Identification of effective factors concentration of heavy metals in the dust existing in the air of Tehran metropolis

Fatemeh Arsalani[1], Bohloul Alijani[2*]

1. PhD in Climate Hazards, Kharazmi University, Tehran, Iran
2. Professor Physical Geography, Kharazmi University, Tehran, Iran

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Introduction

In large and industrial cities, thousands of heavy metal particles are released into the environment [2]. These heavy metal particles are released by attaching to dust particles on a large scale [3]. It is important to study heavy metal concentrations in the dust falling due to the threats for human health [1, 4, 5]. Dust originates from both natural and human sources. Studies have been conducted to investigate the sources of heavy metal emissions in street dust with cluster analysis [CA] and principal component analysis [PCA] methods. The metropolis of Tehran has a population of over eight million people, that facing a severe air pollution problem. Therefore, the purpose of the present study was to identify the factors of increasing the heavy metal concentrations (Al, As, Cd, Co, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Se, Si, V, Zn) in the dust falling of Tehran city.

Materials and methods

Dust fallout samples were collected with using Marble Dust Collector (MDCO) from 28 different locations across the city of Tehran, during winter of 2017. XRF analysis used to identify and determine the concentration of heavy metals. The Principal Component Analysis (PCA) method were summarized 15 heavy elements studied into three factors. The kriging interpolation method was used to determine the role of each factor in the study area. In the next step, the extracted factors were grouped based on factor scores, by statistical method of cluster analysis.

Discussion and Results

The results of the Principal Component Analysis (PCA) showed the existence of three factors: natural, human and combination of natural and human factors which increasing the concentration of heavy metals in the dust of Tehran metropolis.

Factor 1: Aluminum, chromium, iron, magnesium, manganese, nickel, silicon, and vanadium have the same emission source. These factors are not affected by human activities but have natural origin. Therefore, this category was called the natural factor.

* Corresponding Author, Email: bralijani@gmail.com

Factor 2: Arsenic, cadmium, copper, lead, and selenium have the same emission source. Probably, human factors have role in increasing these elements in the dust falling. Therefore, this category was called the human factor.

Factor 3: Cobalt and zinc have the same emission source. This factor is combination of both natural and human factors.

Based on the extracted factors and with using method of Cluster Analysis (CA), the stations in Tehran were classified into four clusters as follows:

The First group: Forest and Range Organization of IRAN, Dadman Blvd, Pole Gisha, Arash Blvd, Majidiyeh Shomali, Janatabad, Shahre Ziba, Pole Kan, Motahhari, Narmak, Hashemi, Tehransar. These stations are located in the northern and western regions of Tehran.

The second group: Afsaria station is located in the southeast of Tehran. This station has the highest concentration of heavy metal in dust falling.

The Third group: Velenjak station is located in north of Tehran. The heavy metal concentrations in dust falling are higher than other groups in human resources.

The Fourth group: Enghelab, Darvaze Dolat, Imam Hossein Square, Nawab, Si-e-tir, Komeil Gharbi, Tehranno, Piroozi, Nazi Abad and Shahr-e-rey are located in this cluster. These stations are located in the central, eastern and southern regions of Tehran. The concentration of heavy metals in these regions are high.

Conclusion

Heavy metals in dust are an important component of urban pollution. The harmful effects of heavy elements on human health have been proven in different ways. Considering the population of Tehran metropolis, the results of this research are very important for developing management approaches to create a healthier environment. The results showed that the pollution of dust falling into heavy metal with human origin in the northern and western regions of Tehran is less than other regions and in the southeast of Tehran is more than other regions. results indicated that population density, traffic and traffic volume, industries and mines, topographic pattern, vegetation pattern, prevailing wind pattern and air stability are effective in the concentration of heavy elements in Tehran dust falling.

Keywords: Principle Component Analysis (PCA), Cluster Analysis (CA), Tehran, heavy metals, dust falling, GIS, hazards.

