Investigating Inhibiting Factors Equip Agricultural Land Villagers to Sprinkler Irrigation Systems (Case: Ravansar Township)

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1- Introduction

Despite the many advantages of using pressurized irrigation systems, in irrigation efficiency, about 3252 ha in the Ravansar Township (less than 5% of the total land and about 19.4 percent of irrigated land of Township) of agricultural land have been covered by the system. Using the system in the Ravansar Township for the first time was started in 2005 and in the form of a 4-acre piece of land. According to the evidences, the use of pressurized irrigation systems in the Ravansar Township has increased significantly until 2011, so that agricultural land covered by the system in 2011, increased to about 1797 ha while evidence suggests the use of these systems has a strong downward trend in recent years. Barriers to use sprinkler irrigation systems by the farmers in the Ravansar Township is the main problem of this study, and the researchers seek to answer it. Because to identify obstacles using sprinkler irrigation system, provides the main areas of planning, that is the initial recognition, and can be planned and coherent, we viewed development and equipment in more land areas under study by the utilization of sprinkler irrigation system.

2- Theoretical Basis

According to FAO report to achieve the Millennium Development Goals, in 2015, the first goal was eradication of extreme poverty and hunger in the world. Investigations indicate around the world, there are hundreds of millions who do not have acceptable level of food security and serious risks exist in feeding more than 9 billion people in 2050. To meet these concerns, Deputy Director General of FAO to meet the growing demand for food, has planned to increase

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agricultural production by 70% around the world and almost 100% in developing countries. Despite the importance of agricultural production in food security supply and dependence of agricultural production to water resources; evidence indicates the country at a disadvantage in terms of water resources. Due to the consumption of more than 90% of the country's water resources in agricultural sector, there is special significance in the management of water resources in agriculture. Planners and policy makers of the country use different tools and technologies to minimize the water consumed in the agricultural sector, in order to maintain production. Equipped agricultural lands to sprinkler irrigation systems are important planners' actions in recent years to the present in Ravansar Township.

3- Materials and Methods

The aim of the current study is, the use of descriptive-analytical tools to investigate the factors hindering the usage of sprinkler irrigation systems among farmers in Ravansar and propose practical ways to reinforce these systems. The sample included those farmers who used sprinkler irrigation in Ravansar (N=190). Factor analysis was performed for analyzing the collected data.

4- Findings and Discussion

The results indicated that use of these systems among farmers in Ravansar is more due to the physical issues rather those theoretical issues. Physical variables of performance system issues (26.612), the agricultural characteristics (22.868), behavioral issues (19.997), and environmental factors (16.492) were found to account for the 82.969 percent of the variance. Additionally, theoretical factors of performance system issues (31.874), personal (19/980), technical (15.236), and technical incongruence (7.921) accounted for 72.711 percent of the shared variance. The findings also indicated that providing financial (bank) facilities in form of loans was the best way to implement these sprinklers irrigation systems. Most of the participants (77.9%) found the practical solutions proposed by this study to be satisfactory. The use of sprinkler systems among the farmers, had significant influence the activities of farmers' indices cost-saving irrigation, saving labor, development of irrigated lands,

increase crop yields, saving water, reducing soil degradation and erosion, all of which tend to be more active in the agricultural sector, and increase diversity of crops and finally reduce the problems resulting from water scarcity. Also, investigations indicate, satisfaction of farmers in these systems, is acceptable of sprinkler irrigation systems. Results also showed the investigation, identify factors driving equipped agricultural lands of the sprinkler systems in the study area, support policies, strengthening the educational system extension, active participation of farmers, functionality and efficiency of agricultural land and underlying factors, are the most important factors that can strengthen the systems.

Keywords: Managing water resources, Sprinkler irrigation, Physical hindering factors, and theoretical hindering factors.

Spatiotemporal Predicting of Groundwater Level Using Artificial Intelligence Models and Geostatistics Model (Case study: Duzduzan plain)

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1- Introduction

Groundwater modeling to predict water table in hydrogeology and management studies, engineering structures and agriculture is very important. In the recent decades, due to the complexity and nonlinearity of the aquifers, artificial intelligent (AI) models have been extensively used in modeling and management of aquifers. The purpose of this research is groundwater level spatiotemporal predicting using artificial intelligence models and geostatistics models. The data for measuring characteristics of aquifers are often subject to uncertainty and there are physical problems in directly accessing and measuring their values. AI techniques such as artificial neural networks (ANNs) and fuzzy logic (FL) provide robust prediction approaches for groundwater levels. ANN models are such black box models with particular properties which are much suitable to nonlinear systems model. The ability to identify a relationship from given patterns make it possible for ANNs to solve complex hydrologic problems. More concepts and the former (until 2000) applications of the ANN models in hydrology have been discussed by the ASCE (2000). FL models provide a strategy to develop relationships between a set of input data and a set of output data, using fuzzy sets theory introduced by Zadeh (1965). In this research combination of the AI models and Geostatistics models, as a new method, was used for spatiotemporal prediction of groundwater level. The performance of this models to predict groundwater levels is investigated via the study

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of predicting monthly groundwater levels in the aquifer of Duzduzan plain, East-Azarbaijan, Iran. The watercourses in the plain are ephemeral, thus groundwater has the important role of being the source for supplying the demand for the area. Intensive utilization of groundwater resource impacted the water table of the aquifer by making it to decline and by making its quality to deteriorate. The total study area is about 217 km^2, that 88.5 km^2 of that comprise the plain area. The average annual precipitation is 366 mm and average temperature is about 8.6 centigrade. The aquifer in Duzduzan plain is heterogeneous and unconfined. There are 15 piezometers in Duzduzan plain to monitor groundwater levels. Their locations are distributed over the entire aquifer.

2- Theoretical Basis

Artificial Neural Network (ANN)

A neural network is a simplified model of the biological neuron system consisting of a massively parallel distributed processing system made up of highly interconnected neural computing elements that have the ability to learn and thereby acquire knowledge and make it available for use (Haykin, 1994). In other words, the ANN technique establishes the relationship between a set of inputs and desired outputs without giving any information about the actual processes involved in the phenomenon under study. Thus, ANN is, in essence, a pattern recognition technique or a black-box model.

Fuzzy logic (FL) models

Fuzzy logic was initiated in 1965 by Lotfi Zadeh at the University of California. Fuzzy logic starts with the concept of fuzzy sets. Crisp sets only allow full-membership or non-membership, whereas fuzzy sets allow partial membership which can take values ranging from 0 to 1. For constructing a model based on fuzzy, it is important to select proper types and parameters for membership functions that best fit the dataset. There are two types of fuzzy logic model: Mamdani (MFL) and Sugeno (SFL). Sugeno method is similar to the Mamdani FIS. The main difference between them is that the output membership functions are only constant for the SFL.

3- Materials and Methods

Of the 15 piezometers in the aquifer of Duzduzan plain, 8 of them were selected to predict the monthly groundwater levels. Due to hydrogeologically and morphologically heterogeneous nature of this aquifer, the hierarchical clustering technique is used to classify the piezometers. Feed forward neural networks with different training algorithm (Gradient Descent back propagation (GDX), Levenberg-Marquardt (LM) and Bayesian Regularization (BR)) applied in order to obtain the best structure for the prediction of groundwater level in each groups.

Sugeno fuzzy logic models were implemented for each of the three groups using the subtractive clustering technique. The input and output clusters were created using the Gaussian and linear membership function.

4- Findings and Discussion

Spatiotemporal prediction of groundwater level is very important in hydrogeology studies. To predict temporal groundwater level in the Duzduzan plain aquifer, Sugeno fuzzy logic and artificial neural networks were applied. The resulted values of Groundwater level were evaluated by statistical measures, includes root mean square error and correlation coefficient. The obtained results showed ANNs model has better performance. feedforward network trained with the Levenberg-Marquart (LM) method as it showed the most accurate predictions of the groundwater levels. Then optimal structure is applied for predicting water levels of selected piezometers in Duzduzan aquifer. Then the results of LM-ANN models in selected piezometers, were used as inputs of geostatistics model (Kriging and Co Kriging) for predicting spatially ground water level in the study area.

