

Measurement of stability indicators in urban residences (A case study: ChaharBagh neighborhood in Sanandaj city)*

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Abstract— With respect to current situation of the world, it is predicted that almost a half of global population will reside in urban areas with the advent of 3rd millennium. Investigation and identification of downtown neighborhoods and their problems in terms of sustainability and sustainable development in cities can be helpful in improvement of living quality and growing sustainability over downtown neighborhoods may prevent many urban problems, particularly those related to irregular physical development. To this end, in current research we have evaluated sustainability indicators in ChaharBagh neighborhood in Sanandaj City. The indicators of study in this neighborhood include: socio-cultural, economic and physical ones. Research methodology is analytical-descriptive and data collection was conducted through documents, field studies and questionnaires. Findings suggest that Chaharbagh Neighborhood doesn't have suitable sustainability conditions.

Keywords— Sustainability, neighborhood, ChaharBagh, sustainability indicators, Sanandaj

I. INTRODUCTION

Increasing growth of urbanism and establishment of novel standards of urban development during recent decades has encountered contemporary cities and urbanism with new challenges. As there are different dimensions and changes in the nature of urban issues and their complexity, it is inevitable to have a general view about different aspects of this issue to sustainably solve it. Meanwhile, focus and attention of urban planning and management are more and more directed to lower and tangible levels of urban life [1]. Sustainable urban development seeks to preserve resources for now and future through optimal use of land to incur the least wastes into non-renewable resources. Among the most important topic of this approach we can refer to preventing from pollutions of urban and regional environments, decreasing production capacity of local, regional and national environments, supporting waste

recycling, establishment of competent local governments, increasing participation, not supporting harmful developments and removing gaps between the rich and the poor. Sustainable development theory and approach investigates sustainability of urban forms, sustainability model of residencies and effective transportation models with respect to fuel consumption [2]. In order to achieve sustainable cities, sustainable neighborhoods are already necessary because neighborhoods as the smallest urban divisions are considered building blocks of cities. Urban management and municipalities, performing their duties in neighborhoods, can be helpful in sustainability of neighborhoods. This is felt more and better after raising neighborhood-based approach for neighborhood management [3]. To this end, sustainability of downtown neighborhoods must be considered more than before because growing sustainability of such residencies may prevent many urban problems, particularly those concerning irregular physical development of cities. As a result, in current study we have evaluated sustainability of Chaharbagh Neighborhood in Sanandaj city.

II. THEORETICAL CONCEPTS

A. *urban sustainability*

Rogers states the concept of internal urban sustainability as follows: a city should have capability to supply social, economic, cultural, political, physical and environmental goals of its residents. He also describes features of such a city as equal access to and availability of basic services for all residents, aesthetics in terms of art and architecture, creativity in human activities, efficiency of use of natural resources, minimum ecological impacts, variety, integrity, and mobility and integrity [4]. Camagni comments that a sustainable city is where mutual relations among its economic, social and environmental dimensions are so arranged that general positive features are much more than the negative ones [5]. In order to achieve sustainability, efforts must go further beyond physical structures. If the city is going to have a correct function, it is essential to focus attempts on all aspects from physical environment and social institutions to paler cultural aspects which significantly affect our perception of

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neighborhoods and the whole urban communities [6].

B. *Urban neighborhoods*

A neighborhood is known with a wide range of definitions and concepts. A general definition of neighborhood is as follows: a residential neighborhood is the smallest area for planning where its residents have common social entities and public facilities and where they walk [7]. A neighborhood can be defined with different dimensions. For example, in physical terms, it is defined by given and specified walls, paths or borders, in social terms by perceptions of its local residents, from functional aspect with service areas, from environmental aspect by traffic conditions, quality and security and in aesthetic terms by features or a specific age.

We can also count a neighborhood as an urban area allocated to a specific function. In regulations concerning the divisions of the country, a neighborhood is described as a collection of residential and service-providing buildings the residents of which consider themselves from there in terms of social context. Each neighborhood is formed by a number of building blocks separated by communicative networks. Neighborhood limits follow municipal divisions and through joining a number of neighborhoods, an urban district is formed. Regarding this definition, in many cases, legal and legitimate neighborhoods do not conform. Legal neighborhoods follow urban divisions and their borders are dependent on the structure and streets of the city while in legitimate (common) neighborhoods, an intermediate between common features and social factors of the neighborhood is defined [8].

C. *Sustainable neighborhood*

Robert Cowan believes that a sustainable neighborhood is where there are buildings and spaces with human scales, a network of local streets and squares, a combination of mixed local uses for vitality of streets and open spaces, daily services and facilities with the minimum negative impacts on the environment, feeling of attachment to the place and means to encourage people to feel responsible for the neighborhood [9]. However, we should point out that no comprehensive and standard definition has been presented for sustainable neighborhood. It can be said that the concept of sustainable development is not clear yet for neighborhood scale and its dimensions have not been seriously analyzed [10]. One important reason can be associated with spatial, cultural, social and economic differences in each country. As a matter of fact, there is no single definition for sustainable neighborhood because every location has its unique features, structures and opportunities [11]. However, standards presented regarding sustainable neighborhoods in different nations do not vary that much.

III. RESEARCH HISTORY

Sustainable urban planning is based on this fact that the atmosphere of a city is established and continues within neighborhoods. Detailed concepts and considerations concerning sustainable development and its application in designing and presenting procedures for residential regions have attracted less attention compared to similar cases regarding transportation planning and industries organization [10]. Taghvayi et al (1388) conducted a research on sustainable urban planning process and capability of neighborhood development. Their results suggest that in Kalkatachi neighborhood (an old neighborhood in Tabriz), there is residential capacity for more than 40% growth in population against current situation merely through capacities of the existing infrastructures and the abandoned spaces in the neighborhood.

Azizi in an article, a case study on Narmak neighborhood under the title of “sustainable neighborhood” considers the following characteristics for a sustainable residential environment: identity, vitality, dynamism, adaptability, variety, availability, accumulation and tolerable capacity of the neighborhood.

In an article “comparative study of neighborhood concept and role (in Iran) and neighborhood unit (in western countries)”, Seghat-Al-Eslami&Aminzadeh (1390) suggest that changing the physical structure of the neighborhood, entrance of vehicles and ease of their movement across residential contexts have knocked down physical texture of historical neighborhoods, especially neighborhood centers and have formed checkered textures in the new neighborhoods where neighborhood domain has weakened [12].