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Analysis of tectonic hazards in Zendan Fault located in Jask area with emphasis on morphometry

Mehrdad Sarhangi[1], Ali Solgi[2*], Morteza Talebian[3], Zahra Maleki[4]

1. PhD Student, Department of Geology, Science and Research Branch, Islamic Azad University, Tehran, Iran
2. Associate Professor, Department of Geology, Science and Research Branch, Islamic Azad University, Tehran, Iran
3. Associate Professor, Research Institute of Earth Sciences, Geological Survey of Iran, Tehran, Iran
4. Assistant Professor, Department of Geology, Science and Research Branch, Islamic Azad University, Tehran, Iran

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Introduction

The study area is located in the northern part of Jask, southeastern Hormozgan. The drainage basin is of the North-South trend and mostly except for one case that flows into the Strait of Hormuz, the rest flows into the Oman Sea and the main ones are Bahmadi and Tabarkan Rivers. From a geomorphological point of view, the study area can be divided into two parts, the high part near the fault and the low part that flows into the deltas of the Oman Sea and the Strait of Hormuz. The highest points in the region are Mount Riman, Samuki, Perke and Mubarak. The most important geomorphological controlling factors in the Jask area are the type of rock units, structural features, deformed landforms, and erosive activities due to the greater weakness of rock units and their lithological compositions, which cover large parts of the area as low and eroded lands. The erosional activities in the southern part, which mostly composed of marl, is much higher than the northern part, and the impact of the Zendan Fault in the erosion, followed by floods and landslides, is very evident.

Materials and Methods

The area is one of the most hazardous areas in the South Iran due to its location on the border between two plates of Zagros and Makran, and the compressional stress caused by the movement of these two plates. So, to better understand and identify, prevent and deal with natural disasters and hazards, in this study using the geomorphological indices of SL, Smf, Vf, Af, T, Bs and Iat, which determine the tectonic conditions prevailing in each region, the high-risk points in terms of geodynamic processes occurring on the area and the impact of the Zendan Fault on these indicators are discussed. [1] [2] [4] [5]

* Corresponding Author, Email: Asolgi66@yahoo.com

Discussion and Results

A set of several geomorphic indices can be used to study the relative active tectonics. These indicators can be used as a quantitative method to study geomorphology related to erosional and sedimentation processes in the river channel, longitudinal profile and morphology of the river valley, or tectonic features such as fault escarpment. Tectonic indicators are able to determine the different zones created as a result of local change in tectonic activity. In this research, several geomorphic indices in the basins of the Jask region were investigated and the results of each index were analyzed based on the values obtained for that index.

The various geomorphic indices mentioned in the above section in relative tectonics (Iat) were divided into four categories: very high activity, high activity, medium activity, low activity. By calculating the average class category of indices (S / n) in each basin and evaluating it by the method [3], the relative tectonic index (Iat) was divided into four class categories. In this classification, category one is very high tectonic activity (S / n between 1.5 to 1), category two is high tectonic activity (S / n between 2 to 1.5), category three is medium tectonic activity (S / n is between 2.5 to 2) and category four is low tectonic activity (S / n is more than 2.5). According to this classification, the following results were obtained in the study area (table 1-1).

Table 1. Tectonic activity index (IAT) in the case study area of the author 1400

Class	Iat	T	Bs	Af	Vf	Smf	Sl	Location
Medium	2.18	3	2	3	1.7	2	1.4	**Basin 1**
Medium	2.40	2	3	1	_	3	3	**Basin2**
Medium	2.35	2	3	3	1.9	3	1.2	**Basin3**
High	1.98	2	3	2	2.4	1	1.5	**Basin4**
Medium	2.00	3	1	2	1	3	2	**Basin5**
Medium	2.18							**Total**

Conclusion

After examining the geomorphological indices and calculating them, it was found that the study area is relatively affected by the three major tectonic phenomena of the Zendan Fault, uplift and rough topography, oceanic subduction, and the presence of soft sedimentary rocks as the value of Iat index indicates moderate tectonic activity in this region.

Keywords: Tectonics, Hazards, Faults, Prison Faults, Morphotectonics.

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Hydro morphotectonic and seismic hazards of Badakhshan region of Afghanistan

Khadijeh Mohammadi[1*], Ebrahim Moghimi[2], Mehdi Zare[3], Mojtaba Yamani[4], Masoud Mojarab[5]

1. PhD Candidate in Geomorphology Hazards, Department of Natural Geography, Faculty of Geography, University of Tehran
2. Professor, Geomorphology, Faculty of Geography, University of Tehran, Iran
3. Professor at the International Institute of Seismology, Iran
4. Professor, Geomorphology, Faculty of Geography, University of Tehran, Iran
5. Faculty of Engineering, University of Tehran, and Bonyan Zamin Paydar Co.