Keywords: Artificial neural networks (ANNs), Sugeno fuzzy logic model (SFL), Water table fluctuations, Geostatistics model, Duzduzan plain, Kriging, Co Krigin.

Sabjective Indexes Assessment of Environmental Quality in Deteriorated Textures (Case Study: Abkouh Neighborhood, Mashhad)

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Extended Abstract

In recent decades, the concepts of quality of life and the quality of the environment has been the action against the single dimension economic development ،located at the national level and physical development of urban scale, merely an effort to achieve quality standards in the urban board is programmed. Meanwhile the issue of quality in special residential areas such as Deteriorated Textures, due to their large population and building density and their lack of organic relation with urban structure, has more importance and complicacy in comparison with other residential areas. Accordingly ،try with understanding the concept of the quality of environment and the review of relevant literature international experiences and approaches ، indicators and affecting criteria on the amount of quality of these textures to be identified. Indicators used in this Research by looking at the subjective quality of the urban environment is the product of individual perception and satisfaction of citizens from their environment life ،in a six index ،including the satisfaction of the residence ،the satisfaction of the environmental security ،the satisfaction of the access to public services ،the satisfaction of the environmental health ،the satisfaction of the transportation and communication and finally the vitality of the residents has sorted. The scope of the study is located in Qaleh Abkouh in the Mashhad Metropolis in region 1 that has the texture by rural core ،organic and very dense ،which has become deteriorated texture on its path of transformation. Having the fact ،these research is practical and its methodology is based on descriptive and analytical research method.

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The sample of research primarily includes family guardians and individuals over 20 years. Having the fact، the number of 370 questionnaires was supplied and distributed by using systematic sampling method. Finally، for analysis of the acquired data، we used the statistical methods. For the measurement of the amount of environmental quality indicators of satisfaction، T test, to determine the significant relationship between individual variables and Environmental quality indicators - Chi-square test and for determine the intensity and direction of the correlation between them Kendall's tau and Kramer's test in the SPSS software is used. The results of the research show that the rate of satisfaction of environmental quality indicators in the study area is located on the lower level. It also was clear that the satisfaction of the quality of the environment has been accepted the Greatest impact of three variables such as age، education and duration of residence in Abkouh neighborhood.

Keywords: Quality of Urban Environment, Satisfaction, Subjective Indexes, Deteriorated texture, Abkouh Neighborhood.

Survey of Pedestrian Network Development Patterns and Feasibility of Theirs Development in the Central District Tabriz City

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1- Introduction

This article is an attempt to study the pedestrian network development patterns and feasibility of their expansion in the central district of Tabriz city. This review becomes even more important because besides the allocation of the central district of Tabriz to a considerable population and placement of important spaces like Bazaar and historical building like “the Alishah” citadel, “The Blue Mosque”, “The Mashrute house”, “Jame mosque” and residential complexes, it faces adverse environmental pollutants, car accidents and traffic jams. This part of the city could be considered as the heart of the city in every social, economic, cultural and skeletal aspects. In terms of climate, Tabriz city is categorized in Cold Mediterranean group with very cold winters and very hot summers. Absolute maximum and minimum temperatures in the coldest month of year are 15 and -19 degrees Celsius.

2- Theoretical Basis

Despite the tremendous developments in transportation and traffic systems, walking is still considered to be the main and the most common and important pattern of movement among communities; as far as concerned, nowadays many different patterns and models like Traffic Isolation, pedestrian movement and downtown enclosed shopping center, pedestrian-oriented streets, pedestrian shopping center, shopping streets, Woonref, Pedestrian malls and traffic architectural, traffic slowing policies, green pedestrian and flyovers has been presented for its development. Since Scientific and practical explanation of models and pattern also their advantages and disadvantages can contribute to the urban pedestrian expansion.

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3- Materials and Methods

This research has a descriptive- analytic framework. The theoretical part includes the documents and authoritative resources in addition to some scientific reports. Given the fact that this research is studying the old part of the city of Tabriz, by the means of criteria fulfillment, every pattern and models were examined. Sample of the study is consisted of 20 urban and traffic experts. In this study after presenting enough explanation of the survey's purpose and determining how a weak pedestrian pattern is scored 1 and a strong one is labeled 4, questionnaires have been hand out and later collected then descriptive analysis was performed at the end. Moreover, user's direct interacts and photography are other means of conducting this research.

4- Findings and Discussion

It is to be considered that among all the pedestrian movement patterns; streets with pedestrian priority, pedestrian-oriented streets, traffic slowing policies and the expansion of pedestrians itself has shown the most compatibility to the mentioned context. Therefore it is recommended to use the Pedestrian-oriented street design principles in the urban planning on the scale of city's centrals. Which will result in the possibility of development of historical spaces, revitalization of destructed spaces, Improvements in the environmental quality of urban spaces and finally a healthier city.

Keywords: Development Patterns, Spaces, Pedestrian Malls, Feasibility, Central District Tabriz City.

Measurement of Villagers' Satisfaction of Dehyari (Rural Management Unit) Performance and Factors affecting it in Central District of Hamedan County

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1- Introduction

Rural management refers to the process of organizing and guiding the community and the rural environment through the formation of organizations and institutions that provide the environment to achieve rural community goals. Dehyaris are as public non-governmental organizations that managing rural areas in the field of public services. Dehayers greatly need the satisfaction and trust of the rural community, so that they can get people's participation in the programs and achieve stability and sustainability in rural management practices. The satisfaction of rural households can be considered as a criterion for assessing the performance of the rural management units. The purpose of this study was to measurement of rural households' satisfaction from Dehyari performance and the influential factors on it.

2- Theoretical Basis

Rural development is the process of improving the economic and social life of the people living in the rural areas. One of the main dimensions of rural development is management. Achieving sustainable rural development is the main goal of rural management. In sustainable rural development, management denotes adjusting human relationship with the environment. In Iran, Dehyari is an organization for rural management that has been established in rural areas. Law of Dehyaris was approved in 1998. According to this law, dehyar (village manager) appoint by rural councils for 4 years and have 47 tasks in villages. The main aim of these units is to create an environment for organizing and managing villages through rural households' participation. Rural households' satisfaction of local institutions such as rural management units is more important for their

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participation in rural development programs and integration of various rural development efforts.

3- Materials and Methods

The purpose of this study was measuring villagers' satisfaction of Dehyari performance and the influential factors on it. Therefore this study is a type of an applied research, carried out through surveying and quantitative method. The statistical population of the study was heads of rural household in central district of Hamedan county. This sample included 268 of heads of rural household that were calculated by the Cochran formula and the data was chosen through the random stratified sampling. In this research, the important tool for data gathering was a questionnaire. The validity of the questionnaire was confirmed by specialists and its reliability was computed using Cronbach Alpha coefficient (0.83(.Data analyses were conducted using SPSS version 22.0. Descriptive statistics were used to describe the characteristics of the study population. In order to assess villagers' satisfaction, ISDM methodology was used. Based on mean and standard deviation values, the four categories were determined as "not satisfied", "relatively not satisfied", "relatively satisfied" and "satisfied". Mann–Whitney tests were conducted to determine the differences among individuals' varied satisfaction level. To model the effects of individual and county level variables on villagers' satisfaction, data was analyzed using a step by step regression.

4- Findings and Discussion

The result reveals generally that villagers were satisfied with Rural Management Units' performance. Overall, 50.4 percent were relatively satisfied and satisfied; while on the other hand, 49.6 percent were relatively not satisfied and not satisfied. The results of Mann-Whitney tests indicated that there is a significant difference between the villagers' satisfaction who permanently reside in the village and those who temporarily reside in the village. Also, there is a significant difference between the villagers' satisfactions who cooperate with Dehyari and who have never cooperated with Dehyari. The result of regression analysis revealed that the variables Dehyari relationship with villagers, age of household heads, and attention to the views of

villagers and the awareness of villagers from Dehyari responsibilities in a total are predicted of about 67 percent of the dependent variables (villagers' satisfaction of rural management unit performance).

Keywords: Rural Management, Performance, Rural Management Unit (Dehyari), Satisfaction Measurement.