IV. METHODS

A. *The study region*

Chaharbagh neighborhood is located in Sanandaj ,the capital city of Kurdistan ¹province. This neighborhood located on the north-eastern side of the old texture was a big garden and place for recreation which was established following the order of the 1stKhosrow Khan Ardalani in 1818 and was changed to Chaharbagh by four streets. Later, it went under construction and during recent decades, old residents have evacuated this neighborhood due to rush of rural people. Generally, relationship among its people is a combination of urban and rural relations. The center of this neighborhood has lost its form due to layout of streets and now it serves in the area because of urban services. This neighborhood is bounded to the north by lower Jourabad and to the south by AghehZaman neighborhood. This neighborhood ends in Chaharbagh street from the north, in Taleghani street from the west and in Dey 28th street from the east. Chaharbagh

¹ Kurdistan is one of the Iran` provinces

neighborhood is located in the central part of Sanandaj.



Fig.1 Chaharbagh neighborhood in Sanandaj

B. Analysis of data

This is a descriptive-analytical research of applied-developmental type. Data collection was conducted using library-documentary and field studies including questionnaire and findings were analyzed using the results. GIS software was used to produce maps and plans.

C. Research indices

Different factors may contribute in urban sustainability which can be categorized into different dimensions. In current article, we examine sustainability of Chaharbagh neighborhood from economic, sociocultural and physical aspects.

Table I dimensions and indices for evaluation of neighborhood sustainability

Dimensions of sustainability	index
economic	Occupational grouping (profession type)
	Household income
	employment
sociocultural	Household dimension
	Percentage of literacy
	Spending leisure time
physical	Type of constructional materials
	Quality of buildings
	Per capita income

V. INVESTIGATING AND MEASURING SUSTAINABILITY INDICES IN THE AREA OF STUDY

A. Sociocultural sustainability

Household dimension

With a population about 2689 people and 697 households in Chaharbagh neighborhood, household dimension in this area would be 3.86 people which with respect to 3.73 people among urban households in 2006 all over the country show that it does not have a suitable status against national average.

Percentage of literacy

According to the existing census data, 85.69% of population in Chaharbagh is educated. Totally, of all educated people, males with 52.33% literacy had a better status compared to females.

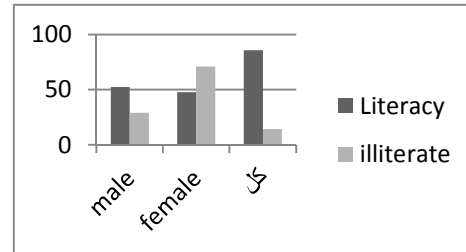


Fig. 2 literacy level in Chaharbagh

Spending leisure time

Today, urban centers, in addition to their main function (the center of superior urban activities and functions), serve as a symbol and arena for social interaction, manifestation of collective memories, civil life and social identity of citizens. Regarding their socio-cultural contribution, these centers have a close and direct relationship with leisure time activities. Studies suggest that leisure time activities and also suitable facilities are inadequate in Chaharbagh so that one of the major challenges of this neighborhood is lack of leisure activities. We also can refer to low physical and functional quality of such activities which at no cost respond to current demands of local people. The majority of people living in this neighborhood were not satisfied with availability of leisure facilities and recreation centers (about 60%). Accordingly, we may evaluate Chaharbagh neighborhood very poor.

B. Physical stability

Type of constructional materials

Investigations demonstrate that a high percentage of buildings in the neighborhood were made with cheap and short-lived materials. Only 10.49% of total buildings were built with durable materials.

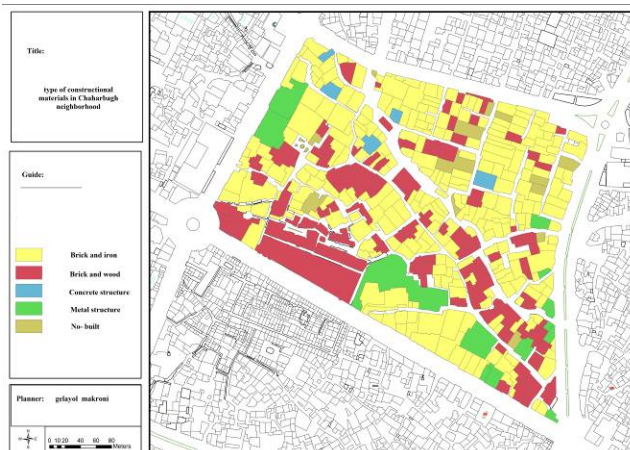


Fig.3 type of constructional materials in Chaharbagh neighborhood

Table II type of constructional materials in Chaharbagh neighborhood

skeleton	number	area	percentage
Brick and iron	279	66521	59.27
Brick and wood	110	30047.7	26.77
Metal structure	13	10092.72	1.5
Concrete structure	5	1689.20	8.99

quality of the buildings

Through investigations on the quality of constructions we concluded that 54.1% of buildings are durable and new and the other 45.9% lacked the suitable quality.



Fig.4 quality of the buildings in Chaharbagh neighborhood

Table III quality of the buildings in Chaharbagh neighborhood

quality	number	area	percentage
New-built	7	2141.24	1.9
Repaired	115	32362.16	28.83
Ruined	1	47.06	0.04
Maintainable	204	58576.35	52.2
Destructible	80	15223.88	13.56

Share of land uses

Chaharbagh neighborhood has an area over 139083 square meter and a population of 2689 people. According to field studies, the share of land uses can be stated in the following table.

Table IV land uses and their share in Chaharbagh neighborhood

Land use	Area	Percentage	Share
Residential	61117.28	24.32	22.72
Mixed residential	15273.62	6.07	5.68
Commercial	24837.32	9.88	9.23
Educational	1320.56	0.52	0.49
Religious	3855.70	1.53	1.43
Tourism and reception	867.65	0.34	0.32
cultural	1078.53	0.42	0.40
Idle	3628.15	1.44	1.34
routes	26868.22	10.69	9.99
Green space	236.13	0.09	0.08
Total	139083.16	100	51.68

Source: field deduction of the writer

As it is obvious in the above table, in all land uses, there is a significant difference between the existing uses and common shares of urban plans and among the shares of current situation, residential land use, 22.72 square meter has taken the highest percentage.

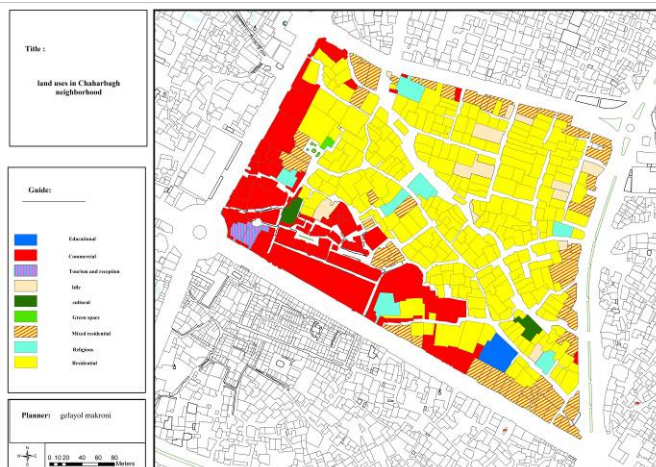


Fig.5 land uses in Chaharbagh neighborhood

C. Economic sustainability

Employment

Among the critical standards concerning economic sustainability we can refer to employment level and unemployment percentage. To this respect, the first indicator we examine in Chaharbagh concerning economic sustainability is employment standard in this neighborhood. As it is clear in the following table, over 62.21% of population in this neighborhood had no income.