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Introduction

Hydro geomorphology is the study of earth-shaped forms that are influenced by aquatic processes as their deforming factors and the relationship between the two. Previous studies in other parts of the world use morphotectonic indices. It has been done on the basins and the network of waterways, indicating their efficiency in identifying active areas. To investigate the topographic criteria for the discovery of the structural model and morphotectonic evolution of the central Himalayas, Nepal. Afghanistan, especially its northeast (Badakhshan), is one of the earthquake-prone countries, which also has several faults due to the structural zone of the continental collision with Eurasia, Hindu Kush, and the high Pamirs.

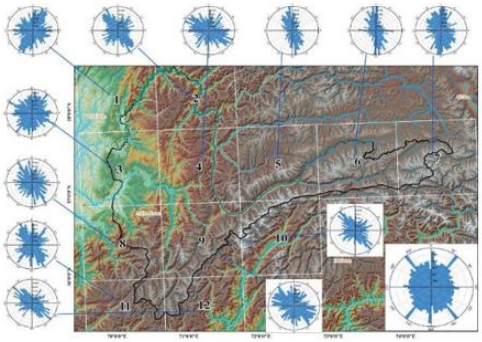
Methods

The following elements are used to prepare the hazard map: Hydro-morphological, Landsat 8 and Quick-bird satellite images, waterways and faults lines identified from Global Mapper, digital elevation model of 12.5 meters, and morphotectonic field of geomorphic indicators from the field of index Morphotectonics and seismicity catalog (1900-2011) EMME with updates from 2011-2021.

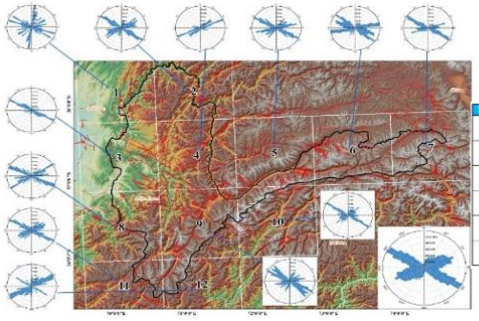
Discussion

Results show that based on hydro-morphological, rectangular drainage network and based on the morphotectonic index, the eastern and northern regions of Badakhshan mountainous region and V-shaped and active valleys with evidence of triangular shapes in the conic line and East and North areas with the most tectonic activity and tilt to the west, Badakhshan seismic catalog with high seismicity, as a result of Badakhshan region has a high-risk potential.

* Corresponding Author, Email: Kh_mohammadi_92@ut.ac.ir



No.	Main Trend	Other Trend	No.	Main Trend	Other Trend
١	٠٣٠	١٣٠	٧	٠١٠	١٥٠
٢	١٣٠	٤٥٠	٨	١٥٠	٠٩٠
٣	٠٤٥	١٢٠	٩	١٤٠	١٠٠
٤	١٢٠	٠٩٠	١٠	١٤٠	٧٠
٥	١٧٠	١٥٠	١١	١٥٠	٤٥
٦	١٨٠	١٦٠	١٢	١٤٠	٣٠



No.	Main Trend	Other Trend	No.	Main Trend	Other Trend
١	٠١٠	١١٠	٧	١٢٠	٠٧٠
٢	١٢٠	٠٦٠	٨	١٢٠	٠٦٠
٣	١٢٠	_	٩	١٢٠	٠٧٠
٤	٠٧٠	_	١٠	١٢٠	٠٦٠
٥	١٢٠	٠٧٠	١١	١٢٠	٠٦٠
٦	٠٨٠	١٣٠	١٢	٠٦٠	١٢٠

Conclusion

Results show that eastern, northeastern and southeastern parts of the region are in high-risk class. Evidence of landforms and linear trends show that the east-west movement of the Badakhshan region is accompanied by a pressure component in the continent-to-continent collision zone and exactly the opposite point of the North Badakhshan fault shows seismic trends. Therefore, the risk situation in the region is very high. In Badakhshan, the network of waterways is in line with the direction of faults. Based on these data, further innovation of the research explanation is to identify the danger zone with high potential. According to the application of the obtained results can be for urban and civil development and data source of seismic information and geomorphology of the region.

