Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 27/2/2011 Accepted : 7/10/2011
PP : 1- 4

Ranking the Sustainability Levels of Rural Areas Based on Vikor Model
Case Study: the Villages of Fasa County – Fars Province

Dr. Seyed Ali Badri
Assistant Professor of Geography
University of Tehran

Dr. Hassanali Faraji Sabokbar
Assistant Professor of Geography
University of Tehran

Dr. Mojtaba Javedan
Assistant Professor of Geography
University of Tarbiat Modres

Dr. Hojjat-Allah Sharafi
Assistant Professor of Geography
University of Shahid Bahonar Kerman

Introduction

Sustainable development together with its complicated principles, have been globally discussed for years. The development process which started from1940, has reached to a dead end, therefore from 1980s environmental issues and development have been under a new perspective and special attention has been paid to them. This was the basis for sustainable theories. Acceptance of the definition for sustainable development from the viewpoint of UN Commissioning which a development is regarded sustainable if it enables to meet the present generation demands without neglecting the future potential for meeting the future generation demands, for the difficulty of determining the future generation needs and demands is faced with some problems. Meanwhile, concerning the sustainability measurement, there are no specific and fixed matrixes which enable us to predict them based on them the present and future condition. In most cases, based on the variable conditions of different countries and different historical eras, special matrixes have been used for measuring sustainability both at local and national level. However, since the late of 1990s , a kind of convergence has been formed for better recognition of different aspects and dimensions of sustainable development and since then the economical, social, political and environmental aspects, have been considered and regarded simultaneously in sustainability studies. The aim of the present study is identifying and designing the analysis process for multi-criteria decision making network in measurement of sustainable development and defining the links between the active and effective factors in this regard, these all have been attained through a careful study of the properties and characteristics, elements and of sustainable development indices in a rural district located in Fasa town ship area of Fars province by the use of Multi-criteria Decision Making Models (MCDM) and Analysis Network Process(ANP) and also the use of Vikor model . With respect to the main purpose of the present study i.e. the use of a proper model for ranking sustainability levels of rural areas, in this paper, with emphasis on sustainable development approach, Vikore model has been used for measuring the sustainability level of economical, social and environmental dimensions of Fasa town ship. For this purpose, firstly the frame work for organizing sustainable indices was presented and then through a brief introduction of the methods and models of measurement, based on the considered aims of the study, the characteristics and features of some of them are presented.

Then by implementing the obtained results, the level of sustainable development is measured through paired comparison in Super Decision software and using Vikor model.

Research Methodology

The method used in this research is a combination of analytical and descriptive methods by using library and field systems. The rural analytical unit is comprised of rural households and experts, that by using Network Analysis Method and Borda technique, the data obtained from collecting the related questionnaires were processed by SPSS and Super decision Software. For sampling, class sampling method was used, in this method, in addition of the population criterion geographical dispersion of rural districts has also been considered. In this sampling method, firstly, specific codes were assigned to the rural households residing at each district. This process has been performed for all households residing at the selected districts. At the next stage, from each district, based on the required samples, the codes' number was selected randomly. Then by referring to rural health care centers, with respect to the existing files of the rural households, the required numbers of samples were selected and finally the questionnaires were filled by snowball method.

Discussion and Results

The results of using Vikor method reveals that this method as a multi- variable decision making method has some advantages, including multi- characteristics optimum theory or non- ranking methods.On such a basis and following calculating the weights by Using Network Analysis Technique and benefiting from Vikor model, the difference of sustainability rate in economical, social and environmental dimensions of rural districts of this township will be determined.

Based on the performed calculations, in which S is the distance of I than the ideal solution (the best composition) and R is the distance of alternative from negative alternative solution (the worst composition) and when V>0.5, then Qi index has maximum agreement. when V<0.5 indicates maximum negative agreement, in total if V=0.5 it means equal group agreement. Ranking results shows that Jarghe village of Sheshdeh and Gare balagh based on the related indices with R=0.0764 , S=0.292and Q=1 has the highest level of sustainability and Novbandan village with R=0.220, S=0.098 and Q=46 has dedicated itself the lowest level of sustainability and other villages are placed between these levels.

Conclusion

Also the overall results indicate that Vikor method for solving the dispersive decision issues based on selecting the best alternative among the existing ones, according to ranking system, has a high capability. Regarding the actions, reactions, and interactions and the interlinks among different criteria and matrixes in different dimensions ,for accurate assessment of sustainability, paying attention to different groups and dimensions of sustainability independent from each other and also using the public and professional views is necessary. In this case, the group decision making method by using Vikor method and questionnaire together with combining the obtained data in ANP model has a high efficiency.

Keywords: Sustainable Development, Ranking of Sustainability, Vikor Model, Rural Areas, Fasa County.

Refrences

1- Birkmann, J (2000).NachhaltigeRaumentwicklung imdreidimensionalen Nebel, in: UVP-Gesellschaft: UVP-Report 3/ 2000. UVP-Verlag, Hamm.

2- Boosle, H (1999). Indicators for Sustainable Development: Theory, Method, Application; a Report to the Balaton Group; IISD; Winnipeg, Monitoba, Canada.

3- Büyüközkan,G., Ruan,D (2008). Evaluation of software development projects using a fuzzy multi-criteria decision approach, Mathematics and Computers in Simulation 77 464-475.

4- Chang,C, Hsu,C,(2009). Multi-criteria analysis via the VIKOR method for prioritizing land-use restraint strategies in the Tseng-Wen reservoir watershed, Journal of Environmental Management Vol 90 (11),3226–3230.

5- Chen, L.Y, Wang ,T.C (2009). optimizing partners' choice in IS/IT outsourcing projects: The strategicdecisionoffuzzyVIKOR, International Journal of .Production Economics, Volume 120, Issue 1.

6- Chu M. T,et al (2007). Comparison among three analytical methods for knowledge communities group-decision analysis, Expert Systems with Applications 33.

7- Chu M., et al (2007). Comparison among three analytical methods for knowledge communities group-decision analysis,Expert Systems with Applications 33.

8- Ewert.F & et.al (2005). Development of a Conceptual Framework for Integrated Analysis and Assess ment of Agricultural system. SEAMLESS.UE.

9- Hardi & Atkisson (1999). The Dashboard of Sustainability; Winnipeg, Manitoba, Canada: Consulative Group on Sustainable Development Indicators and international hnstitute for sustainable development.

10- Hardietal(1997). Mesuring Sustinable Development: Review of Current Practicee; IISD, Canada, Winnipeg, Monitoba,Canada.

11- Inskeep,E (1991) Tourism Planning: An Integrated and Sustainable Development Approach, New York: Van Nostrand Reinhold.

12- Jahanshahloo,G. R, Hosseinzadeh Lotfi, Izadikhah M, (2006), An algorithmic method to extend TOPSIS for decision-making problems with interval data ,An algorithmic method to extend TOPSIS, Applied Mathematics and Computation 175.

13- LEPAE (1998). Towards Indiators of Sustainable Development; Chemical Engineering Department, University of Porto Rua dos Bragas, Portugal.

14- Lihong, M. et al (2008). Improved VIKOR Algorithm Based on AHP and Shannon Entropy in the Selection of Thermal Power Enterprise's Coal Suppliers International Conference on Information Management, Innovation Management and Industrial Engineering.

15- Moffatt I (1996). "Sustainable development, Principles, Analysis and Policy", The Parthenon publishing group, London.

16- Murdoch, Jonathan (1993). Sustainable Rural Development: Towards a Research Agenda; Geoforum, Vol. 24 (3).

17- Nardo,M & et.al (2005). Handbook on Construction Composite Indicators Methodology and User Guide; Statistic Directorate; OECD.

18- Opricovic S, Tzen, G (2007). Decision Support Extended VIKOR method in comparison with outranking methods g, European Journal of Operational Research Vol. 178.

19- Opricovic, S, Tzeng H (2007). Extended VIKOR method in comparison with outranking methods, European Journal of Operational Research 178,514-529.

20- Opricovic,S, Tzeng H (2004). Decision Aiding Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS, European Journal of Operational Research 156, 445-455.
21- Opricovic, S (2009). A Compromise Solution in Water Resources Planning, Water Resources Management, Volume 23, Number 8.
22- Opricovic, S, Tzeng G (2007). Decision Support Extended VIKOR method in comparison with outranking methods, European Journal of Operational Research 178.
23- Opricovic,S, Tzeng G.H (2004). Decision Aiding Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS, European Journal of Operational Research 156 .
24- Prasenjit Chatterjee, Vijay Manikrao Athawale, Shankar Chakraborty (2009) ,Selection of materials using compromise ranking and outranking methods, Materials and Design 30 ,4043-4053.
25- Prescott-Allen, R. (1999) The System Assessment Method Illustrated by The Wellbing of Nations; IUCN/PADATA.
26- Rao,R.V (2008) A decision making methodology for material selection using an improved compromise ranking method, Materials and Design, Materials and Design ,29.
27- Saaty, Tomas L (2007). Fundamentals of the Analytic Network Process, dependence and feedback in Decision-Making with a single Network", Internet search.
28- Sadler.B (1999). Aframworke for Enuirnmental Sustainability Assersment and Assurance.
29- Sanayei A,Farid Mousavi A, Yazdankhah A (2010), Group decision making process for supplier selection with VIKOR under fuzzy environment, Expert Systems with Applications 37, 24–30.
30- Sayadi, M, K., Heydari, M., Shahanag, K (2009). Extension of VIKOR method for decision making problem with interval numbers, "Applied Mathematical Modeling,33 2257-2262,Tehran,Iran.
31- Serageldin,S (1995). Evaluating Environmentally Sustainable Development; in: Evaluation and Development Procedings of the 1994 World Bank Conference,OED,W.D.C,U.S.A;1995
32- Sors, J. C (2001). Measuring Progress Towards Sustainable development in Venice:A Comparative Assessment of Methods and Approaches. Fondazion Eni Enrico Mattei. Italy.
33- Tong, L., Chen, C, Wang, C (2007). Optimization of multi-response processes using the VIKOR method, Intl, adv,manuf Tecnoal, 31: 1049–1057.
34- Wang,T.C, et al (2006). Multi-Criteria Decision Analysis by Using Fuzzy VIKOR, International Conference on Service Systems and Service Management, 2006, Vol. 2.
35- Wei, J, Xiangyi Lin (2008).The Multiple Attribute Decision- Making VIKOR Method and Its Application,Wireless Communications, Networking and Mobile Computing, 2008. WICOM '08. 4th International Conference, Chain.
36- Yu, P. L (1973). A class of solutions for group decision problems.Management Science19(8), 936-946.
37- Zeleny, M (1982). Multiple Criteria Decision Making. Mc-Graw-Hill.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received :20/3/2011 Accepted : 12/10/2011
PP : 5- 8