Table V employment level and unemployment percent in Chaharbagh

	Number	Percent
employed	686	28.57
unemployed	214	8.91
studying	701	29.19
With income without a job	157	6.53
housewife	579	24.11
other	64	2.66

Type of occupation

A high percentage of people in this neighborhood are engaged in primitive jobs including peddler or jobs that do not need skill or expertise. Only 5.32% of local residents have specialized occupations. 4.31% are employed, 29.41% are engaged in industry and related jobs and 25.21% in primitive professions.

Household income

Collecting economic information has consistently faced challenges and failure. According to results, the majority of families in this place have low income living under poverty line (poverty line in 2010 was 9460 thousand Rials) (Pezhoyan, chief of urban household competition council). Based on the existing questionnaires, 78.2% of residents are under nutritional poverty line in terms of meat consumption.

51.26% of these people use less than half of minimum meat and 21.14% take less than one fifth of minimum meat a month. In addition to the aforementioned issues, many families get less than 6,000,000 Rials a month and average income in this neighborhood is 9,250,000 Rials.

VI. CONCLUSION

Unlike other kinds of development, local development shares a longer history and has experienced much more fluctuations in development and planning references. Thought and knowledge revolutions in planning on one hand and social changes on the other have made local development our everyday debate [13]. To this end, local sustainable development can be considered a prerequisite for urban and regional sustainable development. In current work, we examined sustainability level of Chaharbagh Neighborhood in Sanandaj city using physical, economic and sociocultural indicators. According to findings and field observations we can state that Chaharbagh is categorized as a non-sustainable neighborhood with unsuitable status in terms of sustainability. Defining and allocating clear tasks to specific management authorities leads to higher local and urban sustainability. For example, larger integrity and unity in allocating and performing physical tasks by municipality across regions and neighborhoods has facilitated more effective and coordinated management activities at different levels of policy-making, planning and doing physical-spatial affairs. In contrast, managerial differences in economic and sociocultural affairs are visible across different areas and neighborhoods of the city and there is no special authority to respond to such differences. So we can't expect urban management to be appropriately effective in this regard. In order to realize the necessary sustainability for each dimension and indicator of sustainability, we have to define specific tasks and allocate them to given organizations based on their nature and integrity and coordination principles. This process can be regarded as a requirement for management to promote urban and local sustainability and evaluate performance of urban management in the field of sustainability of urban development.

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The evaluation of Mehr housing plan of Baharan Township Project with approach toward urban sustainable development

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Abstract— Evaluate and analyze the impact of urban development projects is one of the affecting factors in leading cities toward sustainable development. Mehr housing Projects in Iran is one of the housing policies that recently has been implemented in order to supply supported home to low-income people of the society. Although this project led to provide many houses for a large segment of low-income households, but inattention to its environmental, economic and social consequences have faced cities sustainable development with challenges. This paper followed assess the effects of Mehr Housing projects on urban sustainability indicators. To this aim, challenges that was created in the way of urban sustainable development due to Mehr housing implementation, identified with descriptive and analytical methods. Required data and documents of the paper collected through library studies, referring to the relevant administrative organizations, questionnaires, face to face interviews and field survey as research tools and operational solutions. Assessment indicators were collect through reviewing the relevant theoretical contexts. Study, analysis and assessment of Mehr housing indicators in Baharan town in Sanandaj city as the case study, shows that Mehr housing project in economic and environment fields is relatively acceptable, in social field is not acceptable and its implementation process is largely incompatible with the principles of sustainable urban development.

Keywords: Evaluation of Mehr housing, housing policy, economic, social and environmental consequences, sustainable urban development.

1. INTRODUCTION

The housing is not solely a shelter, but it is a group of physical elements and human values for life. In other words, a shelter may not only meet human needs. Shelter and housing may be assumed as the main foundation and body for formation of human communities since the housing has been one of the main elements in construction of cities after

requirement and necessity of building of residence along with public and military constructions and economic element (market). Formation of housing is a function of cultural, climatic, economic, living and technical conditions of structure of a user community. But the concept of appropriate housing should be sought not only in physical and matrix dimensions, but within the framework of biologic, cultural, social, economic, security needs and requisites for the inhabitants of that community. Meeting of need of housing for low- income social class has been noticed within various policies in development plans (Shieh, 2001). Government's effort to meet this basic need has been noticeable in recent years. Policy of right of exploitation from the land in which deletion of land price from the final costs of construction has been taken into consideration is an effort that will certainly produce positive outcomes in Housing Sector and balance of land market if it is noticed from all its aspects. The primary point of Mehr Housing Projects started throughout the country since 2007 and then it began with Provision 6 of Budget Law in 2007.

One of the reasonable ways to achieve goals of sustainable development is the evaluation of the effects of developmental activities and it may serve as a planning tool available for planners, directors, and decision-makers according which the potential effects in all aspects to be known as a result of execution of civil projects and sustainable development and to select the logic options to solve them. This necessity is felt more regarding Mehr Housing Plan since:

1. It has been executed throughout a wide range;
2. It is concerned with vulnerable social classes (lower deciles);
3. It deals with the paramount need for the people i.e. housing.

As a result, it requires review on quality and type of providing land in Mehr Housing Project both in goals and after their execution.

The studied zone is situated in Sanandaj city from Kurdistan Province (Iran) and at southwestern point of city in Baharan new township so that whereas this point is included a part of

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the areas along Abidar Range thus loading soil and excavation will be too difficult in this region. Similarly, it includes a type of environmental destruction. Of the problems in this plan one can refer to economic and social issues since this plan is not cost-effective due to a lot of unevenness of land and huge volumes of excavation. Whereas this housing plan is of apartment type construction as a result several group of people should live together with various tastes and culture so it will create numerous problems. With respect to this primary recognition of this plan in which the principles of sustainable development have been considered in primary goal for Mehr Housing Plan but it has not been appropriately executed in practice. Now, to review this assumption, the main question is that:

- Are the objectives of policies in Maher Housing plan based on urban sustainable development?
- By which factors does the policy of Mehr Housing plan affect on urban sustainable development and how can you evaluate these impacts?