Keywords: Badakhshan Afghanistan, hydro-morphotectonics, hazards, seismicity.

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Spatial Variations Analysis of Flood hazard Susceptibility based on a new ensemble model (Case Study: Aland Chai Basin, Khoy city)

Tohid Rahimpour[1], Mohammad Hossein Rezaei Moghaddam[2*], Seyyed Asedolah Hejazi[3], Khalil Valizadeh Kamran[4]

1. PhD Student in Geomorphology, Department of Geomorphology, University of Tabriz
2. Professor of Geomorphology, Department of Geomorphology, University of Tabriz
3. Associate Professor of Geomorphology, Department of Geomorphology, University of Tabriz
4. Associate Professor of RS and GIS, Department of GIS and RS, University of Tabriz

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Introduction

Flood is a disaster which causes a lot of economic damages to farmlands, forests, gas and power transmission lines, roads, engineering structures, and buildings. There are numerous floods in the northwest of country at the beginning of spring and the start of spring rains, which in most cases results in heavy damage [4]. The aim of the present study was to prepare a map of spatial variations in flood risk susceptibility in the Aland Chai basin located in West Azerbaijan province and Khoy city. To achieve this aim, 13 effective parameters in the occurrence of this phenomenon have been used. These parameters include lithology, soil hydrological groups, NDVI, land use, slope, aspect, elevation, distance to river, river density, precipitation, topographic wetness index, stream power index, and sediment transport index.

Study area

Aland Chai basin is located between 38°- 30′-14″ and 38°- 48′-22″ N and between 44°- 15′- 13″ and 45°- 01′-02″ E in the Northwest of Iran and the Western Azerbaijan province. This basin is one of the sub-basins of the Aras River basin to which surface water flows after joining the grand Qotour River. Basin elevation variations are from 1093m in the Aland Chai River bed to 3638m above sea level in the Avrin Mountain [4].

Materials and Methods

The following data, software, and methods were used to analysis flood risk susceptibility and prepare flood risk maps in the study area:

- A frame of Landsat 8 satellite image OLI scanner with path of 169 and row of 33, in 30m spatial resolution
- Geological maps in 1:100000 and 1:250000 scale from Khoy and Dizaj

* Corresponding Author, Email: rezmogh@tabrizu.ac.ir

- Topographic map in 1:50000 scale from Khoy city
- Digital Elevation Model (DEM) in 12.5m spatial resolution
- ArcGIS software to generate maps
- ENVI software for land use mapping
- WEKA software to data mining

The new ensemble model of FURIA-GA-AdaBoost have been used to investigate the role of parameters in the occurrence of floods. FURIA is a fuzzy rule-based classification method, an extension of the Repeated Incremental Pruning to Produce Error Reduction (RIPPER) rule learner (Cohen, 1995), introduced by Hühn and Hüllermeier (2009) [1, 3]. AdaBoost is a machine learning algorithm introduced by Freund and Schapire in 1997 [2].

Discussion and Results

To implementation the FURIA-GA algorithm, the following characteristics were obtained after trial and error. For the GA, crossover probability was set to 0.2, mutation probability was set to 0.035, population size at 250, and the number of generations set to 50. For the FURIA evaluator, a 10-fold cross-validation technique with T-Norm product as a fuzzy aggregation operator was trained to combine rule antecedents. The results showed that the FURIA-GA classification with 86.45% was very accurate. The following settings are used to run the AdaBoost algorithm: batchsize, 100; number of iterations, 12; seed, 1. Decision tree C4.5 was also selected as the base classifier. WEKA software was used to perform these algorithms.

Conclusion

The present study was an attempt to investigate the susceptibility of flood risk in the Aland chai basin. Therefore, 13 effective parameters in flood occurrence were used to prepare a flood risk susceptibility map. ArcGIS and ENVI software were used to prepare each of the information layers. In order to perform the relevant analyzes on each of the parameters, the new ensemble model FURIA-GA-AdaBoost in WEKA software was used. The results of these studies showed that slope, soil hydrological groups, altitude, vegetation, and land use have an important role in the occurrence of floods in the area. Flood risk susceptibility map was prepared in 5 classes of very low, low, medium, high, and very high susceptibility. The results showed that the areas that are highly susceptible in terms of flood risk are mainly concentrated downstream of the basin, which includes flat and low areas. Generally, 26% of the total area of the Aland Chai basin is located in high and very high risk for floods.