Modeling Agricultural and Arid Land use Changes Into Built-up in Ardail Urban Region Using CLUE-S Model

Dr. Feridoun BabaeiAgdam
Assistant Professor of Geography
University of Mohaghegh Ardabili

Dr. HosseinEbraheemzadeAsmin
Assistant Professor of Geography
University of Sistan and Baluchestan

Introduction

Rapid expansion of cities, has led to emerging some problems in physical and spatial locations of them. Urban development in the last decades, caused fractal in urban land use which followed by conversion of agricultural lands to urban built up area. Nowadays, activities concerning the land use are the most important challenges of urban and environmental planners to make healthy locations. However, human activities have an important role as a threat for environment that has some negative impacts such as soil erosion, global warming and different pollutions. In small scale, humankind is the key issue on urban extensive land use changes. In most cases, human role in revolution of natural and agricultural structures has been seen which urban development in Ardabil has been followed from this trend. During the last 20 years, urban development within the urban region of Ardabil has been affected from tremendous increase in both population and physical area. Hence, one of the main issues in these areas is the growing trend of land use change to build up regions in urban fringes. This study will be performed to the aim of describing the decrease of the agricultural lands and increase of build up uses within the project horizon and with respect to the past trends. The remarkable thing in this research is combining the benefits of urban development with environmental values. As a result, in this study three land use types of urban region of Ardabil entitled agricultural, built up areas and water levels were analyzed using historical data, then future patterns of land use has been simulated.

Research Methodology

In this research, in order to determine the factors which affecting on the change of agricultural land use to urban areas, documentary method and interviews with the experts of some related organizations such as Housing and Urbanism organization, Province office, consulting engineers company of master and detailed plan and finally academic centers have been used. In order to simulate the future land use patterns in urban region of Ardebil, together with geographic information systems, the Clue-S model has been used. It should be mentioned that, the process of future land use pattern simulation has

followed the hierarchical order, so the first step was defining and indicating the issue. Review and data collection followed as the second step. Conversion of data into the same format as vector, raster, and Ascii was the last step in the process of entering data into Clue-S model. Scenarios definition with respect to the present and future land uses situation, as well as a restriction model and ultimately defining the parameters for running model were provided. For explanation of relationships between land use and factors which affecting them, the cause-effect method was used. On the other hand, statistical analysis of data in SPSS needs to tabular format. Thus, the text files of research variables using Convertor sub model of Clue-S model have been converted to tabular format. For statistical analysis, logistic regression method was used. Running model and calculation of probability maps, was the final step in data processing of research. At each step of the implementation of this model, the spatial pattern of land use will be store in the target drive as Ascii files. GIS packages such as ArcView, ArcGISand Idrisi can be used to see the final outputs.

Discussion and Results

The setting of converting each one of usages to another one is performed with respect to the relation between usages. These settings are specified in a conversion matrix. This matrix defines that land use types in present situation can be converted to another land use types or not. In this study, it is assumed that changing agricultural and arid lands to build up usages is possible and changing the recent usages and water levels is not possible.

Spatial policies and restrictions can indicate areas where land use changes are restricted through policies or tenure status. The CLUE-S model has the possibility to indicate where these area restrictions are located. All files in the installation directory called regi*.* (e.g. region1.fil) will appear in the 'Area restriction' selection box. Active cells should have the value 0, no data cells should have the value -9999 and restricted area cells should have the value -9998.

The rock unit, altitude, slope, slope direction, distance from city center, distance from roads, land types, population density and land price are the main driving forces in land use changes of urban region of Ardabil. These driving forces have been selected using stepwise regression by binary logistic method. After running model, it is possible to produce probability maps of land use types.

Investigation and comparison of logistic regression results and future pattern of land use in two scenarios shows that in the first one, agricultural and arid lands will be decrease in low rate (less than 0.5 percent) until terminal age. While, the other lands will increase in that period. Therefore, built up areas will have nearly 1 percent of development. Justification for development of this land uses, is the probability of continuing investment in this part as fast as possible. While the increase rate of build up uses in the second scenario is 2% and decrease rate of agricultural and arid uses is about 0.8%. Matching this map with the situation of the existing town ships at the south and south west areas of Ardebil indicates the reliability of these places for the coming years.

Conclusion

Conclusions can be addressed as:

1- Clue is a useful tool to model land use pattern of urban areas in Ardabil.
2- Clue is a useful tool to produce probability maps of land use types in case study area.
3- The edition of input and output maps is possible in various software entitled GIS and text processors.
4- The comparison of population density with land use maps proves low rates of gross density and figures of population density in case study which even the recommendation of 87 person per hectare by master plan cannot prevent land use changes in Ardabil urban fringes.
5- The most important land use changes of agricultural and arid lands will be occurred in south and south west regions of city includes Kovsar, Dadgostari, Mokhaberat, Velayat, Naderi and Karshenasan.

Land use changes of agricultural and arid lands to urban built up uses will be inevitable regarding the realities of urbanization in Ardabil urban areas.

Refrences

1- Abedini M. (2008). The analysis of historical development trend of touristic city of Ardabil with emphasis on incorrect land uses of city,Research plan, faculty of humanity and social sciences, MohagheghArdabili University.
2- Abran, Consultant Engineers Company (2002) .Population and urban development studies of Ardabil's water supply project, Power ministry of Iran.
3- Ahadnezhad, M. (2000). Evaluation and modeling of land use changes using GIS, MA. Thesis, TarbiyatModarres University.
4- Asgari A. etal. (2002). Urban land use planning (systems and models), Noor e Elm publication.
5- BabaeiAghdam F. (2007), the analysis of spatial patterns of urban fringes (A case study of Tabriz)PH.D. Thesis, Tabriz University.
6- BabaeiAghdam F. (2008), Modeling land use patterns of Sareyn town at 1400, Research plan, faculty of humanity and social sciences, MohagheghArdabili University.
7- Clarke, K.C. (2008) A Decade of Cellular Urban Modeling with SLEUTH: unresolved Issues and Problems, Ch. 3 in Planning Support Systems for Cities and Regions (Ed. Brail, R. K., Lincoln Institute of Land Policy, Cambridge, MA, pp 47-60
8- Feng, Xu (2004), "Modeling the spatial pattern of urban fringe, Case studies Hongshan, Wuhan" ITC, Enschede, the Netherlands.
9- Feyzizade, B. (2009). Application of GIS and ETM satellite images of Landsat 7 in land use maps production case study of Malekan county, 2nd national geographic conference, Ourmiyepayamenoor university.
10- Feyzizade, B. etal. (2009).Land use change detection using object-oriented classification (Case Study of Andishe Town), GeomaticQuarterly, Vol. 19, No. 99.

11- Jean-Luc de Kok, et al., 2001, modeling land-use change in a decision-support system for coastal-zone management, Environmental Modeling and Assessment 6: 123–132, 2001.
12- Marija J. Norusis, (1999), "SPSS Regression Models TM 10.0", SPSS Inc.
13- Tarh O Kavosh, Consultant Engineers Company (2009) .The master plan of Ardabil, Housing and urban development organization of Ardabil province.
14- Verburge, Peter, Veldcamp Tom and Jan Peter Lesschen, (2002), "Exercises for the clue-s model, Wageningen University. (Accessible by link http: //www.cluemodel.nl
15- Verburge, Peter, Veldcamp Tom, de Koning, G.H.J., Kok, K. and Bouma, J. (1999), A spatial explicit, allocation procedure for modelling the pattern of land use change based upon actual land use, Ecological modelling, 116: 45-61.
16- Verburge, Peter, Van de steeg Jeannette and SchulpNynke, (2005), "manual for the clue-Kenya application." Wageningen University. (Accessible by link http: //www.cluemodel.nl
17- Verburge, Peter (2007), "The CLUE-S model, Tutorial CLUE-S (version 2.3) and Dyna – clue" (version 2), Wageningen University. (Accessible by link http: //www.cluemodel.nl

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 15/3/2011 Accepted : 5/1/2012
PP : 9-12

The Geometrics Parameters and Role of Them in Time - Interval Changes Sequence of Bed Rivers (Case Study: Hor Rood a Sub Basin of Karkhe River in Lorestan Province)

Dr. Mojtaba Yamani
Associate Professor Faculty of Geography
University of Tehran

Siyamack Sharafi
P.H.D Student of Geomorphology
University of Tehran

Introduction

Rivers and streams are fully dynamic systems and their position, shape and other morphological characteristics are changing continually over the time. Due to the bank's erosion and displacement of river banks, every year a great surface of agricultural lands, residential areas and bank facilities are being destructed. Different factors effect on the destruction of river floor and walls, including scour erosion of the banks, erosion and destruction due to entering agricultural drainage and so on. A group of factors such as waterway slope, flow rate, characteristics of bed materials, frequency and flood intensity determines the river morphology based on the time and spatial aspects. In this regard Leopold and Leman divided the rivers from morphological point of view in three groups of direct, meander and arterial. These patterns are also affected by these factors. Among these, meander pattern of the rivers as an effective parameter appears to be essential as a useful parameter to identify the hazards and the ways to conserve the existing resources and capital in different regions. This study investigated the lateral changes of the rivers that in the last years has threaten the communication path, agricultural lands and human structures besides the river banks, Therefore, due to the existence of bank erosion and morphological changes of the under study river, the aim is to study Hor rood River Geomorphology and its changes in a period of 52 years with a focuses on applied fields in different ranges of river engineering schemes. With this objective, identification of effective variables in bed instability for understanding the pattern of the river, changes trend, river path displacement in a long period of time and investigation of the factors and mechanism of bed changes is essential. And it was necessary that critical paths and parts of rivers have been detected concerning the bank erosion on the river. It was adapted by previous studies, calculated geometric parameters and field survey basis.

Research Methodology

In this research, the morphology of Hor Rood River has been studied through the spatial and temporal changes using the quantitative measurements. River plan and its geometric characteristics have been studied through the aerial photographs of military geography organization (1334), satellite images (IRS2007 and Aster2005) with a resolution of 5 and 15 meters respectively and Google earth's maps. To calculate the geometric parameters such as wavelength, sinuosity, radius and central angle of meanders, relative radius, length of the valley and etc in two mentioned period, river path has been

drown in Arc GIS software and tangent circles have been drawn on meanders in the AutoCAD software. After these measurements, statistical comparison between the geometrical characteristics of the two time periods was obtained. By the use of graphical directions, the spatial variations of river path have been identified and compared in past and present. In order to better understand and describe of the river morphology and measured geometric parameters Hor rood River has been divided into four reaches concerning with cross sections and morphological characteristics in each reach.