The Study of Economic, Social and Cultural Impacts of City Councils in Cities of Iran (Case Study: City Council of Sardasht)

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Introduction

The council is one of the most basic customary principles and the traditional council even has the oldest methods of management in the social struggle of mankind, signs of the council system. The performance of city councils, municipalities and other local public organizations is effective on the quality of citizen's life and sustainable livelihoods. Evaluating the performance of these institutions is a constructive and reformist initiative for their growth and dynamics. That is why the management of the performance of local organizations as a management strategy attracted the attention of local authorities and led central government officials to take legal and scientific measures to improve the performance of local organizations. Performance evaluation, Refers to a set of actions and activities that are used to increase the level of optimal use of facilities and resources to achieve goals and practices along with efficiency and effectiveness. This program has become customary in most developed countries and in some developing countries in recent decades; so that adoption of specific performance evaluation rules is a requirement. The purpose of the evaluation of the measurement function, Assessing and judging the performance of the executive agencies of the country in accordance with approved laws and regulations, effective Criteria approach, Efficiency, Economical And ethical to improve the quality of public services. One way of assessing the performance of the city council is to evaluate people's performance. Performance evaluation is debatable, on the one hand, the satisfaction of people from city councils plays an important role in the success of the organization in achieving its goals. Citizens who are satisfied with the City Council

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are more likely to carry out their citizenship duties, such as paying fees and participating in public programs. And On the other hand it can be said that only those who Understand Difficulties and issues of living environment of people well are the same people. In recent decades, our cities have suffered from many economic, social and cultural problems. The city council has by now been the only arm of public participation in the management of urban affairs, which aims to reduce the problems of cities in the country. Certainly, the city council did not have the same performance in different cities of the country. As a result, it can be said that the influence of the city council was different in different cities of the country. According to preliminary studies carried out by researchers, the main problems of the city of Sardasht were divided into three sections, economic, social and cultural. Accordingly, the present study basis of its citation in the analysis The opinions of people and urban experts on the functioning of the City Council To this end realize the functions of the city council of Sardasht in three dimensions of economic, social and cultural. To this end, it is possible to provide a clear understanding of the functions of the city council from the point of view of the people and experts in reducing urban problems. In fact, the purpose of this research is to investigate the feedback of the actions of the Islamic city council of Sardasht To this end, the weaknesses in the functioning of this institution are eliminated and strengths also strengthened.

Methodology

This research has been done in descriptive-analytical method and with purpose Applied. To collect information According to the requirements of the research, a survey has been used. First, the performance of the councils was evaluated for economic, social, and cultural performance, and in the next stage, for each of these indicators, the five options were presented in the form of Likert spectrum. The population of the study consisted of all person aged 18 years and older living in Sardasht. So the volume of the sample population (based on the Cochran formula) was 384. Finally, were chosen by stratified random sampling, Proportional to the number of different areas of the city. In the next step, this questionnaire is

comprised of 15 experts, managers, graduates and urban management students were distributed. The method of determining the number of expert samples has been to use the snowball method.

Results and discussion

According to the findings of the research, the most average of economic performance of the councils in Sardasht was the encouragement of city to develop tourism. On the other hand, the lowest average for the economic performance of the Sardasht city council was related to the activity in the capital investment. According to experts, the highest average was related to the encouragement to prepare the city for tourism development, and the lowest average was the amount of council co-operation to address the unemployment problem of the people. The results of the research on the social performance of the council of Sardasht indicate that According to the citizens of this city, the best performance of the city council in the social sphere was related to activities to provide security, and on the other hand, the worst performance was for inviting people to participate in city council meetings. From the experts' point of view, the best performance of the security measures was the weakest performance, as well as inviting people to participate in city council meetings with an average of 3.27. According to the findings of the research on the cultural performance of the Sardasht city council in the studied area, In terms of residents the performance of the councils has been the highest in the field of national and religious ceremonies. On the other hand, information on the activities carried out by the Council has had the lowest average. In the opinion of experts too most average Performance related to the establishment and development of public libraries and the lowest average was related to information on the activities of the council.

Conclusion

The overall results of this research show that in general, the performance of the Islamic Council of Sardasht is higher in the social and cultural domain and in the economic field is lower than the average level. With a careful look at the results, it can be seen that Experts and managers of urban affairs have considered the

performance of the city council more appropriate than citizens. This is perhaps due to the fact that urban experts often have a more realistic view of the people, while also monitoring the ongoing activities of the city council with the aim of improving the urban life situation in Sardasht city, which is why they have high scores to the city council in different areas have given. These results highlight a very important issue and the weakness of the city council in economic activities. Certainly, city councils as representatives of the people in the city's management system should be effective in every way and can properly declare the needs of residents that are very diverse, including economic, social and other needs, to the above. To provide them with a solution and to communicate existing solutions to relevant organizations. Certainly, the weakness of the City Council in each dimension could lead to irreparable problems for the city.

Keywords: City Council, Council Functions, Effects of Councils, City of Sardasht

Climate Regionalization of Atmospheric Perceptible Water in Iran

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Introduction

Water vapor is considered to be one of the most significant atmospheric constituents as it contributes in precipitation and is also a critical element of the climate system. This climate element extended from earth surface to upper level of troposphere that potentially perceptible. Accordingly it called perceptible water. Therefore The total atmospheric water vapor contained in a vertical column of unit cross-sectional area extending between any two specified levels, commonly expressed in terms of the height to which that water substance would stand if completely condensed and collected in a vessel of the same unit cross section. The total perceptible water is that contained in a column of unit cross section extending all of the way from the earth's surface to the "top" of the atmosphere. The water vapor component of air requires monitoring because of its importance to weather and climate and the essential role it plays in the operation of the global water cycle. This is the reason that atmospheric perceptible water determines the potential value of precipitation as well as an index for forecast precipitation for a certain time of year. So it is an important variable in climatic study and climate change survey. Precise calculation of perceptible water needs to know about the atmospheric water vapor amount. However the amount of water vapor is determined by many factors including atmospheric density, temperature, cloudiness, wind direction and velocity, humidity in top of geographical situation. All of these factors determine the capacity of humidity, distances from the water bodies as well as leading the water vapor to any location. In this paper it has attempted to calculate perceptible water in atmospheric column from the earth's surface to the top of troposphere. This purposeful effort has been done to achieve

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the long term trends of perceptible water over Iran atmosphere. In order to this purpose the NCEP/NCAR data has been applied.

Data and Methods

Consider a column of liquid water with cross-sectional area, and certain height. This height is the perceptible water. One way to determining the mass of water vapor (in grams) in a vertical column one square centimeter in cross-sectional area that extends from Earth's surface to the upper reaches of the atmosphere. Mathematically, if $x(p)$ is the specific humidity at the pressure level, p, then the perceptible water vapor, PW, contained in a layer bounded by pressures p_1 and p_2 is given by

$$PW = \frac{1}{g}\int_{p_1}^{p_2} x dp$$

Where g refers to gravity acceleration.

For the purposes of our study, the pressure and specific humidity of NCEP/NCAR which exist for each 6 hours has been used. This data characterized by 2.5 longitude*2.5 latitude degree resolution. For zoning and classification of climatic water is Joe Iranian cluster analysis on the variables mean and coefficient of variation of monthly.

Results and discussion

The results showed that local factors, in particular the height and distance to the Seas Important role in the separation and classification of atmospheric precipitation of water climate in the area is hydrophobic, So that the observed spatial variation areas corresponding to the high altitude, the water is little rainfall. This implies that the conditions rainfalls due to short waves Western and Promotion, in the northern West more. The Central, North West and North east of the country c) low rainfall area with water, the area is mostly Zagros Mountains. Instead, the Caspian Sea and Persian Gulf littoral due to the massive water supply has high rainfall areas with water and place the coefficient of variation was low. Because the high latitude effect on increasing or decreasing the water is not in Iran There is a huge source of water of the Caspian Sea latitude to reduce

the impact of rainfall water is neutral. So that after applying cluster analysis identified three areas is as follows:

A) High rainfall area with water, this area includes the coastal areas of the country.

B) The average rainfall area with water, this area consists mostly of large parts of the central region, the North West and North East of the country is

C) Low rainfall area with water, the area is mostly Zagros Mountains.