Keywords: Flood, Modeling, FURIA, Genetic algorithm, Aland Chai Basin.

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Multi-hazard potential mapping of Mazandaran province using multi-criteria spatial decision analysis

Narjes Mahmoody-Vanolya[1], Meysam Argany[2*], Mohammadreza Jelokhani-Niaraki[3]

1. PhD Student in Remote sensing and GIS, Faculty of Geography, University of Tehran, Tehran, Iran
2. Assistant Professor of Remote sensing and GIS, Faculty of Geography, University of Tehran, Tehran, Iran
3. Associate Professor of Remote sensing and GIS, Faculty of Geography, University of Tehran, Tehran, Iran

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Introduction

In the recent years, the scale and frequency of natural hazards were increased, significantly [21]. Published data and reports on natural hazards show an increase in such disasters around the world [18, 5]. It's not possible to eliminate these risks, completely, but their negative effects can be minimized by using new methods and appropriate data in the decision-making process [12]. Many parts of the world are exposed to the events that involve more than one natural hazard [22 ،10]. In natural hazards, any hazard can be associated with hazards or other processes, in which case, they are considered as multi-hazards [22 ،6]. Floods, landslides and forest fires are among the most common natural hazards [16]. Floods are one of the most common and destructive natural hazards in the world, which has many social, economic and environmental consequences [24 ، 15 ،14]. Landslides are known as one of the most common geological disasters that cause serious damage to the natural ecosystems and human infrastructure [20 ،7]. 17% of all natural disasters occur due to landslides [19 ،17]. Fire is also one of the main threats to the environment with many negative effects that in some cases the negative effects continue for more than 10 years after the occurrence of this phenomenon [3]. The financial and human damage of fires have increased significantly around the world in recent years [4].

Recent advances in GIS technologies for data collection and spatial analysis can provide practical tools to develop a hybrid approach and as a useful tool for spatial analysis in risk evaluation [23]. In this regard, GIS is an excellent tool for storing, analyzing and managing spatial data and combines different types of numerical and descriptive values with spatial data [11 ،1]. Multi-criteria decision analysis (MCDA) methods have been widely used in integrating, identifying or ranking influential factors, especially in natural hazard analysis [2 ،8 ،9].

* Corresponding Author, Email: argany@ut.ac.ir

Materials and Methods

Mazandaran province is located in north of Iran and includes part of the Alborz Mountain belt. There are about 3 million of people in Mazandaran province (4.9 percent of the population in Iran) with an area of about 23,756 square kilometers (1.46 percent of Iran). The first step of the research is the production of standard maps and their standardization. The second step is determining the weight and importance of each criterion by experts. In the third step, using the weighted linear combination (WLC) multi-criteria method, the weights produced by the AHP method and the standard benchmark maps are combined to create flood, landslide and fire hazard maps, separately according to the effective factors. The validity of these maps was assessed using two accuracy evaluation parameters and based on historical events. In the next step, according to the overlap and spatial distribution of the predicted high-risk areas, the final multi-hazard map is produced. Finally, by comparing the population map of Mazandaran province and the produced multi-hazard map, the amount of population and area at risk of each of the hazards were determined and evaluated.

Discussion and Results

In this research, using standard criterion maps, weight values assigned to the criteria and using WLC multi-criteria method, multi-hazard maps (flood, landslide and fire) of Mazandaran province were produced. AHP method was used to determine the weight of each criterion. Then, maps were prepared regarding the potential for flood, landslide and fire hazards. Each of these maps were classified into 5 different classes with very low, low, medium, high and very high risk in order to study the areas with potential risk. In the production of flood potential mapping, the criteria of distance from the drainage network, height and slope have the highest weight and importance according to experts. Most areas with flood risk potential are located in the northern parts of Mazandaran province. According to experts, the incidence of landslides is closely related to the type of land, the degree of slope and proximity to the road. In new Quaternary sediments and steep areas near to roads in Mazandaran province, landslides are most likely to occur. Forest lands near to roads and mountainous residential areas show the highest risk of fire. As a result, in this area, human factors can play a very important role in creating and occurring fires. In addition to using the degree of overlap of the fifth grade of each of the flood, landslide and fire potential hazard maps in the production of multi-hazard map, the geometric average of all hazard potential hazard map classes to produce the map multi-hazard has been used. The reason for using this method is to apply the concept of geometric mean and maintain the value of high-risk data and spatial locations in each of the potential hazard maps. In order to estimate the area and population at risk of each of the flood, landslide and fire