Discussion and Results

For classification and identification of hydraulic and hydro physic properties of rivers, it is necessary that some characteristics of river has been measured and calculated as quantitative geometric parameters. Geometric parameters such as, 1) wavelength, 2) the central angle of meander 3) meander radius 4) relative radius and 5) sinuosity of the river are some of the main quantitative measurable parameters. In this study, the geometric parameters of the river in 1955 and 2007 time period were measured, compared and analyzed.

Central angle probe in the period of the study shows that three of reaches are developed meanders concerning with Kornis classification method and fourth reach changed from developed meander in 1955 to underdeveloped meander in 2007 due to the mountainous region of the reach. But the averages of central angle of this three meanders has increased in comparison with averages of central angle in 1955. Radius changes of meanders show that the radius of the meanders has decreased from 1955 to 2007 except in reach 1. Sinuosity of the river in the period of the study probe shows that reaches number 2 and 3 were meanders and reaches number 1 and 4 were sinuous rivers in 1955. But reach number 1 has changed to a meander reach since 2007. Changes in wavelength and the length of the river valley shows that average changes in the wavelength and valley length from 1955 to2007 has changed to more than twice and its reason can be depended on high power of the river in soft and alluvial bed than mountainous regions. And also the average amount of wavelength in reaches 2, 3 and 4 has decreased from 1955 to2007. The average amount of valley length in reach 3 from 1955 to2007 has increased. But the average amount of valley length in reaches 2 and 4 from 1955 to2007 has decreased. It means changing rate in these two reaches was lower. Changes in relative radius shows that study reaches of Hor rood River are located in each three kinds of bents and their relative radius from 1955 to2007 has decreased. Reach number 1, is located in confined region. Reaches number 2 and 3 are located in free zone and their relative radius dwindle in 2007 declares decreasing in freeness of bents and increasing pressure on bents but bents in reach 4 are located in confined zone. It means bents are confined in mountainous zone. Bed width comparison in 1955 and 2007 shows that bed width in reach 1 has doubled and in reach 4 there was a little change (about 1meter). There were significant changes in bed width of reaches 2 and 3.

Conclusion

Probe in geometric data of rivers and changes in their shape and regime can shows variation trend in future. Calculated parameters of Hor rood River shows its changes in time series in the study reaches. These parameters show that the most changes has been occurred in reach 1 due to its erodible bed, bed load increase, braided shape and low vegetation cover. Variations in parameters such bed width, number of meanders; wavelength and etc approve the trend of these changes. Although sediment and

water discharge have been increased and slope decreased in reaches 2 and 3, there is lower changes. These changes have been occurred just in upstream of reach 2 and end of reach 3 in some bents which encompasses the meandering part of Hor Rood River. This reaches has been supposed to have the most changes due to sediment and water discharge increase and also slope decrease in reaches which are the most important factors in morphological changes in river. But evidences don't show this issue. Investigations and data incorporation shows fairly strong earth topology in the path of the river is the main reason. Although there is proper condition for bank erosion and morphologic changes in reach 4, the changes are lower and results showed earth strength against erosion, straight path of river and topography effects are the major variables. Thus regarding with river geometric parameters, effective factors in changes of regime and Hor rood River morphology we can infer that changing in reaches 1 through 4 has been decreased but sediment and water discharge have been increased. Overall results show there is no direct relationship between hydrologic factors and morphologic changes and the most effective parameter in morphologic changes and bank erosion of the studied river is river bed and bank material.

Keywords: Geomorphology, River, Hor Rood River, Geometric Parameters, River Changes, Lorestan province.

Refrences

1- Agharazi H, moradi nejad A, goudarzi GH, (2002), Protection of vegetation on the sides of ghareh-Chai River, Markazi Province, Sixth International River Engineering Conference, shahid chamran ahvaz university.
2- Ahmadian yazdi M, (2001), The role of vegetation in erosion control side meander, MS thesis, Rangeland and Watershed Management, Faculty of Agricultural Sciences and Natural Resources Gorgan.
3- Arshad S, saied M, abolghasemi H,(2007), Morphological changes of the river using remote sensing, case study: karoon river(1990-2003), Journal of Agricultural Sciences and Natural Resource, volume 14, number6.
4- Biedenharnd, S., Elliot, C.M. and Watson, C. C., (1977), The WES Stream investigation and stream bank Stabilization hand book, U. S. Army Engineering, P. 268.
5- Chris parker and et al, (2008), The effects of variability in bank material properties on river bank stability, Goodwin Creec, Mississippi, Journal home page.
6- Consulting Engineers, abdan faraz, (2001), Volume II (from hydrology and sediment), The first phase of the ayvashan Dam, West Regional Water, Department of Water Affairs lorestan province.
7- Dulati J, (2008), Geomorphological changes in the middle section of Atrak river with using GIS, MA thesis, faculty of geography, university of Tehran.
8- Gabrielle, CL., David and et al, (2009), The impacts of ski slope development on stream channel morphology in white river national Forest, Colorado, USA- Journal home page, Geomorphology, 375- 388.
9- Geological survey of iran, (1992). scale geological map Khorram abad 1:250000.

10- Ghafari G, solaymani K, mosaedi A, (2006), Changes in the side channel morphology using GIS(babbol rod mazandaran), journal Geographical Research, number 57.
11- Gharib R, masoumi HR, (2006), zohreh river morphology and changes in The hendijan coastal plains, Seventh International River Engineering Conference, shahid chamran ahvaz university.
12- Kornish, MRS, (1980) Meander Travel in Alluvial Streams, (4)35-82 in Proceeding of the International Work Ship on Alluvial River Problems. India. Sarita Prakashan Meerut, New Delhi.
13- Leopold, L.B and M.G, Wolman, (1960) River Meanders, Geological Society of America Bulletin, V 71.
14- Payrovan H, habibi M, vali samani JM, haghi abi AH, (1997), On geometric properties - hydraulic meander ghzel ozone Lower River salmon and morphological changes, Iranian Hydraulic Conference.
15- Petts, G.E. et al. (1986), Historical Change Large Alluvial River, John Wiley and Sons.
16- Rangzan K, (2002), Impact of immigration on the structure of urban rivers in the plains of Khuzestan using satellite imagery, Sixth International River Engineering Conference, shahid chamran ahvaz university.
17- Rangzan K, salehi B, salahshori P, (2008), Changes in the downstream region Karkheh dam after dam construction with using a Land Sat images, Iranian Geomatics Conference.
18- Reading, H. G., (1996), Sedimentary environments: Processes, Facies and Stratigraphy, 3rd Edition, Black well Science.
19- Schumm, S.A. (1980), Planform of alluvial river problems, India, Sarita Prakashan Merrut, New Delhi.
20- Shen, H. W. (1971) River Mechanics, vol., I, and II, Colorado State University, For Collins Colorado.
21- Talouri A, (1992), Understanding of river erosion in the alluvial plains, Research Institute of Forests and Rangelands, 1 edition.
22- Talouri A, (1994), Rivers and their geometric, Research Publications of Agriculture.
23- The Armed Forces Geographical, (1955), Scale aerial photographs 1:55000.
24- The Armed Forces Geographical,(2005), Aster satellite images with a resolution of 15 m.
25- The Armed Forces Geographical,(2007), Aster satellite images with a resolution of 5 m.
26- Thorne, C.R. (2002) Geomorphic analysis of large alluvial rivers, J. Geomorphology, vol. 44, No 5, 203- 219.
27- Yamani M, hossein zadeh MM, noheghar A, (2006), Hydrodynamic babbol and talar rivers and Instability and its role in changing their geometric, journal Geographical Research, number 55.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 25/4/2011 Accepted : 25/1/2012
PP : 13 - 16

Assessment the Performance of Agricultural Cooperatives in Rural Areas Case Study: Khoramabad Township

Dr. Mehdi Pourtaheri
Assistant Professor of Geography
University of Tarbiat Modares

Dr. Mohammad Hossien Papoli
Professor of Geography
University of Tarbiat Modares

Alireza Fallahi
M.S of Geography and Rural Planning

Introduction

In the recent years, agricultural cooperatives have played an important role in rural development through development of agriculture. Researchers are of the opinion that under normal circumstance agricultural cooperatives in the shape of fishing, animal husbandry, aviculture, forestry, beekeeping, flower and plant, play significant role in the provision of services that enhance agricultural development. They described agricultural cooperatives as a medium through which services like provision of farm input, farm implements, farm mechanization, agricultural loans, agricultural extension, members education, marketing of farm products and other economic activities and services rendered to members. Regular and optimal performance of these roles will accelerate the transformation of agriculture and rural economic development. So it seems that the agricultural cooperatives are considered to be the most important organizations that pay attention and try to support the rural development in general and the agricultural development in special through the activities and services achieved for the sake of farmers. Agricultural cooperatives have contributed greatly to the development of modern national and systematized agricultural production-base, helped enhance self-sufficiency of major staple foods, and strengthened farmers' household economy by facilitating market access and competitiveness, adapting their operations to agricultural technological innovations and encouraging democratic decision-making processes, leadership development and education. In the recent years, Lorestan province, especially Khoramabad has witnessed a remarkable development of agricultural cooperatives in rural areas. Although the development of agricultural cooperatives have been attractive in this township, but there is no comprehensive assessment of creating the agricultural cooperatives for achievement of goals of rural development. So, the overall purpose of the study is to investigate whether cooperatives have contributed to positive change in the economic, social and environmental conditions among the two groups of cooperatives managers and members.

Research Methodology

This research is applied-developing in scope and the methodology is descriptive-analytical. The data were collected among the two groups of cooperatives managers (15 managers) and members (123

members) by applying systematic random sampling technique. The scale was developed with 24 items for members and 18 items for cooperatives managers on a 3-point scale. Questions were closed and mainly focused on the economic, social and environmental dimensions, accordingly to the research goals. The selection of these items was based on previous researches and literature review. Reliability based on Cronbach's alpha coefficient for the final scale resulted in a robust value (0.8).Data from questionnaires analyzed by use of One-sample T-test, in SPSS software.