Conclusion

The aim of this study atmospheric precipitation zone the water is Iranian. For this purpose, pressure and humidity data, especially during the period 1950-2010 the Database NCEP / NCAR dependent on the US National Oceanic and Atmosphere were extracted and analyzed. In order to analyze the data and draw the diagrams of the software Surfer, SPSS, Matlab were used. In this study, the average rainfall for water mapping and spatial variability factor has been extracted in different months. The cluster analysis has been used for zoning. The mean and coefficient of variation of monthly precipitation data available water cluster method was studied and analyzed the three climate zones: High rainfall area with water and low coefficient of variation, the average rainfall area with water and the average coefficient of variation and water area with low rainfall and high coefficient of variation was determined. To evaluate the results of cluster analysis, discriminant analysis and test of mean difference was used. The results of discriminant analysis showed that 98.24% of the cells are properly placed in their respective groups.

Keywords: Zoning, water precipitation, cluster analysis, discriminant analysis, Iran.

Modeling Urban Development Using Fuzzy-Cellular Automata

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1- Introduction

Today's cities are increasingly expanding in terms of physical development and complexities of structure, a phenomenon that has gradually transformed their physical, economic, social and cultural development. The physical space of cities has always been influenced by a number of mechanisms and the factors which are changing parallel to economic, social, cultural, political and environmental changes over time. Further, it has introduced new changes to the physical state of cities.

To discuss the issue of urban development from the standpoint of changes control, it should be examined from different angles. Recently, growing attention has been paid to the rise of urban planning together with new technologies such as RS and GIS as well as the modeling techniques designed for facilitating planning. An example of integrating different capabilities of existing technologies can be found in current approaches to urban development in which the main goal is to identify the process of future urban change in terms of past changes. The modeling of urban development has attracted the attention of many urban planners, thus allowing them to offer an appropriate development plan for the future of the city based on the location of the city and a number of pertinent environmental and natural factors.

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The cellular automata (CA) model, which is a suitable method for modeling complex spatial processes, is widely used in modeling urban development. Given their dynamic nature and simple structure, cellular automata models are used for predicting land use changes and the development of urban areas. CA as a technique with notable features like simplicity, transparency and strong potential for modeling spatial dynamics has been the subject of growing attention in GIS model and urban issues. A great deal of research has been dedicated to the modeling of urban development from different perspectives.

The main purpose of this paper is to improve CA model with using fuzzy concepts in different stages of the model, especially at the stage of defining the transition rules. The overall structure of this research is built on CA method. Also, in various stages, the fuzzy logic is applied to strengthen the model. To this end, among the factors affecting urban development, based on the available data, the factors related to physical fitness, level of access and proximity effect have been taken into account and the proposed model is designed based on these three factors. At the beginning of this paper, some points about CA and application of fuzzy concepts in this method are discussed. Then, the results of implementation of the proposed model at city of Shiraz are presented and compared with the actual conditions.

2- Materials and Methods

The cellular automaton model is one of the widely used methods in urban development. In this model, the state of the cells exposed to urban development is determined based on their neighboring cells and neighboring rules. The cellular automaton is a dynamic system which is discrete in terms of space and time and acts on a regular grid of cells. In CA method, the state or value of each cell changes over time as a function of neighboring cell value or the values of cells themselves. Given its dynamic nature and unique characteristics in physical modeling of natural features and land surface, CA is widely used to predict changes in land uses and urban development.

In cellular automation, the aim is to demonstrate the system in terms of simple elements and display its complexities in terms of its

interaction with simple rules. What is noteworthy about this model is that such changes take place locally in terms of space and time and only the neighboring cells are involved in the process of changes. Cellular automata model varies in accordance with the variation in the states of its neighboring cells. In other words, the new state of each cell at the time t +1 is a function of the state of the cell (S_x) and its neighboring cells (S_Ω) at the time *t*:

$$(\text{Eq. 1})\quad S_{xij}^{t+1} = f(S^t_{xij}, S^t_{\Omega xij})$$

CA model is composed of five main elements, including cellular space, neighborhood, transition rule, set of states and time:

- Cellular space: cells can be put together in trilateral, quadrilateral and hexagonal forms and in one-dimensional, two-dimensional and three- dimensional states.
- Neighborhood: refers to the neighboring cells of a cell which affect its future state. Four- cell, eight- cell and radial neighborhood are the best-known neighborhoods in cellular automata model.
- Transition rule: provides algorithms for changing a cell from one state to another. In other words, they are the rules governing the transition between different states of a cell.
- Set of states: Each cell at a time assumes one of the possible states. In urban cellular automata, the cell state can represent the land use or land cover. In cellular space, states are typically expressed in discrete format.
- Time: According to the definition of cellular automata model, the cell state changes in successive paces with recurrent cellular automata rules relative to the state of its neighbor cells. These paces, however, can have different speeds for different cells.

Application of fuzzy concepts in CA**:**

A) Fuzzy expression of transition rules: a crucial component of the CA is transition rules which it's definition and expression has a

significant effect on the structure of the model and its output. The expression of the transition rules in classical cellular automata model is based on mathematical method. The fuzzy theory with its underlying uncertainty and ability to describing natural words can be used to express CA transition rules. This should increase CA ability to model complex spatial process.

B) Fuzzy expression of cells states: In classical CA, cells are typically expressed discretely where there is a distinct border between states. For example, to simulate urban development based on these models, the cells state is assumed to be binary; however, in practice it is difficult to draw a clear line between possible states. To solve this problem, some researchers suggest utilizing the theory of fuzzy sets to define cell states in the simulation of urban development. That is, instead of the binary definition, a fuzzy set is defined and based on membership functions, the membership value of each pixel relative to the set is determined. For example, the developed pixels assume the membership value of one, binary pixels assume the membership value of zero and developing pixels assume the membership value between zero and one.

C) Fuzzy expression of geographical borders: When describing features with constant changes such as the type of soil, land cover and population density, the use of clear boundaries to distinguish different classes is not a good option and the use of definite borders may lead to misinterpretation. Much similar to such phenomena, cities are "continuously" changing in terms of space and time. From a spatial perspective, cities can be seen as units with high density of residential land uses, which are dominated by constructed lands. This is a fuzzy definition in which a variety of differences in terms of determining the density of residential land use and the extent of dominance of the constructed lands can be identified. In addition, all cities are surrounded with rural or natural land, which makes it difficult to draw a clear boundary between these regions and the city. The use of fuzzy set theory and its applications for expressing geographic phenomena can offer a solution to these problems.

3- Implementation of Fuzzy CA

Shiraz, as one of the major cities in Iran, is the capital of Fars Province. According to the national census in 2006, Shiraz had a population of over 1,214,808 people, which increased to 1,455,073 in 2009. In addition to the increasing population, the city has developed significantly in terms of physical area with informal settlements and marginalization around the city. In this study, in addition to elevation data and road maps, the layers related to six land uses including industrial, office, recreational, healthcare and undeveloped lands in 2004 as well as the satellite images were taken by TM and on ETM+ sensors on Landsat satellite were used. To this end, the data collected in 2004 were used and simulated for 2009. Then, based on satellite images, the simulation was examined to compare the accuracy of the model with the reality.

At the first, based on the data collected and using appropriate methods, physical suitability maps, accessibility and proximity effects are produced and then the general suitability is calculated for each pixel by combining these maps. In the next step, based on the general suitability and land requirement, the allocation process is implemented. The steps in the proposed method are: i) Determining the physical suitability, ii) Determining the level of accessibility, iii) Calculation of neighborhood effect, iv) Calculating the general suitability and v) Calculating the land requirement.

The proposed model in the previous section was applied to the case study area. Data processing and neighborhood effects calculation were conducted by assuming circular 8-pixels radius. The study of the resulted map indicates that about 3.6% of the pixels has a general suitability over 0.9. Thus, approximately 730 pixels were involved in the allocation process. A comparison of the simulated map in the target year and the real data reveals that 321 pixels in both maps have turned from undeveloped into developed. A comparison of the results with real development captured from satellite images shows that about 80% of the pixels that had actually changed from undeveloped into developed were also correctly identified in the simulation.