2. DEFINITIONS

2-1- Evaluation

Evaluation is acquisitive trend in which it is tried to provide reasons and evidences for advantages and disadvantages of the subsidiary plans and to take new approaches toward better alternatives. As a result, evaluation is a certain process, which is done in order to improve and enhance life of community members (Hosseinzadeh Dalir; 2009:22).

2-2- Tasks and performances of evaluation

Evaluation has several performances out of which one of their foremost is to achieve a rational and reasonable trend and purposing of solutions. Such trend will be realized through constant review on the consequences of suggestions of projects on various groups and adjusting them with the goals of plan. Of other roles that evaluation may play in urban plans is to prepare the needed information for planning and making new decisions for improvement of urban space. In this dimension, the evaluation is like an activity that put the needed information permanently at planners' disposal and shows the proper direction.

One of the major techniques of classifying evaluation activities is related to time of its execution, which is divided into three kinds of evaluation based this classification (Hosseinzadeh Dalir; 2009:23):

- Evaluation before execution
- Current evaluation or during execution
- Final evaluation or after execution

2-3- Development

Development is a process of change and transformation during which all community and human system move toward creation of better and humanistic society. Development does not only include economic dimension, but it also comprises of social system, political organization, and finally some of disciplines, which lead human behaviors. Unlike growth that is a quantitative issue, development is a qualitative subject and whereas the values depend on appropriate and given conditions in any community and there is no global model to measure values thus accordingly concept of development has theoretical and value-driven aspect that varies from one society to other society and from time to another. In other words, value-driven attitude of individuals is important in definition of development order in any society (Zangiabadi; 2007).

2-4- Urban sustainable development

The concept of urban sustainable development is what Pitter Hall has introduced it as follows: "It is a form of today development that guarantees potential for constant development of cities and urban communities for next generations." (Hall; 1993:22) In terms of matrix, urban sustainable development means some changes, which are exerted in land use and density levels to meet city-dwellers' requirements regarding housing, transport, leisure times, and nutrition in order to keep the city inhabitable for life in terms of environment (clean air, healthy drinkable water, lands and ground and underground water supplies without pollution etc.), and durable economically (the coordinated urban economy with technical and industrial changes to maintain basic jobs and to provide appropriate and affordable housing for inhabitants with fair taxation per capita), and correlated socially (lands use model will enhance social correlation and citizens' sense of belonging to heritages of cities) (Saeedi Rezvani, 2013).

2-5- Housing

Rather than physical conditions, concept of housing covers housing environment totally as well including all the needed and necessary services and facilities for living of family and employment, educational, and healthcare plans. In other words, housing is something more than only one physical shelter and it comprises of all needed public services and facilities for better life and the relative long and secure right of possession should be reserved for its user (Poormohammadi; 2000:3).

2-6- Mehr Housing (Plan)

Mehr Housing Plan was presented by the government as one of the paramount efforts made by Islamic Republic Ninth Government in the course of providing appropriate housing proportional to need of low-income community deciles, which have been yet deprived from receiving government

facilities for housing. The main components of Mehr Housing Plan, which consisted of assigning right of exploitation from land and allocation of construction loan, were continued in IR Tenth Government. Paying attention to policies of IR Ninth Government in providing appropriate housing for members of nation, especially low-income classes was put as the priorities in plans for those governments. Rather than emphasis on this important subject, Clause d following to provision 6 of Budget Law (2007) purposed several strategies to achieve the

determined objectives, including land long-term leasing with the framework of right of exploitation from public lands in order to lower cost of housing unit and to delete price of land plus final cost of the housing unit. The implementation instruction for executive procedure of Clause d of provision 6 from Budget Law (2007) was notified by Ministry of Housing and Urbanization in order to execute goals of the given plan and by minister of housing and urbanization on 04/07/2007.

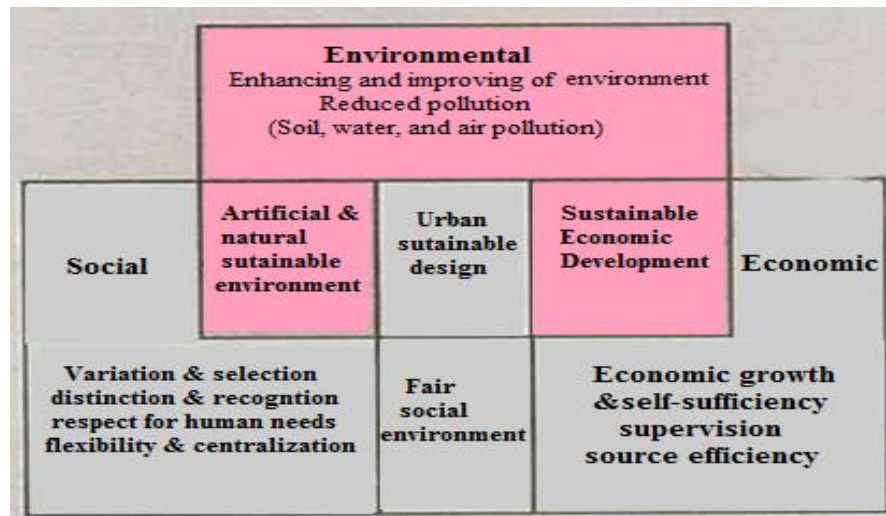


Fig 1. The general goals and elements in urban sustainable design (Carmona, 2002).

3. THEORETICAL BASES

3-1- *Presuppositions of urban sustainable development:*

In the course of realization of urban sustainable development, some conditions should be prepared to provide the platform for human sustainable development and improvement of citizenship social welfare where in such a ground, one can refer to establishment of social justice (Haravi; 1997:99-110), the coordinated climatic design with human environment (Bahraini, Shiite; 2001:25), improvement of social correlation structures like commitment and accountability, strengthening of social and family foundations and revival of public environment (Bahraini; 1999:34), and creation of structural order in urban space to perceive urban aesthetics and legibility (Kevin Lynch; 2002:12-34), and improvement of exploitation from urban spaces and rising of citizenship satisfaction (Bahraini; 1999:98-129) and sector integration to environmental visual structure and urban landscape (Gordon, Kalen; 1998:64-90). The parameters of sustainable development should cover dimensions of sustainable development. For example, based on 21 chapters of working agenda, parameters of sustainable development are: social parameters, economic parameters, environmental (ecological) parameters, and fundamental parameters (Maleki; 2011:16).

3-2- *Urban sustainable development and land*

Land is a factor of natural production, place of settlement, and implementation of economic and social activities and national capital for humans. The land is the most basic factor in urban development and construction of housing and for this reason one could not ignore this rare and valuable good. Lesser attention –and sometimes paying no attention- to land policy may be one of the important reasons for inflation in land and housing sector in our country. Whereas human is a opportunist and profit-seeking creature and individual opportunisms contradict to public interests of the society, the individuals pursue their own interests without paying attention to public interests and needs. As a result, the governments should take measure and intervene to provide public interests and to prevent from economic rent and speculative deals on land (Majedi; 2004).