Discussion and Results

Cooperatives are defined as "an autonomous association of persons who unite voluntarily to meet their common economic and social needs and aspiration through a jointly owned and democratically controlled enterprise. Poverty, infrastructural backlog and illiteracy are amongst the most serious factors that inhibit growth of cooperatives in Iran. The present socio-economic challenges facing the poor, particularly in rural areas, encourage people to form cooperatives even if there is no demand for their produce in the marketplace. An agricultural cooperative is considered as one of the important economic and social organizations in rural societies. It plays an important role in the agricultural development and also has a significant role of rural development and poverty reduction as well. Perhaps the most striking finding of this research is the corroboration of one of the major inferences drawn from the qualitative method concerning the importance of agricultural cooperatives in rural development by the statistical results. The results of the one-sample t-test showed that kind of agricultural cooperatives are strongly influenced in rural areas, but the social aspect of agricultural cooperatives had the largest impacts on members. Thus confirming existent literature, and adding new information at the same time, it has been found that social impacts are superior to economic and environmental impacts from view point of members and cooperatives managers. The findings of this study suggest that agricultural cooperatives play a vital role in the socio-economic development of poor rural villages. Agricultural Cooperatives create self-employment and sometimes also temporary employment. In this regards it seems that agricultural cooperatives contribute to members livelihoods by providing some income and food for the families, Also provide space and time for socialization. So, agricultural Cooperatives are depicted as the engines of employment creation, poverty reduction and income generation at rural areas. Although, the study reveals that agricultural cooperatives are a profitable venture in the study area but it appear opportunities still exist for increasing income if the constraints identified by the members and cooperative managers are addressed.

Conclusion

The scope of this study was relatively small (fifteen cooperatives) and local (located in the rural areas in the Khoramabad in Lorestan province) and the results therefore are based on a particular defined study area. The results show that agricultural cooperatives have influenced positively on the socio-economic and environmental conditions in rural communities. These results further show that with government's commitment to working with cooperatives, they can yield greater returns for the people, the government and the nation as a whole. Some of the contributions that different kinds of agricultural cooperatives have created employment creation, income generation, as well as better socio-economic living conditions among members. Agricultural cooperatives are therefore a suitable alternative to eradicate poverty in the rural areas. The results show that from view point of members,

agricultural cooperatives are important organizations for sustaining food security and rural development but they have constraints and limitations in leadership and management. The major constraints identified by the members and managers include; inadequate capital, lack of access to credit facilities and low education. The agricultural cooperatives have failed to attract new members. Majority of cooperatives have 7 or 8 members that are a constraint on the base of cooperative's articles of association. There is significant difference between view point of members and managers about economic, social and environmental impacts of agricultural cooperatives. It seems that the members are satisfied more than cooperatives managers.

Keywords: Assessment, Agricultural cooperatives Performance, Rural areas, Khoramabad.

References

1- Abdel-Seed Mohamed, F.(2004). "Role of agricultural cooperatives in agricultural development - the case of menoufiya governorate, Egypt." Institute fur Agrarpolitik, Marktforschung und Wirtschaftssoziologie Abteilung Welternährungswirtschaft.
2- Bijman, J (2005). "Cooperatives and heterogeneous membership:eight propositions for improving organizational efficiency." Paper presented at the EMNet Conference Budapest, Hungary, September 15-17, Wageningen University.
3- British Columbia. (2005). "Agricultural cooperatives a start guide." Ministry of Agriculture and Food.
4- Clegg, J. (2004). "Rural cooperatives in China." policy and practice, Department of Social and Psychological Sciences, Edge Hill College of Higher Education, Ormskirk, UK.
5- Daman.Prakash(1999) "Social goals of cooperatives," translation of Masomeh Rezaie , ESCAD publication, Tehran, Iran.
6- Deller, S. Hoyt, A. Hueth, B. and Stukel, R (2009). "Research on the Economic Impact of Cooperatives." Project Principal Investigators. University of Wisconsin Center for Cooperatives.
7- Fulton, J. & Hine, S. (2001). "The Economic Impacts Associated with Locally Owned Agricultural Cooperatives: A Comparison of the Great Plains and the Eastern Cornbelt" Paper Presented at NCR-194 Research on Cooperatives Annual Meeting Las Vegas, Nevada USA.
8- Gios, G. (2002). "Agricultural Cooperatives in the County of Trento (Italy): Economic, Organizational and Legal Perspectives", Department of Economics, University of Trento and Alceste Santuari Free University of Bozen, Journal of Rural Cooperation, 30(1), 3-12.
9- Hong,G.&. Sporleder,T. (2007) "Does Social Capital Influence Member Participation in Agricultural Cooperatives? -Korean Agricultural Cooperatives" Department of Agricultural, Environmental and Development Economics Presented at NCERA-194 Annual Meeting.
10- James W. Dunn, Jayson K. Harper, and Lynn F. Kime.(2005). "extension associate in agricultural economics." College of Agricultural Sciences, Agricultural Research and Cooperative Extension, agalternatives.aers.psu.edu.
11- John L. Adrian, Jr., and Thomas Wade Green, (2001). "Agricultural Cooperative managers and the business environment." Journal of Agribusiness:17-33.
12- Kraenzle, C. A. (1998). "Co-ops break supply sales record." Rural Cooperatives 65(6), 4S6. [U.S. Department of Agriculture/Rural Development, Washington, DC.]

13- LEE, K. (2008).”Korean Agricultural cooperatives as a model for development of the Lane County” Terminal project presented to the Department of Planning, Public Policy & Management of the University of Oregon for the degree of Master of Community and Regional Planning.
14- Lin, D. (2006). "FFTC-NACF International Seminar on Agricultural Cooperatives in Asia_Innovations and Opportunities in the 21 Century, Country Report of Taiwan, Associate Researcher Research and Development Division National Training Institute for Farmers' Organization, No. 113, Sec. 7, Chung-San
15- Madane, M. (2003). “Cooperatives and the community cultural.” International Cooperative Alliance, Regional Office for Asia and the Far East. New Delhi.
16- Mahdavi.M & Taherkhani.M (2005)“ Application of Statistics in Geography,”Ghomes Publication, Tehran, Iran.
17- Ministry of cooperation and rural affairs (1974)“The role of agricultural cooperatives in marketing,” Number of 98.
18- Ministry of cooperation (1972)“Principals and Operations of Agricultural Cooperatives,” Tehran, Iran.
19- Olson, F (2002). “New generation cooperatives - who invests?” Quentin Burdick Center for Cooperatives Theron Kibbe, Farm Credit Services Gary Goreham, Nort Dakota State University.
20- Pinto, A. C, (2009).” Agricultural cooperatives and farners organizations - role in rural development and poverty reduction -“ Swedish Cooperative Centre, Development Director Agricord (network of international agro-agencies), Board Member Stockholm.
21- Prakash, D (2003). “Development of agricultural cooperatives -relevance of Japanese experiences to developing countries.” Paper presented at the 14th ICA Japan International Training Course on“Strengthening Management of Agricultural Cooperatives in Asia”.
22- Royce, F. (1996). “Cooperative agricultural operations management on a CUBAN sugarcane farm.” A Thesis Presented to the Graduate School of the University of Floridi in Partial Fulfillment Of the Requirements for the degree of master of science, University of Florida.
23- Taghavi. Nematollah(1997) “Feasibility study of generative employment by cooperatives in E.Azarbaijan; Final report,” Tabriz, cooperation office.
24- Taleb. Mehdi (1998)“ Principals and thoughts of cooperation,” University of Tehran Publication, First edition.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 6/3/2011 Accepted : 12/11/2011
PP : 17- 20

Drought Forecasting Using Neuro-Fuzzy Model, Climate Indices and Time Series of Precipitation and Drought Case Study: Zahedan-Iran

Dr. Mehdi Azhdari Moghadam
Assistant Professor of Civil
University of Sistan and Baluchestan

Dr. Mahmood Khosravi
Associate Professor of Climatology
University of Sistan and Baluchestan

Hossein Hosseinpour Niknam
M.S of Water Engineering
University of Sistan and Baluchestan

Ehsan Jafari Nodooshan
P. H. D Student of Hydraulic Structures
University of Semnan

Introduction

Drought is a complicated phenomenon that arises from lack of rain and increasing of temperature. It may happen in all climates. Unlike flood, finding the beginning, duration and ending of drought is so difficult. It may last for weeks and months to recognize that really the drought has happened or not? Although drought happens fewer than other phenomenon in comparing with other natural disasters, but has dedicated the first rank from the view point of people's life and financial damages. Zahedan as the capital city of Sistan and Baluchestan province has been located in the southeast of Iran. This province is located in a hot and dry region and has a bad situation from the view point of natural resources. Lack of rain together with time and spatial dispersion from one hand and heavy evaporation on the other hand are the main reasons of shortage of water resources in this area. Researches show that Zahedan has the third rank of drought in Iran with 43% of frequency.

Research Methodology

This research uses three variables including precipitation, climate indices and SPI in order to forecast drought. The entire 1951-2007 precipitation data have been gathered from synoptic station of Zahedan dependent on weather organization. These data did not have many gaps. Different statistical analysis such as spearman and runs tests applied on data for checking independency, trend and randomness. Climate indices gathered from NOAA website as second group of input variables. These indices were SOI, PNA, MEI, Nino1+2, Nino3, Nino3.4, QBO, SW Monsoon, TNA, TNI, TSA, WHWP, EPO, BEST, AMO, AMM, NAO and WP. Finally, SPI index, constituted the third input variable as well as the output one. Drought forecasting performed on the base of autumn average of SPI index. For this aim, models have been constructed using Adaptive Neuro-Fuzzy Inference System (ANFIS) method. So, subtractive clustering method has been used for finding neuro-fuzzy rules and optimizing

parameters of membership functions. The Sugeno system with Gaussian membership function applied as fuzzy inference system. Hybrid learning algorithm with epoch of 100 also applied for training of model.

Discussion and Results

In order to forecast autumn drought, the average of monthly SPI in October, November and December in one month scale (SPI-1) in all years of statistical periods was calculated and considered as the predictable parameter or the same similar outcomes . The length of statistical period is totally 56 years (1952-2007), in which 70% of this period (equal to 39 years) was used for training and the remaining 30% of the remaining period was used for evaluation of the constructed models. Input parameters as mentioned before were climate indices, precipitation and previous time series of standardized precipitation index (SPI).

The models were constructed in 4 groups, that each group uses a three months time interval of time series of input variables, including a. Oct-Nov-Dec, b. Sep-Oct-Nov, c. Aug-Sep-Oct and d. Jul-Aug-Sep as input variables time series(with time delays of 0,1,2 and 3 months respectively).

For evaluation of constructed models, different standards such as correlation coefficient (CORR), root mean square error (RMSE) and mean absolute error (MAE) were used. The obtained results showed that each of input variables in one of the said three months intervals has a proper capability for predicting autumn drought. Among the studied 3 months time intervals, the variables which constructed models had minimum error and their correlation coefficients were meaningful at 0.99%, have been selected and presented in the following table.