4- Conclusion

In this paper, the efficacy of CA modeling, fuzzy systems and geographical information system was evaluated in an integrated model for modeling urban development. The proposed model seeks to enhance the efficiency of cellular automata method in modeling complex spatial processes by combining it with fuzzy logic. The proposed model was utilized with the aim of identifying and improving the knowledge of users regarding the physical and accessibility factors and neighborhood effect on urban development and locating the most likely places for future urban development of the city of Shiraz. In this regard, the development of Shiraz city in the period between 2004 and 2009 was simulated by implementing the integrated model on land use layers refers to 2004. A comparison of the results with real development captured from satellite images shows 5% improvement regarding the results presented by Maleki (2010) based on utilizing cellular automata method without the use of fuzzy logic. The results provide deep insights concerning the simulation of future urban developments.

Keywords: Urban Development, Geographic Information Systems, Cellular Automata, Fuzzy logic, Transition Rules, Shiraz City.

Evaluation and Simulation of Urban FringeLand-use Changes by Using CA-Markov Model (Case Study: Miandoab City)

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Introduction

Urban development and the migration of population from rural to urban areas are significant global phenomena. Increasingly, smaller, isolated population centers are changing into large metropolitan cities, with the conversion of natural land to urban use becoming quite obvious. At present, the growth of urban population on the world is faster than the growth of world's total population and according to the data published by United Nations over 50 percent of the world population are living in urban areas. The rapid growth of population in urban areas together with other political, legal, social and economic factors created a sort of urban expansion as of urban sprawl or urban irregular expansion. The term sprawl is frequently used to describe the uncontrolled spread of development into rural areas. Sprawl is a low-density, automobile-dependent, center less approach to development. The urban growth imposed the significant effects on urban fringe ecosystems. One of the effects is the change of agriculture land-use to urban land-uses. Land-use change of urban fringes in Iran also were very rapid. After the land reformation and excessive rely of country economy on oil exporting, the country experienced unprecedented urbanization that resulted in continuous and rapid changes in per-urban land-uses. Miandoab city with 114000 population in the year of 2006 during of several decades having the great expansion. Too, because of location the city in the alluvial plain the lands of urban fringe were the pregnant agriculture lands. Therefore, the necessity of attention to urban growth and effects on fringe areas as the urban and rural transition area is vital. Recent progress in tools and methods of geographical information system (GIS) and remote sensing (RS) giving a capability to researchers in the case of modeling urban

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growth. Spatial models, are useful tools for understanding urban development process. By modeling of urban complex system, can be simulating the urban spatial patterns and growth trends and acquired a better understanding of urban system as a total. In this context, the many models for simulation of landscape changes be created. One of the models is CA-Markov model that combine the two model Markov chain analysis and cellular automata for modeling of changes in a urban environment. Markov chain analysis demonstrated that future situation of a system can be modeling only based on current situation. Cellular automata model applied for allocation a spatial dimension in modeling. Cellular automata are a dynamic non-contiguous system that space divided to regular spatial cells and time moved forward in non-contiguous estate. Therefore, in this study for modeling of urban and urban fringe land-use changes is used of CA-Markov model. Simulation method divided to the two segment of quantity projection of changes by Markov chain analysis and simulation of spatial change patterns by Cellular automata.

Methods and materials

Markov chain analysis is depended to analytical methods of probability process. Markov process is a probability process with special characteristic that separate them from other probability process. Markov chain analysis demonstrated the land-use changes from one time to another time and applied this changes as a basis for projection of future changes. This projection that is basis for projection of third period implement by creating of a transition probability matrix of land-use changes from one time to another. In IDRISI software Markov module creates a transition probability matrix and transition area maps by using of two land-use map of different periods. Cellular automata are discrete and dynamic systems and behavior of them quite depend to local relations. The Space organized as a monotonous grid (array of cells) and every cell can be in one of possible and finite states. CA models consist of five sector (cell, situation, neighborhood, transition rules and time). Though, Markov model be successful in analysis and simulation of land-use changes. But inattention of this model to spatial patterns of land-use

induced a series criticism. Thus, in this study the urban growth and land-use changes of urban fringe of Miandoab city simulated during a period of 41year by using of CA-Markov in IDRISI software. Case study of Miandoab city in south of province of west Azerbaijan in the year 2006 had 113933 population and 1820 hectare area. The coordinate system of city is 46 degree and 4-8 minute in east length and 36 degree and 57-59 minute in north width. Data: In this study, the used data are Landsat satellite imagery TM of years 1984, 1997 with 30 meter resolution, ETM 2011 with 15 meter resolution, urban land-use map and elevation digital map of region. After preprocess of Satellite imagery, they processed and classified by ENVI software and land-use map created. This maps in five category (settlement, barren, and farm, garden and water body) classified.

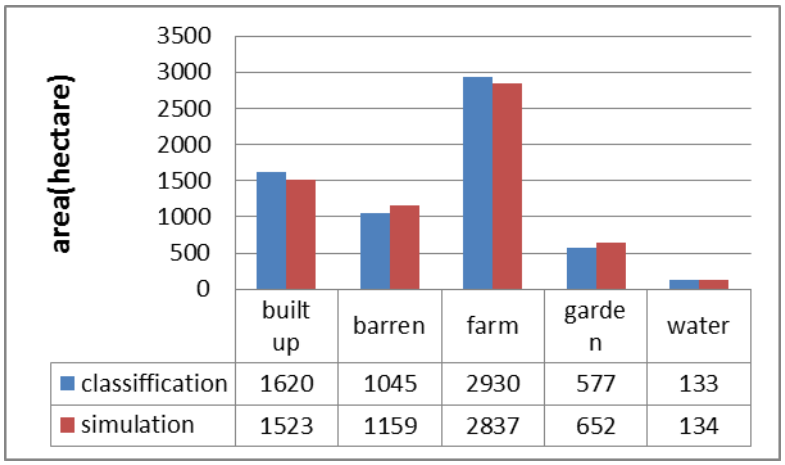
The process of research consist of three general stages:

*Calculating of transition matrix by use of Markov chain analysis.

* creating of suitability map for every classes of land-uses by using of multi-criteria evaluation (MCE).

* Using of transition matrix and suitability maps for simulation land-use changes based on CA model.

Simulation process in two place conducted. First by using of land-use maps of 1984 and 1997 the changes trend for year of 2011 simulated and then compared the simulation map and classification map of 2011. The results indicates that simulation have high accuracy. In this respect settlement and farm land-use having the very well correspondence and barren and gardens land-use having the partly correspondence. As shown in figure1.



Because the successful of simulation for the year of 2011, the simulation of land-use change for the future period of 14 year conducted. Results illustrates that settlement and garden land-uses have 24 percent growth than the year of 2011 and barren land-use have 5 percent growth than the year of 2011. Whereas, the farm lands have 19 percent decline in area. The water body have the very low change during the 41 year.

Conclusion

Many of Iranian cities, from ancient age settled beside rivers and other water resources and thereupon around lands of them are prolific agriculture lands. The growth of urban population, heavy demand to land, speculation, weakness of urban management rules, policies of government development and consumption life style, caused the farm land-use changed to urban land-uses in areas of urban fringe and that will threat the urban sustainable indicators. Miandoab city also, settled between the two rivers and surround them the prolific agriculture lands. According to census year of 1956 the city has 14000 population that reached to 113000 population in year of 2006. In the year of 1984 the area of city was 607 hectare that with increasing ratio reached to 1060 hectare in the 1997 and 1620 hectare in the year 2011. The major of changes was due to the convert of agriculture lands to barren lands and then built up lands. Unlike of built up land-use, farm land-use during this period encounter with intensive decline, As the area of

farm lands with 4044 hectare in the year of 1984 reached to 2930 hectare in the year of 2011. Namely 1114 hectare of areas farm land-use changes to urban and barren land-use during the 27 past years. On the base of successful evaluation for year of 2011, modeling of land-use changes by using of CA-Markov for the year 2025 conducted. The results of study indicates that area of built up and garden have more increase, area of barren land-use have relative increase and area of farm land-use have very decrease. Modeling land-use change for the year of 2025 show that if current growth of urban built up continue without assumption of sustainable development policies will caused the decreasing in prolific agriculture lands in area of urban fringe and appearing of urban sprawl phenomena. Thus, combination of geographical information system (GIS) and remote sensing (RS) with CA-Markov modeling are providing a suitable tool for analysis and projection of land-use changes.