3-3- *Urban sustainable development and housing*

With respect to definitions of urban sustainable development, it is seen that provision of housing is considered as one of essential social requirements for human and it is considered in planning for urban sustainable development by the planners. Likewise, the relevant reviews on land uses in various cities suggest that residential uses play more role than other uses all

the times (Abbaszadegan; 2009). W. Blinco A. states: residential uses have greater share more than other uses in formation of an urban sustainable development. While 40% of total urban lands are allocated to housing and each of two other groups of land use namely open spaces and industry includes only 20% and 10% of lands, respectively. Thus, housing is considered as important aspect of land use planning.

3-4- Mehr Housing Plan and urban sustainable development

After approval of prospectus in series and seriously in line with realization of objectives in the given project, Housing Foundation has made every effort by means of its high

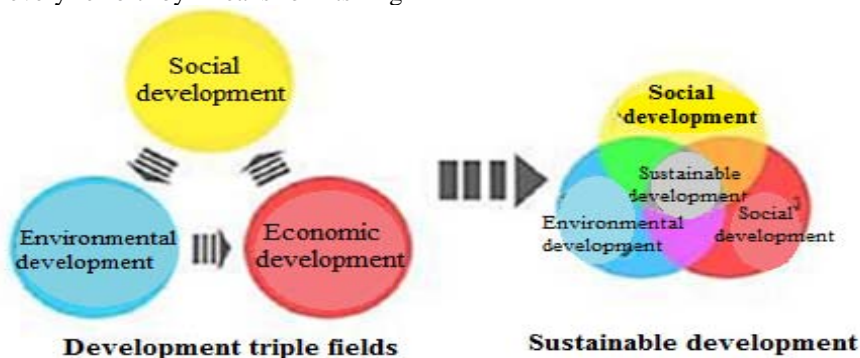


Fig-2: Triple fields of urban sustainable development

3-5- Environmental factors and Mehr Housing Plan

3-5-1- Provision of land

In addition to coordination with province housing council, provincial housing and urbanism organization shall estimate the rate of land shortage with respect to total number of the qualified applicants in any city and with respect to regulations of the approved upstream projects it should provide it based on preference by:

- 1) Public lands with residential use, which are located within the zone of cities including the lands, belonged to Ministry of Housing and Urbanization and other governmental bodies where they are owned by in execution of the law for organization and protection from production and presentation of housing. Furthermore, the lands with above-said specifications are preferred within the old constructions.
- 2) The non-public appropriate lands inside the zone of cities through agreement with project as subject in Article-5 commission and or in parallel with Article 7 from law regarding organizing and support from production and supply housing;

potential and wide system of departments and branches throughout towns and cities of the country and interacted with housing bank as a payer bank for facilities in housing sector and they have already collaborated with them widely to the extent that in many cases and with comment from housing foundation has added several provisions and riders to accelerate and advance the project before their execution where some of foremost one of them in terms of stability as follow (Ahari and Amini Jadid; 1996):

- 3) Exchange of non- public residential lands situated within cities zone with public lands (with any type of use)
- 4) Purchase of non- public residential lands situated within cities zone provided that it is proved the land is not effective through above methods;
- 5) The appropriate governmental lands within the borderlines of approved city zone;
- 6) The appropriate non-public lands for residential use connected to the approved borderline by agreement and purposing the subject in housing and urbanization workgroup;
- 7) The public lands situated within zone of settlements inside cities zone and or suitable lands in terms of establishment residential townships outside this zone with preference. (An abstract from exclusive rules and regulations and instructions of Ministry of Housing and Urbanization, National land and housing organization and its affiliates, and Ministry of Housing and Urbanization, and National land and housing organization of Iran)

3.6- Economy and Mehr Housing Plan

Some researchers believe in that before execution of Iran Targeted Subsidy Plan, in the case of lack of Mehr Housing

Plan, this law was not successfully executed and failed. Prosperity of Mehr Housing Plan during last year has practically prepared appropriate platform for successful implementation of Iran Targeted Subsidy Plan and it serves as the condition for this achievement and perfectly execution of law that is subjected to continuance of prosper Mehr Housing Plan. One could summarize advantages of Mehr Housing Plan within state economic system framework in a general classification in the following (Rafiee; 2003):

- ✓ Reduction of inflation
- ✓ Creation of economic growth in various sectors of industry and services
- ✓ Wide and disperse employment
- ✓ Reduced share of housing cost in family cost portfolio
- ✓ Improvement of availability index cost

3-7- Social dimensions and Mehr Housing Plan

One of the major problems in planning system of various countries and especially Developing Countries is the provision of housing for low- income social classes. The Articles 31 and 43 of Constitution of Islamic Republic of Iran have stipulated "Possession of housing commensurate with one's needs as a right of every Iranian individual and family." Similarly, the preference has been allocated to underprivileged class and workers in this respect. As a result, the needed housing can be provided for this group of social class by taking this policy and prevent from formation of more social problems and informal textures and settlements (Azad Armaki, 2009).

4. THE CASE STUDY

The studied zone is located in the areas nos. 18 and 21 at southern and southwestern points of the city. The main texture of these regions, which has been constructed during recent years, is called Baharan Township (Phase-II). This area is located on the western mountains of Baharan Township that have special topography.

In this locality and based on the land assignments several projects have been prepared and offered and approved in sessions of "5-Committee". Some the foremost samples of these projects, which have been reflected in detailed plan are as follows (Tadbir Shahr Consulting Engineers, 2011, Detailed Plan of Sanandaj City):

- Preparation plan for lands of Sanandaj Mehr Housing Township relating to Mehr Housing Cooperative Union of Sanandaj with area of approximately 112 hectares along total number of 6044 housing units in 7-storey blocks;
- Topological site if flat blocks in Baharan Mehr Housing Project (Amended plan);
- Project of Rohaniyoon (Clergymen) Housing Complex in Baharan Township with land area of 18'000sq.m and 240 housing units as 4-storey blocks and pilot;
- Project of housing complex with 144 Mehr Housing Units and land area of 14016 m².