Lag Time (month)	0		1		2		3	
Input Variable	CORR	Error	CORR	Error	CORR	Error	CORR	Error
AMO			0.65	0.39			0.59	0.4
Nino3	0.75	0.33						
SOI					0.78	0.31		
precipitation	0.97	0.13	0.67	0.39				
SPI index			0.72	0.35				

Conclusion

In the current study, the function of climatic indices, precipitation and pervious amount of SPI drought index were evaluated for predicting autumn drought in Zahedan. For this purpose, the amount of three months i.e. October, November and December of SPI index was selected as the output variable. Then each of mentioned input variables entered into models with lag times of 0, 1, 2 and 3 month (Oct-Nov-

Dec, Sep-Oct-Nov, Aug-Sep-Oct, and Jul-Aug-Sep alternatively). The models have been developed using Adaptive Neuro-Fuzzy Inference System (ANFIS) method and finally the obtained results were evaluated.

Among the input climatic indices, Nino3 in lag time of 0, SOI in lag time of 2 and AMO in lag time of 1 and 3months had the best results. Precipitation, as the other input variable, had the best results in lag time of 0 and 1. Finally, previous time series of SPI had suitable results just in lag time of 1, for predicting autumn drought.

Keywords: Drought Forecasting, SPI index, Climatic Indices, ANFIS, Zahedan.

References

1- Anvari S. (2008), Upgrading Intelligent Models for Streamflow Forecasting Using Distributed Climatic Data and Snow Cover, M.Sc. Thesis, Tarbiat Modares University.
2- Alizadeh A. (2004), Principles of Applied Hydrology, 17th Published, University of Imam Reza.
3- Farrokhnia A, Morid S, Ghaemi H. (2008), Data Processing of Continental Large Scale Signals for Long Period Forecasting of Drought, 3rd Conference of Iran Water Resources Management, Tabriz University.
4- Mahdavi M. (2006), Applied Hydrology, 5th Published, Tehran University.
5- Agnew, C.T. (2000). Using the SPI to Identify Drought. Issue of Drought Network News, Vol. 12, No. 1.
6- Bacanli, U., Firat, M., & Dikbas, F. (2008). Adaptive Neuro-Fuzzy Inference System (ANFIS) for drought forecasting, Stoch Environ Res Risk Assess, DOI 10.1007/s00477-008-0288-5, Springer .
7- Jang, J.-S.R., (1993). ANFIS: adaptive network based fuzzy inference system. IEEE Transactions on Systems, Man and Cybernetics, 23 (3), 665–683.
8- McKee TB, Doesken NJ, Kleist J, (1993). The relationship of drought frequency and duration to time steps, Preprints, 8th Conference on Applied Climatology, January 17–22 Anaheim, California.
9- Morid, S., Smakhtin, V., & Bagherzadeh, K. (2007), Drought forecasting using artificial neural networks and time series of drought indices, International Journal of Climatology, Vol. 27.
10- Nayak, P., Sudheer, K., Rangan, D., & Ramasa, K. (2004). A neuro-fuzzy computing technique for modeling hydrological time series. Journal of Hydrology, Vol. 291.
11- Bagherzadeh K. (2005), Evaluation of Meteorological Signals on Drought Forecasting, Using Artificial Neural Networks in Tehran Province, M.Sc. Thesis, Tarbiat Modares University.
NOAA,(2009).Earth System Research Laboratory.http://www.esrl.noaa.gov/psd/data/climateindices/list/.
12- Pongracz, R., Bogardi, I., & Ducksteinc, L. (1999). Application of fuzzy rule-based modeling technique to regional drought. Journal of Hydrology, Vol. 224.
13- The OFDA/CRED International Disaster Database, (2009). www.em-dat.net .

14- Zounemat Kermani, M., & Teshnehlab, M. (2008). Using adaptive neuro-fuzzy inference system for hydrological time series prediction, Applied Soft Computing, Applied Soft Computing, Vol.8.
15- Iran Weather Organization Website, (2006), http://www.weather.ir .
16- Poustizadeh N, Samani J M V, Dezfuli A K. (2008), River Flow Forecasting Using Fuzzy Inference System, Iran Water Resources Research, Vol. 4, No. 2.
17- Khazaee M R. (2009), Hydraulic of Flow and Sediment in Rivers of Draught Watershed Case Study Kaju River, M.Sc. Thesis, University of Sistan and Baluchestan.
18- Khosravi M. (2004), Evaluation of the Relations Between Atmospheric Circulation Patterns of Northern Hemisphere and Annual Droughts of Sistan & Baluchestan, Journal of Geography and Development.
19- Khosravi M. (2003), The Role of Northern hemisphere Circulation Patterns in Severity and Development of Sistan & Baluchestan Pervasive Droughts ,University of Sistan and Baluchestan.
20- Raziei T, Daneskar P, Akhtari R, Saghfian B. (2007), Investigation of Meteorological Droughts in the Sistan & Baluchestan Province Using the SPI Index & Markov Chain Model, Iran Water Resources Research, Vol. 3, No. 1.
21- Sedaghatkerdar A, Fatahi E. (2008), Prescience Indices of Drought in Iran, Journal of Geography and Development, No. 11.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 28/3/2011 Accepted : 19/1/2012
PP : 21-23

Analysis of Deathly Road Accidents in Novrooz Holidays of Year 2007 with Climatic Approach

Dr. Manochehr. Farajzadeh Asl
Associate Professor of Geography
University of Tarbiat Modres

Ali. Bahooshi
M. S of Geography

Introduction

Road accident is one of the most important causes of mortality in the world and in Iran. About 24000 people lose their life in road accidents. Several environmental factors have great influences on road accidents that the share of climatic factors such as sliding areas, snow, fog and freezing is more. Different researchers have studied the relation between climatic conditions and road accidents and found significant relations between road accidents and climatic parameters. Noroooz holiday in Iran starts from 21 march and continues for about two weeks. In this period, travel of people increases and consequently increases the road accidents. This study tries to analyze and study the effect of climatic factors on 1756 deathly accidents occurred during the 20-days of Norooz holiday in 2008 in the roads with heavy traffic.

Research Methodology

Two different data sets were used in this study including the accident data obtained from Police database for the under study period, the statistics showed that during this time, 1756 deathly accident occurred in the main roads of Iran. The collected data covers province name, police station name, day and hour of accident occurrence and the likes. The second data set; include the data of 140 meteorology stations for all climatic parameters such as precipitation, temperature, humidity and so on. Then the distance of accident points based on km were specified on the axes. Also meteorology data for all the stations after being controlled and prepared were entered in to GIS soft ware.

Discussion and Results

The analysis of climatic conditions in this period reveals that in the 25th, 26th and 29th of Iranian month of Esfand (15, 16 and 19 March) and also 8th, 10th and 14th of Iranian month of Farvardin (28 and 30 March and 3 April) adverse climatic conditions were dominated in most parts of Iran. The analysis of the occurred accidents showed that most of them happened in the first 20Km from the origin between 15 o'clock up to 18 o'clock of local time. In the next step, with respect to the frequency of accident in different days, it was cleared that the number of accidents in the days of 29th Iranian month of Esfand (20 March) and 8th, 9th, 13th and 14th of Iranian month of Farvardin (28 and 29 March 3 and 6 April) has significantly increased. Therefore, it can be concluded that this increase,

except for the days that the number of journeys were increased, was mainly due to the bad climatic conditions in the country.

Conclusion

The result of this study indicates that there is a significant relation between climatic conditions and road accidents in Iran especially during travelling by privet cars. The ability of GIS for analyzing the spatial aspects of accidents with combining descriptive data helps to the evaluation of any point of the country for risk analysis evaluation. The method used in this study can be used in other similar studies and it is clear that the accurate analysis of road accidents in Iran requires a powerful online database in order to decrease mortality rate caused by road accidents.

Keywords: Road Accident, Climate, Norooz holidays, Road, Iran.

Refrences

1- Abytoraby Masod, Rezaey Moghadam Farazad (2010), the Modeking if accident intensity in urban highways, Transportation reseach Journal. No. 1.
2- Arnof,Estan(2005).Geograpgic Information System,translated by Iranian Survay organization,320P.
3- Andresscu Mircea-Paul, Frost David B. (1998). Weather and traffic accidents in Montreal, Canada. Climate Research, Vol. 9.
4- Andri, J and Oley, R.S (2001). The relation between weather and road safety: past and future, Climatological Bulletin, 24 (3).
5- Ayaty Esmaeyl (1992), Iranian road acidents, Mashhad Ferdosi University publisher, 220 P.
6- Azizi Ghasem, Habibi Nokhandan Majid (2005), the study of spatial and temporal distrbution of frost and slides in Haraz and Dirozkoh roads using GIS, Geographycal reseach, No. 51.
7- Bros(1990).The Safety index method of evolution and rating safe benefits,HighwayResearch,Ni.332.
8- Carson and Mongering F (1999). The effects of ice warning sing on ice accident frequency and severity, accident analysis and preventation, No. 33.
9- Edvards Julia B. (1998). The relation between road accident severity and recorded weather, Journal of safety research, Vol. 29, No. 4.
10- Eisenberg Daniel. (2006). The mixed effects of precipitation on traffic crashes, Accident Analysis and Preventation, No. 36.
11- Farajzadeh Manuchehr, Baghada Osman(2005), the evolution of road safety with environmental hazards approach using GIS; study area: Sanandaj- Marivan road, Human scence Jounal, No. 38.
12- Farajzadeh Manuchehr, Gholizadeh Mohamadhosin, Adabi Firozjaei (2010), The analysis of road accident with climatic approach: Karaj- Chalus road, Physical geography research journal,No. 37.
13- Habibi Nokhandan Majid (2005), The study of spatial and teporal distribution of fog and effects on road accident, Geographical research Journal, No, 76.
14- Information Technology office, Road preventation and transportation organization (2006), Satatictics Bulitan.

15- Kamali Gholamali, Habibi Nokhandan Majid (1988), Climat and road safty, Road and travelling ministry publisher, 195P.

16- Karami Shahram, Farajzade Manuchehr (2005), The analysis of road accident with climatic approch using GIS; study srea: Firozkouh-Sari road, Human scence Jounal, No. 32.

17- Kamali Gholamali, Habibi Nokhandan Majid (2005). the studty of spatial and temporal distrbution of frost in Iran and its efect on road transportation, Transportation Journal, No. 2.

18- Keay Kevin, Simoonds Lan. (2006) Road accident and rainfall in a large Australian city, Accident Analysis and Preventation, No. 36.

