the remotely-sensed and meteorological time series data and fusing them in a FIS system.

Keywords: drought Indices, hazards, Isfahan, machine learning, remote sensing, time series modeling.

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Synoptic Survey on Death Rate Resulting from Tehran Air Pollution during Heat Wave in Summer 2013 (1392)

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Abstract

Air pollution is the results of industrial development increased continuously by overpopulation urbanization expanse and use more fossil fuels. The most important air pollution consequences are breathing disorder, intensification of pulmonary heart diseases and also mortality increase in the cities. Tehran is one of the most polluted cities in the world, so that for every three days, one day is polluted by one or some pollutant. On the other hand, its topographic situations and locating in Alborz Mountains increase pollution. In both July and August 2013, when the temperature reached over 40c° most of the times in heat waves, the air became stable and the quality of the air decreased and unhealthy conditions overcame for several weeks in Tehran. Based on the reports of meteorology organization, Tehran had the hottest days in summer 1392 (2013) (Tir (July) and Mordad (August)) in recent 60 years. Air stability caused decrease of air quality and unhealthy conditions development for three weeks. Awareness of air pollution origins and their synoptic patterns is useful for forecasting unhealthy conditions and controlling them. Temperature data were received from meteorology organization; pressure, altitude and temperature maps in sea level, 700 and 500 HCT Pascal conditions were obtained from NCEP/NCAR and Skew-T was obtained from **University** of **Wyoming** to recognize the synoptic pattern of the conditions. The results of the study showed Gang Cyclone tongue in SLP map and Anticyclone Azore and also inversion in middle and upper atmosphere caused air stability and increase of the temperature and then trapped the polluters near the ground caused decrease in air quality of Tehran.

Keywords: heat waves, mortality, respiratory disease, summer 2013 (1392), synoptic pattern, Tehran air pollution.

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Evaluation of Chemical Pollution Hazards of Karstic Water in Quri-Qala Cave

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Abstract

Study the quality of groundwater in karstic areas is highly important. In this research, the hazards of karstic water chemical pollution in Quri-Qala cave are assessed. Rigorous tests have been conducted using samples, field works and interview with professionals to identify the role of human and natural factors contributing to the pollution of water in the cave. Samples have been taken from the cave entrance and the end part of the cave during the six-month period. And the density of heavy metals and major cations have been measured in the laboratory. Apart from these, electrical conductivity, acidity or alkalinity, rate of oxygen consumption by organisms in water and nitrate has also been measured. In tests, arsenic and lead have been measured by atomic absorption spectrometry, Iron, magnesium and manganese by flame and lithium, sodium, calcium and potassium by Photometry methods. PH with PH meters, EC with EC meters, BOD with BOD meters have been measured and nitrate by ion chromatography IC. Drinking water density obtained from the laboratory results were compared with standard criteria. Based on the results, the density of some elements such as lead and arsenic within the water is higher than the permissible limit of drinking water. This is a serious risk to human health. Also the results show that the origin of this type of pollution is in relation to geological factor of mineral streaks, fuel emission of lime kilns and sewages. High density of iron, magnesium and manganese is in relation to the water crossing on the soils and rocks and then penetrating into the cave. Recent elements changed the color, turbidity and flavor of water. The high BOD can be linked to the sewage and waste by visitors. Considering the above points, the following actions are required for elimination of risks threatening groundwater of Quri-Qala cave: continuous monitoring, use of international standards and practices in management, increasing public awareness of visitors and limiting their number, removal of waste and polluting elements inside and outside of the cave particularly across the catchment area of the cave.

Key words: chemical analysis, karst water, hazard, pollution, Quri-Qala cave.

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Zoning of landslides prone Kashtar area (Kamyaran, Iran) to reduce hazards

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Abstract

Landslide is one of the most important geomorphological risks. Identification of risk areas susceptible to landslides is one of fundamental steps in the management of natural resources and reduction of the risks. Kashtr with an area of 26 square kilometers south-west of Kurdistan Province is located in the eastern edge of the mountains Shahoo. In order to zone, sliding zones was first examined with field visit, and about 28 sliding zones were identified and after processing in GIS application became as a layer. With underlying landslides distribution map landslide weighting parameters took place, including geology, slope and direction of the slope, elevation, soil texture, land use, soil erosion, distance from fault, waterways density, and distance from road. Logistic regression model was run in SPSS and the results showed that the influencing factors on landslides occurrence in the region are distance from the fault, geology, soil erosion, direction of the slope, etc. Finally, the area studied in terms of sensitivity to the risk of landslides was classified into 5 classes, based on that: 2.6 km^2 has a very high risk, 6.4 km^2 high risk, 3.19 km^2 average risk, 7.9 km^2 low risk, and finally 5.6 km^2 has very low risk.

Keywords: hazards, hazard zoning, Kashtar, landslide, logistic regression

Monitoring of regions struck by earthquake using unmanned aerial systems based on new proposed GPO meta-heuristic technique

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Abstract

Subsequent to earthquakes, an updated and reliable map of environment is not often available; terrestrial substructure is either not appointed or ruined and time is turned into a vital element for hazard management, search, and rescue of patients. Regarding these facts, hazard management and monitoring of areas struck by earthquake is one of noteworthy applications of autonomous systems, which can enhance the excellence of search-relief missions. Utilizing of unmanned aerial systems as multi-sensor platforms in destruction surveillance is transformed into a novel economic procedure for enhancing autonomy and efficiency of natural hazard management tasks. Nowadays, tendency in the development of unmanned aerial systems is toward autonomous navigation or hybrid tasks. In this field, development of comprehensive, efficient methodologies for path planning, control, navigation, and processing of UAS sensor information has attracted an increasing momentum among researchers as one of the fundamental steps for achieving autonomous navigation of aerial systems. In this article, a new meta-heuristic algorithm is proposed based on gravimetric measurements in physical geodesy studies. The purpose of this algorithm is to achieve an efficient method for solving complex optimization problems with different constraints such as hazards monitoring tasks. Evaluation of the precision, quality of results, success rates, and CPU running times of implemented algorithms demonstrates that gravitational potential optimization algorithm outperforms other methodologies for monitoring of regions struck by an earthquake.

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