hazards, the overlap of each of them were calculated using a multi-hazard map and the population map of Mazandaran province was done.

Conclusion

The aim of this study is to prepare a multi-hazard map of Mazandaran province and determine the area and population exposed to these hazards. The results of this study showed that many areas in Mazandaran province are exposed to more than one natural hazard. Multi-hazard interaction in an area can have much higher negative effects than the sum of the effects of several hazards alone. Therefore, to manage natural hazards and reduce their negative effects, using a multi-hazard approach and planning based on the results of this approach is very important. On the other hand, due to the fact that estimating the potential of each risk is affected by several spatial criteria, the use of multi-criteria spatial decision-making models can increase the accuracy of spatial modeling of multi-hazard maps. The results showed that about 0.04% of the population and 0.6% of the province are at risk of all three. These areas are located in the central strip of Mazandaran province. As a result, these areas are more sensitive than other areas of Mazandaran province.

Kaywords: Multi-hazard, Mazandaran province, multi-criteria spatial, decision analysis.

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Forest fire risk uncertainty analysis based on Dempster Shafer's theory of evidence (Study area: part of Kermanshah forests)

Zeinab Neisani Samani[1], Ali Asghar Alesheikh[2*], Najmeh Neysani Samany[3]

1. Ph.D. Student, Department of GIS, Faculty of Geodesy and Geomatics Engineering, K. N. Toosi University of Technology, Iran
2. Professor, Department of GIS, Faculty of Geodesy and Geomatics Engineering, K. N. Toosi University of Technology, Iran
3. Associate Professor, Faculty of Geography, Department of RS and GIS, University of Tehran, Iran

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Introduction

Every fire accident is accompanied by an uncertainty factor that is caused by human or natural factors. In general, fire hazards are assessed through a variety of predictive models based on the history of large fires. However, researchers and experts point to uncertainty-based fire modeling as one of the challenges to verifying the results. Therefore, the ultimate goal of this paper is to model the fire potential of fire in forest areas by considering the uncertainty due to the weighting of effective spatial criteria based on the Dempster-Shafer Intuition Theory.

The innovation of the present study is the application of the Dempster-Shafer Intuition Theory of intuition to reduce the uncertainty caused by the weight of criteria by experts. The necessity of conducting this research, considering the large number of sub-criteria, is managing uncertainty by using the simultaneous use of belief and justification functions, which highlights the possibility of managing uncertainty due to the importance of fire prediction discussion.

Research Methods

First, the effective criteria along with the sub-criteria related to the review of previous research as well as the opinions of experts were identified; Then, a weighting process was performed using the Dempster-Shafer Intuition Theory. To weigh the effective criteria, the opinions of 30 experts were used. Finally, the weighted overlap of the criteria is done and the desired fire hazard map is prepared. The results are evaluated using the ROC curve.

Determining effective criteria

To identify and determine the effective criteria and sub-criteria, the results of previous researches and experts' opinions were used. Finally, 4 criteria include

* Corresponding Author, Email: alesheikh@kntu.ac.ir

topography, climate, human, and vegetation were considered. Quantitative criteria such as rainfall, temperature, and distance from residential areas that have a direct impact on fire risk were considered for normalization.

Criteria and sub-criteria were defined at 3 levels. Then, using the opinion of 30 experts, criteria and sub-criteria were ranked at different levels about each other and based on their importance in fire risk based on the characteristics of oak forest basins located in Islamabad west and Hamil cities. Since there is uncertainty in the opinion of experts, Dempster-Shafer's theory of intuition and the rule were used to integrate opinions, eliminate uncertainty and calculate the importance of each of the sub-criteria and criteria in this study.