19- Karl, Kim and Leving; (1996). "Using GIS for Improve highway safety"; Computer Environ and Urban System, Vol.20.

20- 20.Mohamadi Hosin, Mahmodi Pyman (2005), the effects of climatic fenomenons on travelling anf accidents in Sanadaj- Hamedan road, Geograph and Rejional development Journal, No. 6.

21- Norrman Jonas, Eriksson Marie, Lindqvist Sven (2000). Relationships between road slipperiness, traffic accident risk and winter road maintenance activity, Climate Research, Vol. 15.

22- Pyden Marjin, Scorfild Richard, Eslyte Dyvid, Mohan Denish, Hydar Adnan, Jarvan Eva, Maters Colin (2006), world report of preventaion of road traphic accident, translated by Jamshid kermanchy, Mehran Sotodeh, Mohamad Hadi Naseh, Tandis Publisher, 230 P.

23- Yamamoto A (2002). "Climatology of the traffic accidents in Japan on the expressway with dense fog.; 11th international road weather conference, Sappro, Japan case study

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 27/2/2011/2/27 Accepted : 7/10/2011
PP : 24- 26

Determine the Climatic Seasons of Zahedan by the use of Cluster Analysis Method

Dr. Hamid Nazaripour
Assistant Professor of Climatology, Science International Centre, Advanced Technology and Environmental Sciences, Kerman

Dr. Rashid. Saieed Abadi
Assistant Professor of Climatology
University of Oromieh

Introduction

Changeability is one of the characteristics of climatology, and natural seasons unlike the calendar seasons are variable. Therefore, natural seasons have time- spatial changes. These changes are recognizable throughout Iran .Some of natural seasons such as winter and spring are not seen in some areas of Iran, and other seasons like summer are dominant in Iran for a long time. Therefore, summer or winter does not simultaneously occur all over the land as a climatic period. While, certain climatic seasons are limited to small parts, others prevail in land wide. So, distinguishing climatic periods in a region, with regard to climate and surveying the related changing systems are considered as desirable strategy for local and national planning. Also the present research tries to provide a strategy for planning and management of energy in this part of Iran through recognizing the climatic periods of Zahedan.

Research and Methodology

For specifying the climatic seasons of Zahedan, thermal indices from Zahedan synoptic station have been used. These thermal indices including the dry and wet temperatures measured at 00, 03, 06, 09, 12, 15, 18 and 21GMT Time, mean dry and wet temperature, maximum and minimum temperature and mean temperatures on a daily scale, which have been obtained from a 35 years period(1970-2004)from Sistan and Baluchestan Provincial Department of Meteorology. First, by using a MATLAB Software, a P_{m*n} database, with matrix dimensions 12784*24 was developed, in which, the lines m and columns n representing, time (12784 day) and climatic elements, respectively. So, after computing the long-term daily mean for each climatic element, a new 365*21 matrix was developed and standardized. The matrix was used as a reference basis for discerning climatic Seasons or thermal types of climate at Zahedan region. The similarity rate of days was computed on the basis of a Euclidean distance and then the similar days were linked by applying the Ward method. The rational numbers of clusters were also assessed by ANOVA test.

Discussion and Results

The results obtained from this research show that 4 climatic seasons which are prevalent at Zahedan region are distinctively different from those assessed as per the formal calendar. They comprise of 4 distinctive climatic seasons:

1- Cold season. 2- Temperate season. 3-Warm season and 4- very warm season.

The cold season begins from mid January, prevailing up to mid April. Then, the temperate begins, continuing up to early June. The very warm after that starts continuing up to early October. Another warm season appears after the very warm season, lasting up to mid December. Then, another appearance of the temperate sets up, entailing a cold starts. So, the temperate is a period transient through the warm into the cold and vice versa, with two different appearances in the year. Similarly, the warm is a period transient to the very warm, also with two appearances.

Conclusion

The cold seasons or the climatic winter at Zahedan region commences and also ends up later than the calendar winter. This season is not so cold and lasts about 3 months. The temperate season become prevalent before and after the cold and indicating winter tardiness and late commence of summer. In the cold and temperate seasons, temperature changes are extreme during a day. Similarly, the warm also appears before and after the very warm season and then, the temperate climatic season's sets up as a start of the cold climatic seasons, while the warm and very warm climatic seasons are of mild round-the-clock temperature changes.

Keywords: Climate Seasons, Distance, Clustering Analysis, Zahedan.

Refrences

1- Alijani, B (2002). Synoptic Climatology, Samt Press. Tehran. Iran.
2- Alijani, B (1993). Thermal Area of Azarbayjan by cluster analysis technical, the Humanities science Journal of Teachers Training University (Tehran. Iran). Vol. 2-3.
3- Alsop.T (1989).the natural seasons of western Oregon and Washington. Journal of climate.Vol.12.
4- Bankers and Millir. 1996. Definition of the Climate Regions in the Northern Plains Using an objective Cluster Modification Technique, J. Climate; Vol.9.
5- Barry. R.G., Perry. A.H (1973).Synoptic Climatology, Methods and Applications. Methuen & Co Ltd, London.
6- Domroes, M. Kaviani, M, and Schaefer, D (1998). An analysis of regional and intra-annual precipitation variability over Iran using multivariate statistical methods, Theor.Appl.Climatol., 61(3–4), 151–159.
7- Fovel, R.G and M. C. Fovel (1993). Cimate Zones of the Conterminous United States Defined Using Cluster Analysis, J. Climate; Vol. 6.
8- Gerstengarbe.F.W.,P.C.Werner,and K.Fraedrich (1999). Applying Non-Hierarchical Cluster Analysis Algorithms to Climate Classic Edition: Some Problems and their Solution, Theor. Appl. Climatol. 64, 143-150.

9- Ghramimotlagh. A (2004). Climatic Regionalization of Bushehr Province, M.A. Thesis of Climatology. Esfahan University.
10- Huth, R (1996). An Intercomparison of Computer Assisted Circulation Classification Methods, Inter. J. of Climatology; Vol. 16.
11- Jaagus J, Ahas,R (2000).Space–Time variation of climate seasons and their correlation with the phonological development of nature in Estonia. Climate research 15: 207- 219.
12- Jaagus J, Jruu J, Ahas, R and Aasa A (2003). Spatial and temporal variability of climate seasons on the east Europen plains in relation to large scaleatmosheric circulation.Climate research23:111-129.
13- Kalkstien, L. S (1987). An Evaluation of Three Clustering Procedures for Use in Synoptic Climatological Classification, J. Climate and Apple. Meteorology; Vol. 26, pp. 717-730.
14- Lamb, H.H (1950). Type and Spells of weather around the year in British Isles annual trend, seasonal structure of the year, singularities. Q.J.R.M.S, Vol 76.
15- Lewik P.1996. thermal seasons of year in southern Poland. Geographic 102: 355-358.
16- Masoodian S. A and Ataei H (2005). Regionalization of Precipitation seasonal of Iran Using Cluster Analysis, the Humanities science Journal of Isfahan University,Vol 1
17- Masoodian S. A (2007). Esfahan Synoptic Types. Esfahan University Press.
18- Masoodian S.A (2003). Geographic distribution of precipitation in Iran bay rotated PCA, Journal of Geography and Development, 1:79-88.
19- Masoodian.S.A (2005). Regionalization of Precipitation Regimes of Iran Using Cluster Analysis, Journal of Research in Geography, 52:47-61.
20- Mohammadi B and Masoodian S.A (2007). The Relationship between Synoptic Climatic Types of Sanandaj Station with circulation patterns of 500 hap, Iranian Journal of Geography and Development, 9:39-56.
21- Shayan, S (1990). Physical Geography Dictionary, School Press.
22- Yarnal. B (1993).Synoptic Climatology in Environmental Analysis. London, a Primer Belhaven Press. Translated by Masoodian S. A. 2006. Esfahan University Press.
23- Youshino, M.m (1968). Pressure pattern calendar of east Asia, MetRund. Vol 21, PP.162-169.
24- Zolfaghari H (2005). Survey of natural seasons in Kermanshah Province, Iranian Journal of Research in Geography, Vol.20.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 6/3/2011 Accepted : 1/12/2011
PP : 27- 29

The Application of Assessment Indicators of Active Tectonic in Estimating Tectonic Status in Upper Zayandehroud

Mahmood. Habibolahian
M.S of Geomorphology
University of Isfahan

Dr. Mohammad Hosein. Ramesht
Professor of Geography
University of Isfahan

Introduction

Given that Iran is located on the Seismicity belt of Alps-Himalaya and since we occasionally have seen huge and destructive earthquakes such as Bam and Tarom, the investigation and study of active tectonic and assessment of threat and risk of such damages in big cities are very important. Zayandehroud River, is known as the greatest and most famous permanent river of the Center of Iran on which the Zayandehroud dam has been established. Upper part of the river is placed at north east of Chaharmahal o Bakhtiyari province and east of Isfahan province att coordinates of geograhocal longitude of 50◦ ,45′ and up to east 50◦, 53′ and 50 ″ and geographical latitude 32◦, 30 ′ and 45″ up to north 32◦,45′ and 50 ″. This area is part of Sanandaj- Sirjan geological zone.

Research and Methodology

In this research, the erosion and tectonic activities in longitudinal and transversal valleys of Zayandehroud have been investigated in an area of about 400 km^2 using quantitative morphometric indicators, such as Hypsometric curve, Integral of Watershed hypsometric curve, Ratio of width of valley bed to valley elevation, V ratio, river length- gradian in den and topography balance in den.

Discussion and Results

An investigation of these indicators showed that the main valley (longitudinal) of the river was classified as semi-active based on V_f and V ratio indicators. Also according to V_f and V ratio, secondary valleys in the right and left shores of the river had active and semi-active status. Also, results indicated that the studied area was settled in non-active status based on SL indicators, and also according to dis-balance index, left side of the river was more active than the right side. Results showed that for purposes of topography balance (T), north of basin is more active than the south of the basin with low severity. Study area has an adult and old trend according to hypsometric and integral indicators.

Conclusion

General assessment from the integration of indicators indicated that the studied area was settled in semi-active to non-active position from neotectonic aspect.

Keywords: Morphometric indicators, Active tectonic, Geomorphology, Zayandehroud.