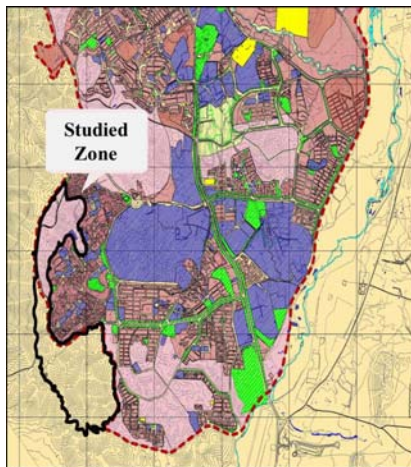


Fig 3. Lands ownership map

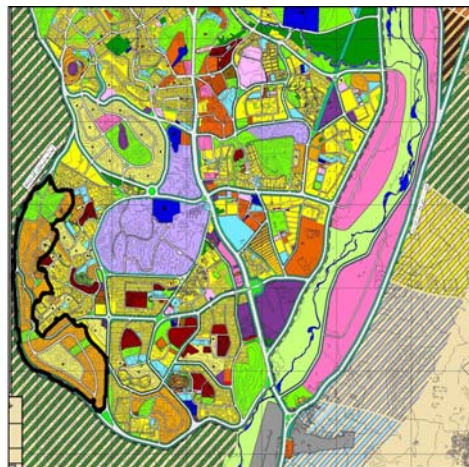


Fig 4. Land use map

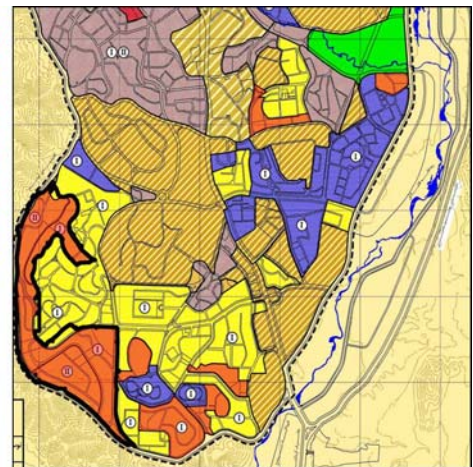


Fig 5. Future development map

According to the proposal for the master plan in the given lands, this plan was called Development Lands (Fig 5) and if it necessitates and provided that it has detailed plan, use of residential apartment with high density (maximally 6 stories) has been suggested (Fig 4) and at the same time some part of

them was allocated to green space. It should be noted that proprietorship of these lands has been mentioned national and private (Fig 3). For this reason, these lands have been used at maximum level of application to construct Mehr Housing Project there. With respect to what it mentioned, it is seen that

the residential use with apartment mixed density has been offered for the given lands in the master plan and some areas of them were allocated to green space as well (Tadmir Shahr Consulting Engineers, 2006, Detailed Plan of Sanandaj City).

5. DATA ANALYSIS (Evaluation of Sanandaj Mehr Housing Project)

5-1- Economic

5-1-1- Economic evaluation of plan topology

The main strategy of plan for transferring right of long-run lands exploitation as 99-year leasing is aimed at omission or deduction of land cost from housing total cost. It is a point that should be taken into consideration. Land cost does not mean only possession cost, but it is considered for all needed costs until exploitation from the land for construction as some part of land cost.

Whereas in the given lands in Mehr Housing Plan the lands are considered as national resources, which are located at the piedmonts of the highlands and they are highly steep gradient and or encounter with matrix and morphological problems thus preparation of land practically creates noticeable cost so often the cost of land preparation may be equal to cost of lands possession costs. As a result, plan strategy regarding deduction of land cost is not realized from housing final cost and it may be typically forgotten. The project of Sanandaj Mehr Housing with 7600 units has been located inside urban zone of Sanandaj city in Baharan consistent township at southern side of this city. As a result by considering high costs, which have been paid for several dependent parts of project including excavation, land leveling, and construction of new access route to Mehr Housing Site, the important goal for execution of Mehr Housing Project in Sanandaj has not been realized because of receiving these costs from the people. The head of Agriculture- Jihad Organization of Kurdistan Province attributed the reason of incurring high costs of construction by Jihad Nasr Company (executive for excavation, street and curbs construction for Sanandaj 7600-unit Mehr Housing Project) to land condition and topographic situations in this project and stated: In this project, a mound was destroyed and the needed land area was provided for housing units by this operation so higher trend of cost is a natural issue. Mohammad Ebrahim Hassannejad (Eng.) expressed: All facilities and potentials of Jihad Nasr Company have been spent for leveling of lands and thus its costs are higher than those companies, which the leveled lands are at their disposal. According to him, Jihad Nasr Company has so far spent more than 120 billion Rials in this project while Union of Mehr Housing Cooperatives only verifies about 70 billion Rials of these costs. So if the related officials do not cooperate with us this means 50 billion Rials loss for Jihad Nasr Company. It is noteworthy that in Sanandaj 7600-unit Mehr Housing Project, excavation and construction of housing

units were done slowly due to inappropriate topology and placement of project site on a mound and hill (Islamic Republic News Agency (IRNA), news code: 30135516, dated 21/12/2010).

5-1-2- Reduced inflation

Housing market witnessed 30 percent reduction in price with execution of Mehr Housing Plan. This phenomenon was unprecedented during four decades of frequent periods in recession and rising inflation. This reduction of price was due to the existing 1.5 million applications for housing market and reduced motive in speculators. 30% reduction in housing price and its fixed rate during two years play essential role in reduction of national public inflation for rising price and rushing speculative demands during execution of Iran Targeted Subsidy Plan in land and housing market so it might be due to its special conditions (Habibi; 2010).

5-1-3- Creation of economic prosperity and growth in various industry and service sectors

World economic recession and its widespread throughout domestic markets and political conditions in 2009 have caused reduction in economic growth at this country. Due to controlling housing price at general level during several recent years and relatively its reduction and conversion of housing from a capital good into durable consuming commodity, execution of Mehr Housing Plan caused reduced speculation attractiveness in this market and on the other hand rising of attraction of capital market (Bourse). This phenomenon caused rising growth in Bourse Index and breaking its record by exceeding higher than index of 20'000 units. In fact, Mehr Housing Plan controlled land and housing market that acted as an unrivaled market for investment and it created balance among national economic macro markets. In addition to above-said point, the rising speed of housing construction and increased number of construction licenses during the last year caused growth in several relevant industry and service sectors to housing sector due to Mehr Housing Plan. Due to higher coefficients of post and pre-relation with other national economic sectors, especially in industry and service sectors, housing sector is one of the economic impetuses. The wide construction workshops in Mehr Housing Plan throughout the geographical zone of this country including villages, small- and -medium- sized cities, and metropolises and megalopolises with 1.5 million housing units have caused economic growth in several related industry and service sectors.

5-1-4- Wide and dispersed employment

Construction sector is the second entrepreneurial sector of the country. The estimations suggest that 5.3 million jobs have been created directly and indirectly by execution of Mehr Housing Plan in cities and rural housing renovation from October 2009 through October 2013 so it necessitates not only

this trend not to be descending in next year, but also they should have ascending trend.