The theory of intuition and the Dempster-Schaffer rule

This theory is developed by discussing existing beliefs about a situation or a system of situations. As the belief structure of the control theory is related to the classical probability model. Among the introductory concepts of evidence, the following can be noted: Diagnosis framework, Function to belief and justification, Belief range, Laws of the composition of evidence

Research scope

The study area is part of the oak forests of Kermanshah belonging to the west Islamabad and Hamil regions. The climate of this region is temperate Mediterranean and the average annual rainfall is 478 mm.

Discussion and findings

To implement the proposed research method, the maps of the criteria were prepared. Experts were used for the desired intervals of the sub-criteria and were modified if necessary. The criteria and sub-criteria were ranked about each other at different levels. Finally, using the Dempster-Shafer Intuition Theory, the final weights for the criteria and sub-criteria at each level were calculated. The effective parameters of the second level have been calculated using the existing sub-criteria in the third level. The fire hazard for the research area was classified into 4 different classes. Comparison of the resulting map with fires that occurred in the study area shows that high-risk and dangerous classes have a high overlap with points. The ROC method was also used to evaluate the results.

Conclusion

In the present study, Dempster-Schaefer's theory of intuitive reasoning was used to eliminate the uncertainty in the opinions of experts and to determine the final weight of the criteria and sub-criteria affecting the fire risk. Criteria and sub-criteria effective in causing fire were determined and then classified at different levels. Then, using weighted overlap methods, the criteria according to the final weight obtained from combining the opinions of experts using Dempster-Shafer Intuition Theory, fire hazard map of oak forests in west Islamabad was obtained.

Finally, the obtained hazard map was normalized. Then, according to the mean values and standard deviation of the normalized hazard map, the research area was classified into 4 classes in terms of fire risk. The results showed that the most effective indicators in the occurrence of fire are vegetation and then humans, respectively. Comparison of the resulting map with fires that occurred in the research area shows that high-risk and dangerous classes have a high overlap with points. Also, model testing by the ROC curve shows the high accuracy of the model with a value of 92%.

Keywords: Modeling, Uncertainty, Fire, Dempster–Shafer, Weighted Overlay.

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Analysis of the effects of human hazards on the management of border areas (Case study: Southeast Iran; Sistan and Baluchestan)

Yashar Zaki[1*], Parisa Ghorbani Sepehr[2], Arash Ghorbani Sepehr[3]

1. Assistant Professor of political Geography of Tehran University of Tehran
2. MA Student of Political Geography of Tehran University of Tehran
3. Ph.D. Student of Political Geography, Kharazmi University of Tehran

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Introduction

Border areas due to their proximity to foreign countries and the geographical and political conditions prevailing in them, have their own characteristics that are considered an integral part of these conditions, which have a direct impact on the development of these areas. Therefore, if these features are not taken into account, it will have a negative impact on the development process and security of border areas and will act as a threat to development. But if this is taken into account and used in the development planning, and planning process of those areas, they will have positive effects and turn from a threat to an opportunity. Some of these characteristics are: distance from the center, geographical isolation, instability of settlement and constant movement of population, illegal border exchanges, cultural, ethnic and religious differences with the interior of the country, and external threats. Accordingly, the crises and insecurities in the southeast of the country cause great human and financial damage to the body of the province, military, law enforcement and security forces, government agencies and the people. High sensitivities of the province due to the geographical location and natural, human and political-cultural, security and military structures and several years of crisis history, the need for comprehensive knowledge of the province and detailed scientific research to discover the causes and factors of insecurity and find appropriate strategies for establishing security and taking advantage of regional opportunities are essential. This can only be achieved through regional studies. Therefore, human hazards in the southeastern region of the country have provided the fragility of this region and the instability of these areas. First, there are serious obstacles to the planning of this area, which should be recognized. Afterward, presenting programs with a visionary perspective sought can control and reduce it and pave the way for development and security in the southeast of the country. Therefore, the main question of the present study is which human hazards have the greatest impact on the management of the border areas of southeastern Iran.