References

1- Arian, M. Pourkermani, M (2001). River morphology and active techtonic (Reviewing the current status of Ghezel ozon river in the province of Zanjan), the fifth annual conference of Geological Society of Iran, National Iranian Oil Company and Shahid Beheshti University.
2- Natural disaster institute (2004). First report on seismic zonation of Chahar mahal province.
3- Hajalibeigi, H (2001). Morphotectonic of Tehran basin, MS thesis, Shahid Beheshti University.
4- Davoodian Dehkordi, A (2005). Tectono Metamorphic and magmatic evolution of the zone between Shahrekord and Daran (Sanandaj-Sirjan zone, Iran), PhD dissertation, University of Isfahan.
5- Zolfaghari, M. Peirovan, H. R. Ghayoumian, J. Bouzari, S (2004). investigating the effect of active technotic on the pattern of drainage basins of the southern half of Haj Aligholi (Southeast of Damghan), Twenty-third Symposium of Geosciences, GSI and Mineral Exploration of Iran.
6- Soleimani, Sh (1999). Guidelines on the Identification of active and young tectonics with an attitude toward the long-standing seismology, International Institute of Seismology and Earthquake Engineering.
7- Soleimani, Sh. Zare, M (1999). Investigating Morphotectonic and young tectonic activities in Tehran-Karaj zone, Proceedings of the Third International Conference on Seismology and Earthquake Engineering, Third Volume, Tehran, International Institute of Seismology and Earthquake Engineering.
8- Ebadian, S (2000). Structural analysis and tectonic analysis of Sabzpousshan Taghdis based on Morphotectonic analysis of the area, MA Thesis, Shahid Beheshti University.
9- Karami, F (2002). Investigating geomorphological issues of northern slopes of Bozghoush mountains and Anbashti Sarab flat, PhD Thesis, University of Tabriz.
10- Malek, R (1998). Applying morphometrical parameters in neotecnotic studies of southern parts of Central Alborz, MA Thesis, Shiraz University.
11- Bull W., and McFadden L (1977). Tectonic geomorphology north and south of the Garlock Fault, California, Geomorphology in Arid regions, D. O. Doehring, ed., Publications in Geomorphology, State University of New York at Binghamton, 115-138.
12- Cox R.T (1994). Analysis of drainage basin symmetry as a rapid technique to identify areas of possible quaternary tilt block tectonics: an example from the Mississippi embayment. Geol. Soc. Am. Bull. 106, 571 – 581.

13- Gardner, T.W., Back, W., Bullard, T.F., Hare, P.W., Kesel, R.H., Lowe, D.R, Menges, C.M, Mora, S.C., Pazzaglia, F.J., Sasowsky, I.D., Troester, J. W., and Wells, S. G (1987). Central America and the Caribbean, in Graf W.L. ed, Geomorphic systems of North America: Boulder, Colorado, Geological Society of America, Centennial Special Volume 2, 343-401.

14- Hack J (1973). Stream profile analysis and stream gradient index, U. S. Geol. Surv. J. Res. 1, 421-429.

15- Keller, E. A (1977). Fluvial systems: selected observations. In Riparian Forests in California: Their Ecology and Conservation, Anne Sands (ed.), University of California, Davis, Institute of Ecology, Publication No. 15, Chapter 5, pp. 39-46.

16- Keller E (1986). Investigation of active tectonics: use of surficial earth processes. In: Wallace, R. E. (eds), Active Tectonics studies in Geophysics. Nat. Acad. Press, Washington, Dc, 136-147.

17- Keller, E. A., and Pinter, N (1996). Active Tectonics Prentice Hall, Upper Saddle River, NJ.

18- Keller E. A., and Pinter, N(2001). Active Tectonics, Earthquake, Uplift and Landscape, Earth Sciences Series, Preintice- Hall, Englewood Cliffs, NJ.

19- Mayer, Larry (1986). Tectonic Geomorphology of Escarpments and Mountain Fronts, Miami University.

20- Molin, P, Pazzaglia, F. J., Dramis, F (2003). Geomorphic Expression of Active Tectonics in a Rapidly Deforming Arc, Sila Massif, Calabria, Southern Italy, Dipartimento Di Scienze Geologiche, Universita Degli Roma Tre.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 28/4/2011 Accepted : 25/12/2011
PP : 30- 32

Synoptic Analysis of Rainfall in Atrak and Gorganroud Basins (39 Pervasive Rainfall)

Dr. Mohammad Baaghideh
Assistant Professor of Natural Geography
University of Tarbiat Moallem Sabzevar

Dr.Alireza Entezari
Assistant Professor of Natural Geography
University of Tarbiat Moallem Sabzevar

Fateme Alimardani
M.S of Climatology
University of Tarbiat Moallem Sabzevar

Introduction

Synoptic climatology term was used for the first time in U.S.A Air force at 1940s decade. Their goal of this field is to analyze the previous frequencies of climatic components and forecast the atmospheric condition based on the computations. Synoptic climatology provides useful tools for the researchers in the fields of atmosphere, environment and geography sciences and at the present it is the most rapid way to recognize the relationship between environmental processes and atmospheric cycles. today, the study of relevant different phenomenon of the climate including draughts, severe rainfalls, pollution and storms and . . .by the use of synoptic methods presents a more acceptable results and more reliable predictions. Aatrak and Gorganrood are the most important rivers in northeastern part of Iran and Caspian Sea catchment area. Wide farmlands and numerous cities and towns with considerable population and also different water structures including bridges and dams are located in this area and being affected by the discharge fluctuations.

Since the type and rate of rainfalls has an important and determinant role on the catchment area reactions , knowing the dominant Synoptic patterns may be efficient to forecast pervasive rainfalls or heavy rain falls flood discharge and can be considered and used in different economical activities and planning particularly agriculture, transportation , tourism and ...

Research Methodology

This research from objective view is of applied research and is of descriptive-analytical method. The main data were obtained from National Centre of Environmental predictions (NCEP/NCAR) data base.. In this research, Environment to Circulation technique is used as the initial principle .It means that circulatory patterns shall provide the criteria which are determined based on the environmental variables. In Synoptic analyses, a combination of qualitative and quantitative methods (using maps and numerical data together) have been used.

The processes of classifying and arranging data are performed by the Excel software and also the data analysis process by the use of descriptive and inferential statistic methods, like the factor analysis and clustering have been performed by SPSS software.

Discussion and Results

In this research, environment to circulation synoptic method has been used in the main initial principle. Among the available stations, Five Synoptic stations were selected with suitable dispersion through analyzing the rainfall data, 39 days with more than 7mm of rainfall which were common in all the stations have been selected as pervasive rainy days . This research has been performed by using daily data of sea level pressure (SLP) which were obtained at the area of 12.5◦ up to 60◦ north latitude degree and 5◦ up to 80◦ of east longitude degree with spatial resolution of 2.5 arch degrees were obtained from National Centre of Environmental Predictions (NCEP/NCAR). For each day a 21* 30 matrix was formed and the data of each matrix (each day one matrix) is reformed by the Excel software in to a row, from left to right and 39 rows together formed a new matrix with dimension 630* 39.

The pressure data for the rainy days was summarized by factor analysis technique. After deriving the main factors, factor scores were used in clustering as the main data. The clustering technique classifies all the observations based on their distance, so the similar observations are combined together and more similar observation are combined in the next step. In this research, applied hierarchical cluster analysis by using Ward linkage method in SPSS soft ware was applied on factor scores. Finally the main groups have been formed regarding Environment to circulation curves and based on dendrograms curve of earth surface data, 6 synoptic patterns were derived.

Conclusion

The obtained results from analyzing the derived patterns related to earth surface and upper levels of atmosphere are summarized as follows:

Regarding to the derived patterns of sea level maps, the existence of a relatively high pressure center in the west or northwest parts of Iran and a low pressure center was identified in east of Iran for the rainy days. The contact of the centers together (which are considered as the transitive systems based on the type) may be efficient to provide the area rainfall mechanisms beside to increase the pressure gradient.

The role of the Siberian high pressure decreasing the temperature and increasing the pressure gradient is absolutely obvious for two sea level patterns. Also the north eastern mountains of Iran were efficient to improve the high pressure locally on earth but generally the existence of a low pressure in eastern part of Iran or being located between two low pressure and high pressure center as the under study area was the most important earth surface pattern for rainfalls.

The under study area was located in front of or under a trough based on the derived patterns in 500hp level maps in most rainy days which it makes instable conditions and it also provides ascent factor. Furthermore, the existence of a trough on north of Iran was observed in 500 hp level patterns and the main differences are more correlated with the trough axis deviation and also related to its depth.

Keywords: Factor Analysis, Synoptic Patterns, Clustering, Atrak and Gorganroud Basins.

Refrences

1-Jahanbakhsh S, Zolfaghari H.(2001), The Synoptic Patterns of Daily Precipitation in West of Iran, Geographical Research, No. 36.

2-Arabi Z,(2006), Synoptic Analysis of Precipitation in 12-17 July 1999 Period, in Iran, Geography Researchs, No. 56.

3-Alijani B,(1987), Relation Between Cyclone Tracks and Upper Level Flow Patterns in the Middle East, Geographical Research, No.4.

4-Alijani B. (1993), Ascent Mechanism of Precipitations in Iran Journal of Literature Faculty of Humanities and Science Teacher Training University in Tehran,No.1

5-Alijani B. (2002), Synoptic Climatology, Samt Press.

6-Alijani B. Hoshyar M. (2005), Appropriate Model for the Synoptic Analysis of Cold in North West of Iran, Ms Thesis, Tabiat Moallem University in Tehran.

7-Fathnia A.(2005), Routing and Frequency of Precipitation Systems in West of Iran in (1999-1990) Period, Ms Thesis, Tarbiat Modares University.

8-Lashgsri H. (1996), Rainfall Patterns, Causing Floods in Southwest of Iran, Ph.D. Thesis, Tarbiat Modares University.

9-Masoudian S. (2006), Synoptic Climatology, Sfahan Press.

10-Masoudian S, Kaviani M(2007), Spatial-temporal behavior of Siberian high pressure in sea level . Geographical Research, No. 87.

11-Moradi H.(2006), Flood Forecasting Based on the Synoptic Situation in the Caspian Sea Coast. Geography Researchs, No. 56

12-Najarsalighe M.(1998), Synoptic Patterns of Summer Precipitation in South-Eastern Iran, Ph.D. Thesis, Tarbiat Modares University.

13-Kalkstien,LS.et al.(1987).An Evalution of Three Clustering Procedures for use in Synoptic Climatological Classification.J.Climate and Apple Meteorology.vol,26,pp.717-730

14-Huth,R.(1996).An Intercomparision of Computer Assisted Circulation Classification Methods.: vol:16,pp.893-922.