5-1-5- Reduced share of housing cost in family portfolio

In average, share of housing cost was 325 in families cost portfolio before execution of Mehr Housing Plan. This figure was up to 70% of fixed income of family sponsor for low-income families in megalopolises. The share of housing cost reduced to less than 29% in average in household cost portfolio. The share of housing cost, which was more than 50% for low- to medium- income groups - Mehr Housing applicants- reduced to less than 33%.

5-1-6- Improvement of accessibility cost index

Accessibility cost index for housing denotes that given total annual income after how many years a family can own housing unit. This index was 11 for Iranian families before execution of Mehr Housing Plan so that the given index was reduced to 4 for applicants of Mehr Housing Plan, who included mainly the low- to medium- income families by considering possession of 100sm gross substructure and 3million Rials per square meter as this cost (totally 300 million Rials.) and with respect to their annual revenue while the accessibility index is 5 in those countries, which succeeded to solve these problems.

5-2- Environmental (ecologic) evaluation

5-2-1- Environmental evaluation of topology for Sanandaj Mehr Housing Project

Topology of Mehr Housing Plan construction projects should be accurately designed from several aspects, particularly their situation and distance from the city and related infrastructures. Whereas cities growth moves gradually on time bed the needed mechanisms are planned in providing the necessary inhabitation conditions in the joint regions to urban zones during long run horizon so it seems that the instant and remarkable increase width of cities may severely overshadow the reign of balance development and its monitoring and control. In particular, the amount appropriate lands for planning in cities zone and their surroundings is followed by some restraints. Thus, it seems that lands topology for execution of Mehr Housing Plan should considered the above basic point that is followed by increase in cities zone and expensive costs and often some irrecoverable consequences. Hence, rising of this area in cities zone may result in abnormal growth of city in the short term so urban sustainable development will not be definitely realized.

With respect to the above-mentioned points, there is no dispute in this respect because the location for construction of Mehr Housing Plan has been selected within the urban zone of Sanandaj and this measure can be evaluated as positive move. But it seems that adjacency of this project to Baharan Township may have negative impacts on spatial organization

and sustainability of township since Baharan Township is currently evaluated as one of the successful townships in western Iran that it has moved preparedly toward growth and development since 1990s. The performances of this township have been improved during recent years.

Non- dense development and villa-type constructions were some of strategic goals in this township. But over the time this goal was gradually sidetracked and it was forgotten and complex construction with high density, including these Mehr Housing Projects, distorted regional development trend. Thus, paying no attention to this problem regarding topology of lands for 7600- unit project of Mehr Housing Plan has caused the sustainable life of Baharan Township to be seriously threatened. The special attention and considerations by urban officials and directors to reduction of adverse effects of this topology may be deemed valuable in prevention from negative effects in urban symptom.

5-2-3- Lands topology in respective of urban development plans

Organizing of housing plan by allocation of land and its discordance with urban development plans and projects is one of these paramount deficiencies in all urgent plans and especially at national scale. In fact, it is tried in these types of plans to use public lands and whereas as usual state-owned lands mainly include lands of national resources and barren lands in cities outskirts thus the residential and anticipated complexes in Mehr Housing Plan are mainly located in margin of city as well and even they are distant from the main texture of city and lack the appropriate functional and spatial relation with the existing urban texture. The majority of the anticipate lands in Mehr Housing Plan is situated in cities outskirts and outside their zone and it is seen for several times that in order to access to city main region, the next inhabitants of these complexes have to inevitably pass through the access routes among cities. In general, it may be implied that no technical study has been totally conducted for topology of lands and the selected lands lack the vital properties of urban textures. It should be noted of course that if technical studies are done, the appropriate alternatives are so restricted, which technical study will not be practically feasible.

Moreover, whereas lands preparation plan is only provided at time of execution of this plan and no measure is made usually to revise guide, master, and detailed plan of city thus the predicted plan may be practically converted into a heterogeneous symptom in the approved urban development plan. Lack of prediction of the needed serving uses, incompatible system with city spatial divisions, non formation of locality concept, lack of access to urban spaces, and services at macro level etc are some problems, which occur in Mehr Housing Plan and urban development projects due to lack of coordination among the anticipated systems. Similarly, these plans may impose extra and unexpected burden on

infrastructures and even reduce infrastructures as well as decrease efficiency of network and or lead to reduced use life and their premature burnout.

5-2-4- Matrix- ecologic evaluation of Sanandaj Mehr Housing Plan

Sanandaj city is situated in mountainous region that is totally surrounded by heights. The approve zone of Sanandaj city master plan is located among eastern, western, and northeastern mounts and also most of the lands inside city zone are also located on mounds and its surrounded lands as well. Therefore, no fine land can be highly found for construction in housing sector in Sanandaj city. Alternately, according to policies of Mehr Housing Execution Law, in order to provide lands for long-term leasing, some of the following methods are employed:

- Use of public lands at disposal of Ministry of Housing and Urbanism;
- Use of national land at disposal of public organization except for Ministry of Housing and Urbanism like natural resources organization etc;
- The agreed lands if it is agreed with personal owners and legal proprietors ;
- The lands at disposal of IR Housing Foundation as a non-state public institute

Such lands are mainly located in Sanandaj city in some points, which lack appropriate quality. Nevertheless, the lands, which selected for Baharan 7600- unit project of Mehr Housing Plan, include an inappropriate land plot with highly steep gradient in piedmont. Thus several excavations with great expenses were done for its exploitation and land preparation to construction of residential blocks. The size of this excavation is so high that it can be easily said that a mount with its grandeur disappeared with one year round-the-clock operation.