Keywords: Land-use change, CA-Markov model, Urban growth, Remote sensing, Miandoab city.

Capability of Cellular Automaton in Simulation of Evolution and Erosion in river Systems (Case Study: Lighvan Catchment)

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1- Introduction

Catchments and river systems altered in response to changes of internal and external factors. Hence, several techniques have been proposed to simulate these changes and evolution of the river systems. Cellular Automata is one of the newest cellular models of river that define the catchment landscape with a grid of cells, so that development of this landscape is determined by the interactions between cells (for example fluxes of water and sediment) using rules based on simplifications of the governing physics. So in this paper, Cellular Automata will be used for simulation of erosion and evolution in Lighvan catchment.

2- Theoretical Basis

In fluvial geomorphology, cellular models use simplified or relaxed versions of the complex flow equations used in CFD models. This allows a substantial increase in speed of operation, which in turn enables them to be applied to long reaches and large catchments over useful time scales. Importantly, the increase in computational speed and simplicity also allows these models to include sediment transport processes between cells, meaning that morphological change can also be modeled. The first of these cellular models was the braided river model of Murray and Paola (1994). The Murray and Paola model also

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inspired the development of a series of similar cellular models. Coulthard et al. (1996, 1998) developed a cellular automaton model of river catchment evolution that was further developed into the CAESAR model. CAESAR has been applied to a range of river catchments and reaches (4 to 40 km^2) with grid cell sizes ranging from 2 m by 2m to 50 m by 50 m. CAESAR is one of a new genre of cellular fluvial models that have also been termed reduced complexity models. They have developed partly to fill the gap between complex 2 and 3D CFD approaches that are often too complex to be readily applied to large areas over timescales greater than a single flood event, and coarse resolution landscape evolution models that simulate the development of landscapes over thousands of years.

3- Materials and Methods

The CAESAR landscape evolution model used here is based on the cellular automata concept, whereby the continued iteration of a series of local process-rules governs the behavior of the entire system. Although these rules are relatively simple and straightforward representations of fluvial and hill slope processes, their combined and repeatedly iterated effect is such that complex non-linear geomorphological response can be simulated within the model. Both positive and negative feedbacks between form and process can emerge. So CAESAR model is used for simulation of Lighvan catchment with 20 m cell size and 10 years precipitation data (1380 to 89). The model requires the specification of various spatially distributed landscape parameters (initial conditions): elevation, roughness, grain sizes and vegetation cover. CAESAR requires an hourly rain data set (forcing conditions) and raster DEM. Editing and correcting the DEM is an important part of preparing for a CAESAR simulation. CAESAR is also set up so that the exit point from the DEM must be on the right hand edge of the map. This may require the DEM being rotated in order to correctly align the exit point. Furthermore, the model will not route water or allow water to exit from no data cells so these must be removed from the right hand side of the DEM. CAESAR accepts data in an ascii raster format which

consists of a 6 line header, followed by the grid cell elevations in rows and columns.

4- Findings and Discussion

Simulation results were evaluated in two qualitative and quantitative methods, so that the relative changes in the catchment and spatial distribution of erosion and aggradation value in the entire catchment and each cell were identified on Digital Elevation Model map and also, values of different particle size distribution in different discharges showed that by the increasing discharge, amounts of sediment increase and among this, coarse sand has been the highest value and very fine sand, clay and silt particles has been the lowest value. Also investigation of longitudinal and latitude profile show that Lighvan river is in mature stage and Lighvan channel has been underwent aggradation due to climate changes in last decade that causes hillslope erosion and channel aggradation. Finally, since certainty of Cellular Automata results is difficult and CAESAR is sensitive to input parameters but comparing the results with previous investigation and field observation shows that Cellular Automata has acceptable results.

Keywords: Cellular Automaton, CAESAR, Evolution, Incision and Aggradation, Lighvan Catchment.

Investigating the Urban Vulnerability against Earthquake Using Mihwp Model-Case Study: 10th Zone of Tabriz

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1- Introduction

What poses the earthquake as a threat is the unpreparedness of human to cope with it. The poor state of physical settlement andinappropriate land uses, city's inefficient street network, compact urban texture, high urban densities and shortage and the inappropriate distributionof the urban open spaces and Etc. have a fundamental role in enhancement of cities' vulnerability against earthquake. The type of structure, built quality, land use, construction and population density, floor-area ratio, the rate of enclosure, streets width, buildings height, lots grading, remoteness and proximity to medical centers have a great influence in reducing or increasing damages and losses caused by earthquake. For this reason, right study of them and specifying the paths and vulnerable or secure areas, according to the above-mentioned criteria, decrease earthquake damage in a city and provide the possibility of correct planning. The use of new technologies, such as GIS, can determine vulnerable areas against earthquake and as a result, proper planning can be done for those areas.

2- Theoretical Basis

Studying the vulnerability of existing buildings is a type of predicting damage of them against possible earthquakes. Vulnerability analysis is the process of estimating the vulnerability of certain elements that are exposed to the potential risk of the occurrence of catastrophic hazards.

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The most important factors that resonating the possibility of increasing cities' vulnerability areplacing the city on different faults, The concentration of population, non-compliance with laws and regulations of urban planning, the existence of many construction as informal settlement, constructing unprincipled high-rise buildings, using less durable materials, lack of principled plans to deal with future crisesand lack of effective education for citizens.

3- Materials and Methods

Current study is applied research because it tries to study one of urban crises and present suggestions in this fieldusing the available fields and theoretical foundations. The estimation of vulnerability capability has been surrounded by ambiguities and uncertainties because in the past, calculation of vulnerability amount, by using the Boolean Model, did not permit to vulnerability criteria that be membershipas a continuous spectrum. For this reason, MIHWP model has been used. The steps of the model is including the determination of the data matrix, applying Delphi survey method, weighting the data on the basis of IHWP Model, overlying maps and finally, preparing final vulnerability map. All modified steps of this model is similar to main method and the only change is in its second mathematical relationship that has been added adjustment coefficient for it.Comparing the results of IHWP methodwith the previous method illustrates that this change results in improving the model. The main advantage of modified method is that increasing vulnerability in categorizing an index is not linearly and this issue is applied as nonlinear with regards to the position of every category.

4- Findings and Discussion

In order to assess the vulnerability amount of the study area against earthquake, following criteria have been selected according to the studies of theoretical foundations and carried out researches corresponding to the topic: Land use, street width, the height of buildings, the rate of enclosure, population density, lots grading, floor-area ratio, construction density, built quality, built material, building age, access to open spaces and distance and proximity to major faults. According to vulnerability map of zone 10, area where had resistant

structures, better quality and new buildings, less floor-area ratio, low construction and population density, coarse lots grading, wide streets, buildings with fewer floors, low rate of enclosure, and proper access to open space, have better situation in terms of vulnerability. Adopting special politics is mandatory in order to deal with future crises actively and dynamically since Tabriz City is always exposed to permanent threat of active fault and earthquake. Creating a hierarchy of open spacewith regards to city's physical divisions,observing the proximity of land uses and transferring incompatible land uses, observing National Building Regulations and codes (2800 code and 21 codes of Engineering Council), observing and enforcing the hierarchy of urban streets, considering the role of planning and urban design and refraining from mere glance to strengthening structures in the topic of earthquake are the most important solutions to reduce vulnerability against earthquake in the whole of zone 10. Two types of solutions can be implemented considering thatmajor part of central texture of zone 10 has been formed as informal settlements and are quite vulnerable and problematic against earthquake and moreover, are observed as areas with high vulnerability in map:1-Transferring resident population in residential textures placed on hills and mountains range that have been constructed on the slope of more than 30%, and construction of green open spacesinstead of these places can lead to decrease losses of this natural phenomenon. 2-Land assembly by encouraging mechanisms and with the aim of eliminating narrow streets and increasing the area of residential lots can be the most important solution with regards to fine lots grading in western, central and eastern area of zone.

Keywords: Vulnerability, Earthquake, Tabriz, MIHWP, GIS.