15-Kahan.R,Ziv.B,Enzel.Y and Dayan.U(2002).Synoptic Climatology of Major Floods in the Negev Desert,Israil. Inter.J.of Climatology: vol . ٢٢, pp.867 – 882

16-Littmann.T.(2000). An empirical classification of weather types in the mediteranian Basin and their inter relation with rainfall, journal of theorical and Applied climatology,66:161-171

17-Robert A.Maddox , faye canova and L.ray Hoxit. (Nov 1980). Meteorological characteristics of flash flood events over the western united stated. Monthly weather review .Vol. 108:1866-1877.

18-Robert P , Harnack, Donald T, jensan and joseph R, Cermak III (1998).
investigation of upper - air conditions occuring with heavy summer rain in utah, Inter. J. of Climatology.18:701-723 .

19-Santos.J.A.J Corte-real and S.M.Leite(2005). Weather regimes and their connection to the winter rainfall in Portugal, Inter.J.of Climatology 25:33-50 .

20-Tamazeiu.R and et al(2005). Winter precipitation variability and Larg-scale circulation patterns in Romania. journal of٧ theorical and Applied climatology,81:193-201.

21-Zangovil A.S. karas and A.sasson(2003). Connection between eastern mediteranian seasonal mean 500 hpa height and sea level pressur pattern and the spatial rainfall distribution over Israel, Inter.J.of Climatology, 23:1567-1571.

Geography and Development
10nd Year- No. 26 – Spring 2012
Received : 3/5/2010 Accepted : 18/12/2011
PP : 33-36

Long Term Hydrological Impact Assessment of Landuse Change on Surface Annual Runoff at the Catchment Scale

Dr. Abdolrassoul Salman Mahiny
Associate Professor of Environmental Science
University of Gorgan

Akram Hosseinnia
M.S of Environmental Science
University of Tarbiat Modares

Seyed Mahmood Ghasempoori
P. H. D Student of Environmental Science
University of Tarbiat Modares

Ahad Tavasoli
M.S of Watershed Management
University of Tarbiat Modares

Mehri Rezayi
M.S of Environmental Science
University of Tarbiat Modares

Introduction

Runoff changes is high due to change in land use and often making model is the only way to evaluate the potential of each area to flood. For simulating of watershed land use change effects, many water quality and hydrology models is developed which usually are integrated with a GIS.

A model of environmental non-point source watershed area (ANSWERS), Soil and Water Assessment Tool (SWAT), agricultural non-point sources (AGNPS), protecting the natural environment of the United States (NRCS) and long-term hydrology impact assessment (L-THIA) model are example of this models.

This models can be used for impact assessment of land use management and other changes on hydrology and water quality. In this study L-THIA model was used for estimating runoff due to change in land use in Chaloos and Noshahr. This model is a good tool for potential impact assessment of land use change on surface runoff and water pollution and has been developed as accessible and rapid tools for using in long –time impact assessment of land use change.

The core of this model based on curve number (CN) which is widely used for estimating the flow behavior in an urban watershed. Using CN equation in the L-THIA is a simple alternative for hydrology complex model that require a lot of data which often are not accessible for more areas. Failure to observe the river privacy and the removing excess sand from the river bottom , upward change in forest land use under the pretext of industrial development in Noshahr and Chaloos cities in addition to disturbance in the upstream Watersheds as result fluctuation in river input ,remind us the possibility of flood risk in heavy rainfall .

Besides this issues, lack of proper urban development plan and uncontrolled heterogeneous construction in addition to making ugly face of the city, create a lot of costs for local people.For instance the costs caused by traffic and the fertile land further degradation and increased pressure on the environment can be named. On this study, long-term effects of land use change and urban development on hydrology conditions has been studied in Noshahr and Chaloos region.

Research Methodology

L-THIA model are estimates the daily runoff for different amounts of CN by using daily rainfall data and the amount of CN afterward total values of daily data were sum and the model estimated the annual runoff which shall be considered as the model output. An analysis assessment of the L-THIA can be used with current and past or proposed land use layers. The Results estimate the effect of current and past or proposed future of land use change on the amount of generated runoff. Land use maps for the period of study was extracted from the classification of satellite images, the class of hydrological groups and soil map created from land resources and suitability maps.

Discussion and Results

Classification of satellite images showed that the highest percentage of change is related to residential landuse .The town have increased from 40.14 in 1987 to 38.32 square kilometers in 2001, Increased 125 percent in residential area lead to decrease in other landuse. The greatest decrease with 48.36 refer to river privacy and the lowest decrease related to forest (82.3- levels) changes Percentage in landuses like agricultural, garden and woodland and bareland respectively is 42.7-, 49.21- 23.23

Conclusion

L-THIA presents the result of runoff model as raster map of depth and runoff volume, investigation the runoff depth map showed increased 17 . 3 mm height of the runoff in the studied basin in the period 1987-2001. Runoff volume Map is calculated on cubic feet in each cell. Based on cell size (28 mm), runoff volume is increased about 8 .145 cubic meters per cell, including 566 . 31 km watershed area, increased total runoff volume produced in this period will be about 9 .7 9 million cubic meters.

As a result of this research land use changes during the studied period (2001-1987) lead to increase 125 percent in residential area. Spatial growth of urban due to growth population is natural, but this development can be a threat while reduce river privacy with 36.48% and the gardens and tree filled with 23.23%.

The results of the L-THIA model in Noshahr and Chaloos cities with regard to the strong trend of land use change during the study period, with dominance of change in river privacy, tree field and gardens to residential land use increased 1 . 23 mm average depth of runoff equivalent to 707 . 89 thousand cubic meters per year.Growing residential areas and wasteland along the decrease in tree field , gardens and agricultural areas in the short term, will be necessary the proper scientific management and control, as well as observance of sustainable development in the areas .On the other hand it is important to note that using the same rain fall data in model performance for watershed in 1987 and

2001 clearly indicate the land use role in runoff variation after the remove of rainfall fluctuation. Should be note that the result of L-THIA doesn't predict the event in the certain year but crate a general insight to long term hydrology effect due to different land use scenario.

Using Model for managers and planners provides the opportunity to control and manage the event before incidence. According to result L-THIA model have acceptable ability to expression of land use change impact on volume and depth of runoff according to different scenario .this model with providing runoff spatial distribution map create the possibility of identification the point with high disaster risk and flood zones as well as flood management .Priority of watershed sub basins for control flood is another capability of this method furthermore the results illustrates acceptable performance of L-THIA in management and planning of land use and runoff control in studied area. While the use of this model for other areas with different topographic and climatic characteristics of is recommended, with regard to some limitation in model result it is important to considered to great number not to the exact amount of them

Keywords: landuse change, runoff modeling, L-THIA, Nowshahr and Chalous.

Refrences

1. Alavi nia M, Nasiri Saleh, F.(2011). Create CN maps based on runoff simulation results using a semi-distributed hydrological model. Fifth National Congress on Civil Engineering.
2. Chio W. and Deal B. M. (2008). Assessing Hydrological Impact of Potential Land use Change through Hydrological ang Land use Change Modeling for the Kishwaukee River Basian (USA). Journal of Environmental Management
3. Choi W. (2007). Estimating land-use change impacts on direct runoff and non-point source pollutant loads in the Richland creek basin by applying the L-THIA model. Journal of Spatial Hydrology Vol. 7, No. 1
4. Cowden J. R., Watkins D., Croley T. E. (2006). Investigating Urban Land Use Effects on Runoff by Using theDistributed Large Basin Runoff Model. The World Environmental and Water Resource Congress 2006 Examining the Confluence of Environmental Water Concerns Environmental and Water Resource Institute American Society of Civil Engineers. Omaha, Nebraska,
5. Engel B. A., Choi J. Y., Harbor J., Pandey Sh. (2003). Web-based DSS for Hydrologic Impact Evaloation of small Watershed land use changes. Computers and Electronics in Agriculture vol.39
6. Ghaffari G, Ghodoosi G, Ahmadi H. (2010). The effect of landuse change on watershed hydrology response (Case Study: Zanjan River Basin), Journal of Soil and Water Conservation Research, Vol.16, No.1
7. Gholamalifard M. (2006). Present the assessment Spatial model supply and demand of land for the urban landfill using urban dynamics model in GIS. the thesis of MS. Tarbiat Modares University. Department of Natural Resources and Marine Sciences.

8. Hosseinnia A. (2007). evaluation Quantitative of surface water variation by using urban development planning method (SLEUTH model)in Nowshahr and Chalous , Iran, the thesis for Master of science of Environmental ,Tarbiat Modares University, department of Natural Resources and Marine Sciences
9. Khaliqhi Sh, Mahdavi M, Saghafian B. (2005). The effect of land use change on flood using NRCS case study areas Barandaz tea weast Azarbayjan, Journal of Natural Resources, Iran, Vol. 58, No. 4
10. Lim K. J., Engel B. A., Tang Z., Muthkrishnan s., Choi J., Kim K., (2006). Effects of calibration on L-THIA GIS runoff and pollutant estimation. Journal of Environmental Management .vol. 78
11. Pandey S., Gunn R., Lim K., Engel B., Harbor J., (2000). Developing a Web-enabled Tool to Assess Long-term Hydrologic impacts of land-use change, information technology issues and a case study. URISA Journal Vol. 12, No. 4
12. Perry P., Nawaz R. (2008). An investigation into the extent and impacts of hard surfacing of domestic gardens in an area of Leeds, United kingdom. Landscape and Urban Planning vol.86
13. Saadat H, Gholami Sh A, Sharifi F, Ayub zadeh S A. (2006). Investigation of land use change Effects on surface runoff simulation using a mathematical model SWAT. Iranian Journal of Natural Resources, Vol. 59, No. 2
14. Tang Z., Engel B. A., Pijanowski B. C., Lim K. J. (2005). Forecasting land use change and its environmental impact at a watershed scale. Journal of Environmental Management .vol.76
15. Tong S. T. Y. and Chen W. (2002). Modelling the relationship between land use and surface water quality. Journal of Environmental Management.vol. 66
16. US Department of Agriculture, Natural Resource Conservation Service, (2007). National Soil Survey Handbook, title 430-VI, available online: http://soils.usda.gov/ technical/handbook/
17. Wang Y., Choi W., Deal B. M. (2005). Long-term Impacts Of Land Use Change on Non-point Source Pollutant Loads for St. Louis Metropolitan Area, USA. Environmental Management.Vol. 35.
18. Whitford, V., Handley, J., Ennos, R., (2001). City form and natural process indicators for the ecological performance of urban areas. Landscape Urban Plan. Vol.57.
19. Yang L., Ma K., Guo Q., Bai X. (2008). Evaluating long-term hydrological impacts of regional urbanisation in Hanyang, China, using a GIS model and remote sensing. International Journal of Sustainable Development & World Ecology. Vol.15.