* Corresponding Author, Email: yzaki@ut.ac.ir

Materials and methods

The research method in this article is a mixed (quantitative-qualitative) method. This research is applied in terms of purpose and descriptive-analytical in terms of research method. The library method has been used to collect the required information. In the library section, descriptive information is collected from books, articles, reports, and statistical yearbooks. These studies have been conducted to identify effective human hazards as well as theoretical foundations of research. Then the appropriate criteria were identified according to the purpose of the research. Also, field method and interviews with experts and a researcher-made questionnaire were used. Sampling method in this research is snowball sampling method. In addition, the sample size in this study includes 70 elites and specialists familiar with human hazards in the southeast of the country. In order to analyze the data obtained from the collected questionnaires, qualitative analyzes as well as descriptive and inferential statistical methods have been used. Thus, SPSS26 statistical software was used to describe the answers given to the general questions of the research questionnaire and Friedman test was used to analyze the data and test the hypotheses.

Discussion and Results

The most effective human hazards in the planning of Sistan and Baluchestan province can be summarized as follows:

1. Poverty: Sistan-Baluchestan province is far from any advantage and employment due to its distance from the center and being in the blind spot of the country, and also due to lack of mismanagement of officials, and lack of use of potentials in this province. Unemployment is high in the province, which is why Sistani citizens have joined terrorist groups or smuggled goods. Based on this, it can be said that poverty is one of the most important factors that affect the planning of this area. Therefore, the development of this area with a landscape perspective should be written in such a way that in the shortest time, the economic situation of the residents of this area grows and attracts their satisfaction.

2. Foreign nationals: Slums around large cities and begging are the consequences of the presence of Afghan and Pakistani immigrants in the geographical area of Sistan and Baluchestan. It should also be noted that the economy of the province is in the hands of Afghans and Sunnis in some areas. The uncontrolled growth of the population with a political perspective and its imbued with religious beliefs, has made the population of the province the youngest population in terms of age among the provinces of the country, which along with economic poverty, numerous security, political, educational and training problems and so on, have finally changed the population balance in favor of the Sunnis. They have changed and, in the future, will create a lot of

social unrest that with new planning programs should be prevented that foreigners cannot easily make the space fragile.
3. Migration: The most important problem of the people of Sistan and Baluchestan that leads to migration is water shortage, unemployment, and ecological changes in the region, which in turn leads to migration and the fragile geographical space of Sistan and Baluchestan. Hence, the issue of migration from Sistan and Baluchestan occurred due to drought conditions and problems caused by the Taliban, the diversion of the river and the dryness of Hamoon Wetland. Therefore, in order to prevent the migration of population from this area to other parts of the country, we need to establish sustainable development and security in this area, in the meantime, we need to establish good relations with neighboring countries to prevent water from dams in the river. The border guards have made us stop and bring the flow of life back to this area.
4. Terrorism: The existence of terrorism and terrorist operations in the southeast of the country (Sistan-Baluchestan), has provided the ground for insecurity and is a serious obstacle to the organization of this area. Therefore, it is necessary for Iran to cooperate with neighboring countries in the field of eradication of terrorism, otherwise, despite the great human dangers in this region, it is possible that in the future the people of this region will become members of terrorist groups and against the regime act in such a way that in this case the government requires them to think of special measures.
5. Lack of ignition: Sistan and Baluchestan, bordering Afghanistan and Pakistan, can provide many opportunities for the region, but it also poses threats, including smuggling of goods, drugs, and jobs. This is due to the lack of employment, which harms the economy of the country and this region, and also leads to insecurity in this region. Therefore, economic plans should be written with an economic perspective only in this area in order to bring development to this area so that this risk can be controlled in this area and provide a stable ground for this area.

Conclusion

The results show that the existence of human hazards is a serious obstacle to the implementation of beauty programs in this area that needs to be followed by national and local managers to control these hazards in the first step and then reduce them. Therefore, among the research items, "Lack of employment; "Smuggling of goods and drugs" is in the first place with 3.75 points, "poverty" is in the second place with 3.65 points. Among the items, "immigration" is in the third place with a score of 2.86, the presence of foreigners is in the fourth place with a score of 2.40, and terrorism is in the fifth place with a score of 2.33. On this basis, despite these risks, the elites can provide appropriate strategies to provide the basis for sustainable development in this area. Therefore, recognizing these risks and considering them in planning programs is the first

step that needs to be considered in the planning document of this area in order to manage the human risks formed in this area.

Keywords: Human hazards, social vulnerability, border management, Iran, Sistan and Baluchestan.