Analyzing of Freezing Return Period and Temporal Distribution (Case Study: Maraghe)

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Introduction

Climate is one of the main environmental factors that controls all manifestations of life. Among the elements of the climate, two elements of temperature and precipitation have a more decisive role. One of the forms of temperature variations is its premature fluctuations, especially the temperature drop to the freezing point, which is called glaciation (Omidvar and Ebrahimi, 2009: 114). With a review of external and internal resources, it has been observed that most of the studies carried out, especially in the interior, focused on some of the glacial characteristics and the synoptic analysis of glaciation. Most domestic studies have evaluated Iran's glaciers, or limited zones, to one or more provinces, or frost and damage caused by it in one of the economic sectors. However, there are few studies on the characteristics of this climatic phenomenon in the form of a case study in a mountainous region during the time period of the day. Therefore, in this research, it is always preferable to study periods of glacial return and its time distribution at Maragheh station.

Materials and methods

In this study, from the beginning and the end of the index, the length of the growing season and the length of the ice season, based on the geological history, were used to analyze the periods of glacial returns and their distribution time. For this purpose, the minimum daily temperature of Maragheh station was used during the 48-year period (1393-1393). In this study, based on the threshold (zero and below), the date of the first and the last frost day was extracted from the minimum daily temperature data for each year.

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The first method is chi-square (χ^2), which is a parametric method and the second method is the non-parametric Kolmogorov-Smirnov test.

After determining the trend line, analyzes related to the trend are presented. Then, in order to confirm the graphing trend analysis of the indices, the Spearman rank correlation coefficient, a nonparametric test, was used. For statistical analysis, Excel, SPSS and Easy fit software have been used.

Research findings

After determining the beginning, the end, the length of the growth season and the length of the ice season, using the minimum daily temperature data for the initial fitting of the indices distribution, two chi-square tests, Kolmogorov and Smirnov tests were used. Based on the results of these tests, the best distribution for the beginning of Gumble glacier was determined for the end of freezing and the length of the season for the growth of three-parameter logging and for the length of the loggia ice season.

- Calculate the return period of the growth season

According to the results of the calculation of the return period of the growth season (Table 2), the growth season lasts from 218 to 230 days with a return period of 3 years. Due to the growing season of the growing season, the length of the growth season can be estimated from 205 to 217 days and 231 to 244 days with a return period of 5 years, which has the highest possible probability. Therefore, it can be concluded that the estimate of the growth season is from 205 to 244 days per year.

Calculate the return period of the ice season

The results of calculating the return period of the frost season showed that with a probability of 41%, the length of the frost season would be higher every two years with a distance of 130 to 149 days a year than other periods of the year. The results show that the length of the ice season has decreased.

- The beginning of the ice season (autumn)

The results of calculating the probability of the return period of the beginning of the frosty season (autumn) based on the Gumble distribution showed that with a 32% probability and a 3-year return period of autumn frost from November 21 to December 1, with a 22% probability and a 4-year return period of autumn frost From November 10 to November 20 earlier than other days of the year (Table 4). Therefore, it can be concluded that the dates from November 10 to December 1 are the beginning of the autumn ice season. This means that farmers in the city of Maragheh should not leave a product on the farm from November 10 to December 1, causing damage to the product.

- End of Ice (spring)

According to calculations from Table 5, the end of spring frost with a 4-year return period will occur from 3 to 17 April, earlier than the rest of the year, and from that date onwards, it would be possible to plant products that are not sensitive to frost.

- Analysis of the trend of ice indicators

For accurate analysis of the results, the Spearman correlation test for the four frost indexes is presented, the results are presented in Table 6. According to this table, the length of the growth season has a significant positive correlation (r = 0.335), since the value of P-value is less than 0.05, so the trend diagram of the length of the growing season also confirms this result. The ice-free season also has a significant negative correlation (r = -0/357), since the value of P-value is less than 0.05, indicating a downward trend in the data. The results of the correlation test for the onset of frost history indicate that the upward trend of Julius's history with a positive correlation of 0.22 is somewhat significant since the value of P-value is less than 0.15. The results of the correlation test for spring frost data show that the correlation of these data is not significant with respect to time, since the value of P-value is more than 0.05. This indicates that the end-of-ice data process is stable, in other words, the process of these data is a random process.

Discussion and Conclusion

From the discussed issues in this study, it can be concluded that the phenomenon of freezing in the study area has the most important determinants in agricultural activities, especially in the cultivars of crops that are sensitive to temperature and frost and, therefore, it is necessary to carefully observe The occurrence and termination of this phenomenon involved the cultivation of crops and also the use of low crop resistant crops to reduce seedling production at risk of frost and loss of crop or reduce its yield To be placed. In general, the results of this study show that:

1: Based on the results of Chi-square and Kolmogorov-Smirnov tests, the best distribution of the beginning of frost (early frosty autumn) distribution of Gumble and for the growing season and the end of frost day (late spring frost), the distribution of logistic parameters 3 parameters, and for the length The ice age of the loggia distribution was recognized appropriately.

2: The estimated return period for the beginning of the frost fall is 4 years from the 1st of November to the 1st of December, that is, every 4 years the first frost occurs in these dates.
3: Estimate of the return period for the end of the spring frost from 3 April to 17 April is 3 years, that is, every 3 years the last spring frost occurs in these dates.

4: An analysis of the trend test for the beginning of autumn frost showed that the frosty frost has a rising trend and the beginning of history has been dragged down, i.e., the length of the cold season has decreased. The process of ending spring frosts is a downward trend, so the spring frost retreats down.

Keywords: Freezing, Gumbel distribution, Log-logistic, Trend analysis, Freezing parameters, Maragheh.

Analysis of Factors Affecting Rural Livelihoods (The Case Study: Villages of Sardasht Township)

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Extended Abstract

1- Introduction

The border areas are considered as the most sensitive and strategic areas of any country. The ignored and unfertile nature of these areas, especially in mountainous areas has been the cause of political, economic and security problems for the time governments. Potential disadvantages in production, lack of employment, low income and having no access to basic needs are the most important socioeconomic characteristics of these areas which have provided basic grounds for problems and imbalances such as immigration and smuggling of goods in these areas. There is a difference in the availability or lack of facilities even among the villages in such areas. For rural morphology, villages located in mountainous areas have more severe constraints than plain villages and livelihood problems in such villages have more dimensions. Therefore, this research aims to analyze the factors affecting rural livelihood and seeks to answer the following questions: What are the major sources of livelihoods (i.e. income) in the studied area? What is the relationship between geographical factors and livelihood patterns in the studied areas? What role the border markets played in the welfare of the people in such regions?

2- Theoretical Basis

Livelihoods and productive activities include anything that is economically valuable for the families and community, such as crops, livestock, handicrafts, wage labors. Ellis defines livelihood as follows: Livelihoods include the assets (natural, physical, human, financial,

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and social capital properties), activities and availability to these intermediaries (by institutions and social relations) that together determine the living standards of a person or family members. The livelihood approach has begun since the 1990s and is better known by Robert Chamber's works: Livelihoods means life and living, abilities, assets and activities that are required in order to be live. The study of the documents and scientific bases related to rural livelihoods has included some part of the research fields that would be referred to some of them: Ellis et al. (2003) studied the livelihoods and rural poverty in Tanzania, Uganda and Malawi. They said that rural poverty is heavily affected by the shortage of agricultural and livestock farming; so they concluded that the lack of job security and deficiency of financial focus on the mentioned activities and loss of agricultural opportunities are among the most important factors of rural poverty in such areas.

3- Materials and Methods

The present study is a type of developmental research that has been used descriptive-analytical and exploratory methods. Field studies have been conducted using survey method (questionnaire, interview and observation) in sampling villages. The statistical population of the study consisted of 5722 inhabitants live in villages higher than 50 households in Sardasht city in the period of 2010-2011. Due to the wide area and large number of households, the sample size of this research was selected using spatial clustering method, i.e. in a randomized way, 1025 people were selected from 8 villages. The studied variables are include income level in each village and household, crop area, land area, agricultural production and rural incomes from border trade, people's welfare conditions in relation to border markets and etc.

4- Findings and Discussion

In order to answer the research questions, the most important economic components of the people in these areas as a dependent variable against the independent variable between the components of agricultural jobs and border transactions with the villagers' income have been considered here, respectively. Since most border markets (independent variables) are located near the Iraqi border, the distances

of villages to the border can be a major factor in their income. Some villages of this research are located far away of such border markets and this factor has caused the income level of those villages to be lesser than border crossings villages. Therefore, by studying the problem, the following results and achievements were obtained:

* The activity of border markets has created direct and indirect employment of the border counties which indirect employment share is being greater than direct employment. Based on the research findings 0.9% of the respondents have had job mobility after the establishment of the border markets.

* The activity of the border markets has increased the income of the border counties by the coefficient of variation to 0.23, of which a large percentage (border market exporter) because of having sufficient capitals tried to export and import in large volumes. The highest income and minority contribution is much lesser, respectively.

* Establishing a marketplace and creating employment for the border residents has not been able to reduce and prevent the enormous number of rural immigrants to the city that grows with a coefficient of variation of 0.12. However, the control of the informal economy has greatly decreased in this region which its coefficient of variation according to their frequencies before and after the establishment of the market was about 33.1.

* Border markets have not a meaningful impact on meeting the needs of border residents with a coefficient of 0.07, which has little growth, and exchange commodities are mostly metropolitan and trans-regional approaches. Finally, the facts indicate that border markets although have played a positive and effective role in a number of cases; however, their multi-year performance show that they are not consistent with the original goals of the establishment. And have had negative approaches including to be a preventive tool for education and culture condition (due to the young people's employment in the bazaars and smuggling the goods).

Keyword: Border villages, Livelihoods, Sardasht Township, Frontiersman, Border.

Assessment of Priorities Allocation of Urban Land Use with Emphasis on Implementation of Electronic City System (Case Study: Ten Region of Tabriz)

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Abstract

Electronics city is affected on various land uses via electronic shopping, electronic services, electronic communications, e-learning, e-banking, teleporting and electronic entertainment. Tabriz has not been exempting from this category. In this research, by using descriptive- analytic method and AHP model, first the effect of electronics city on each of urban land uses in the areas of Tabriz has been evaluated and the significance of each factor is determined. Then, according to this matter that electronics eity in all land uses lad to reduce area and only need to increase the space in residential users, the process of research has been followed din two scenarios. In the first scenario, it has assumed that all require to land use in the area; and must be protected in their regions area and in the second scenario, providing additional needs to residential users that arising from electronic city has been considered outside the city limits. Finally, in each region, priority allocation of conservation areas to different land uses has been analyzed. The results indicate that the main priorities of allocating space in ten regions of Tabriz, are related to land sports, culture and green space. According to land use development, there is no ability to provide the demands of citizens based on real spaces and the need to use of electronic city services and virtual supply is necessary.

Keywords: Urban land use Assessment-Electronic City, 10 regions of Tabriz.

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Analysis of the Attitudes of the Different Aspects of Rural Housing Case Study: The Central city Hashtroud

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Introduction

Assembling of a plenary program in housing portion, requires complete cognition and deep analysis of broad dimensions of housing and its effective factors. But here, the most crucial tools for programming that makes its main foundation is using of housing indexes that could be the most sensitive step of programming. Functional indexes of housing in one side are cognition tools for housing situations in diverse quantitative and qualitative dimensions and in other side are a key tools for illustrating the outlook of the housing's future and programming for it. By doing researches and important projects about cognition and analysis of functional indexes of the housing, it is feasible to increase the performance of housing programs saliently**.** Housing today in our country has become a strategic goods. Product life of citizens and their calculated and evaluated to make it. Rural housing an important contribution in promoting human security and social justice is. On the other hand being vulnerable due to their lack of technical standards and exposure to natural hazard, the Construction and Retrofitting their degree is important. Today, rural housing continues to function far beyond the functions of housing in urban areas**.**

Methodology

The purpose of this study was to investigate the rural housing in rural areas of the central part Hashtroud and evaluation criteria for affordable housing is a vision of society. Methodology the survey

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questionnaire is based on information collected in the questionnaire using SPSS statistical software was used.

Results & Discussion

Accordingly, the maturity and rural houses in addition to providing common functions can be bed housing necessary to provide for rural development. Therefore, maturity status of rural housing, except one major rural development programs in most countries, especially in developing countries are. Functions predicted in the Constitution for the government in providing adequate housing, and the need to create residential units resistant to natural disasters, develop rules, regulations and standards necessary to monitor observance of standards shall require that the government intervention in rural housing construction process can . Accordingly, in Iran and especially after the Islamic Revolution with the aim of improving the quality of government and industry resistance, this intervention is. Considering the importance of rural housing and the role that government can be in the field of rural housing is essential that the government's actions in this field should be evaluated with the understanding; status quo, challenges and strengths and difficulties ahead, areas to improve rural housing and consequently to provide rural development**.** The research findings indicate that the residents of housing strength and resistance against disaster, not satisfied with the condition of heating and cooling systems and design and landscape standards of housing as well. Other findings indicate that the criteria related to adequate housing, building resistance against disasters and environmental health in the first place, area and size of housing, facades, new architecture and the use of local materials is the next priority.

Conclusion

In every society and for every social group or class, regardless of their culture and financial state, accommodation has always been an essential need. In rural societies of the country, particularly the society under study, because of complicated problems some of which are rooted in the deprivation of previous regimes, these needs have not been answered properly by the planners of the country, even though they have had overt and covert impacts on the rural development. For

this reason, an attempt has been made in this study to investigate the problem from different angels. The beginning of human settlement in the planet, housing was one the most important requirements of human that it has two dimension, corporeal and spiritual in rural society of the country and field of studying because of different reasons that it has root in the exclusions of the past periods rural housing in spite of abstruse and clear effects that it can have in rural development, planners and managers don't pay attention to them.

Keywords: Rural housing, adequate housing, rural areas, the central part, Hashtroud

Analysis of the Location of Urban Fire Stations Case Study: Piranshahr City

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1. Introduction

The first key point in order to allocate city facilities and proper use of them especially during the crisis, is choosing (selecting) the optimum location (place) regarding to different and sometimes contradictory conditions. This becomes more important when significant factors such as human life to be considered. Locating fire station and its arrangement is one of the decisions that each fire boss (chief) and crisis management may face with (encounter) it. Therefore, locating appropriate fire stations can have many benefits. According to this, proper construction of these stations increases efficiency and productivity. Therefore it would require a comprehensive study. The main aim of this study is optimized locating of fire stations of PIRANSHAHR city using geography information system (GIS) in order to reduce casualties and damage caused by the crisis. Accordingly, current study would be aimed to answer this question whether available fire stations are deployed optimally to manage crisis? And how many fire stations will be required and where they should be located.

2. Research Methodology

This research is based on descriptive-analytic method and it is an applied study. Information needed for this research are obtained through the detailed results of the General Census of Population and Housing, comprehensive and detailed plans of PIRANSHAHER, map of current status of the city, and also through documents, magazines, and books related to this subject. The results of this study are collected

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through Super Decision, ARC GIS, AUTOCAD software, using network analysis model, TOPSIS, AHP, and ANP to locate fire stations.

3. Discussion and Results

According to the aim of research, that is locating optimized spatial distribution of fire stations in PIRANSHAHER city, it is necessary to locate new station regarding to some indicators and scales. Therefore, information layers of functional radius, user proximity, population density, access to the communication network and closeness passages are used. Weight obtained from ANP model was allocated to each of the layers in GIS (geography information system) environment using Spatial Analysis through Weighted overlay. And overlapping layers and then location map of fire stations were constructed. As can be seen in the map west and south part of the city and portion of east are suitable to locate new stations. Using Boolean logic, six suggested stations were considered for the city. In this method the city was divided into two favorable and unfavorable groups. These two groups are identified respectively with the value of zero to one. Next step was to prioritize the proposed sites for the construction of new stations. Using hierarchical model AHP, used indicators were weighted to prioritize the sites and ultimately by using TOPSIS technique point (site) ranking was performed.

4- Conclusion:

The results of this study show that, with respect to network analysis, fire stations in times of crisis cannot present the ideal services, and parts of the city with a high population density and having sensitive applications are outside of its direct sphere of influence. Therefore, this situation requires locating and establishing new stations.

Keywords: Site selection, Fire stations, Crisis, Piranshahr city.