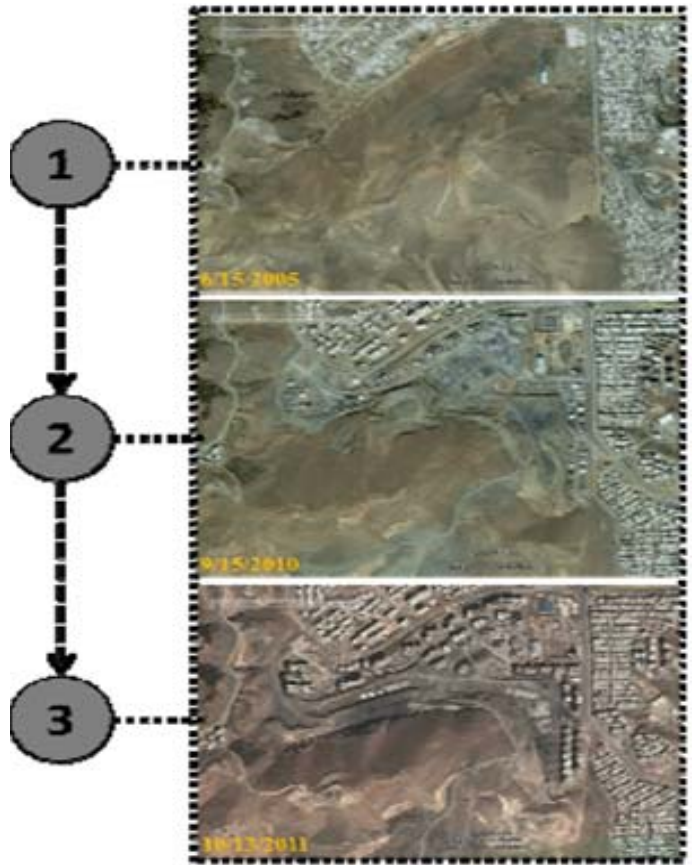


Fig -6: The progress trend of Mehr Housing Project and huge size excavation

As we know, the natural views are divided into view from outside to inside as well as from inside to outside. The view from inside to outside point are usually concerned with natural landscapes and surrounding heights of urban texture. 7600-unit Mehr Housing Project site is located at the base of a high mount to which the views from inside-to- outside Sanandaj Baharan Township mainly lead to it. Before start of working of this project, 22-Bahman axis route had a very beautiful natural view toward this mount. But with startup project operation and the conducted huge excavations, this potential view disappeared and unsuitable urban view was created. Rather than creation of an unsuitable view for this city through excavation and leveling this land, it has caused interruption in order of nature as well. The excavated volume of soil from this site should be transferred finally to another place. Replacement of soil from one point to another may automatically disrupt the order in regional ecosystem. Thus, this time instability is transferred to other place. At last, with respect to the created disorders as a result of human manipulation in the nature and unsuitable view and landscape caused by execution of this project, process of implementation

of this project is not evaluated positively in matrix and ecologic sector.



Fig-7: Prevention from inside-to-outside view and including view toward Abidar Range- Huge size excavation and destruction of hard mounts

5-3- Social and cultural evaluation of Mehr Housing Project

Paying attention to local and cultural conditions and various tastes of applicants is one of the important subjects in rising of demands and success in any plan that is seen more rarely in Mehr Housing Projects. Various types of housing are not only related to kind of view and residential requirements can be identified and planned with study on cultural conditions in any city and region where this is more rarely observed in Mehr Housing Plans, especially the regulation of 75sq.m substructure for any housing unit. Regardless of applicants' various conditions, mass construction in the form of buildings with more than 3 stories, which were increased to 10 stories as well, this issue is included in this class.

Sanandaj city Mehr Housing projects are dispersedly constructed throughout this city at present (June, 2013). With respect to the published statistics about Sanandaj detailed plan, the greatest project is 7600-unit Mehr Housing project at the northern part of Sanandaj Baharan Township where by considering the data from Statistics Center on Iran regarding average number of 4 members for a family in Iran, only 30'400 people will live in not- so wide living space with high density in this project and this is possible if each of these families immigrates from their primary settlement with its specific conditions and situation to new place of living with which they had not been familiar. They will be settled in one story and construction unit along with those individuals, which they had never seen them before and they are stranger regarding their temper. Some of rural people may immigrate from the villages near the city to this place. Certainly, a great number of this people had lived in villa- form houses with private sessions. Most of them have not been yet familiar with joint living. They have lived with their own thoughts, ideas, customs, and views. They have provided their living requirements under the governing former conditions and they have been adapted ecologically with the same trend. But now they are located in a new environment after delivery of residential units where all objects have been modernized and became new and all the previous relations have been

substituted. They are located in housing units with are of 60-75sq.m and after a while they may be disappointed by small size house and they have no longer access to outdoor and open space and staircase and elevator of this building are the only available open space for them. They are replaced in a setting where face of all people is new and strange. The previous social relations existed in their former living place, no longer exist currently. The people are faced with new cultures, which may be in conflict with each other. Living in such a climate may be boring and tiresome per se. it is predicted that that people, who have lived in various environments differed from the space of Mehr Housing units for several years, will suffer from depression. It is possible to types of social abnormalities occur including moral corruption inside flats as we witness them in apartment complexes today.

The population of Baharan Township is mostly composed of educational class of the community and space of this township to which the population of Mehr Housing units has not been added at present is away from traffic and congested people. But it is anticipated that with settlement of 30'000 people from Mehr Housing project, current security and comfort and welfare to be turned into anarchy and crowd and to disrupt social balance and uniformity of this region due to immigration of population from various and several social strata and classes.

6. The paramount impacts of this policy on city future development trend

6-1- Economic

1) Rising of costs for creation of urban utilities and facilities and administration

Although according to Article three of bill, Ministry of Housing and Urbanism and land assignment organizations are responsible for supporting from housing production and supply (Mehr Housing Plan), other side- costs of this policy, which will be generally incurred by municipalities as well, is a

subject that it is probably seen throughout metropolises in terms of scale, but it is important for small-sized cities where the municipality encounters problems for providing its current lower costs as well and it pins hope to contributions and aids from the relevant organizations and including organization of municipalities and county executive offices. With respect to report of Sanandaj city master plan in 201, during these years the annual revenue of municipality was 180'000Rials that never meet the current and rising requirements for development and construction in Sanandaj city (Tadbir Shahr Consulting Engineers, Sanandaj City Master Plan Report, 2011).

2) *Rising of transport cost in household portfolio*

With rising distance among residential setting and workplace, particularly in development sites and distant from the center of town or main city, transport cost is increased in families portfolio and some other costs are imposed to them such as wasting time, spiritual- mental stress due to transport within long distant routes, the problems caused by lack of sense of security (especially for women etc.) and the like. With respect to this point that approximately 98% of official, commercial, and servicing centers are located at the center of city and outside Baharan Township, the estimated 20'000Rial at least for transport cost per day for any person and only a round trip to center of city may indicate the rising transport costs in family portfolio.

6-2- Ecologic

3) *Disruption of urban current levels and funds per capita*

Although there is no position for final determination of land use and other subsidiary levels and funds per capita in structural and strategic planning, with respect to method of preparation of current projects and their pursuance to model of recognition, analysis, design, and determination of funds levels and per capita may be observed to remove the current and next shortages affected by increase extent of city zone and expose planners to lands with high extent which they should be inevitably identified and their use should be defined for them typically.

4) *Inadvertent and unbridled expansion of city*

Despite of the fact that principle of density and maximum use of lands within the zone of cities is considered as one of the main and primary preconditions for sustainable development and it was assumed as the policy for most of reference bodies in national urbanization system by recent years (it can be proved by the approved law (02/01/2000) regarding not expanding cities zone by the respected Board of Ministers), Mehr Housing policy is deemed as its main principle based on which lands are assigned to applicants for mass construction

of residential units continually and or intermittently, which contradicted to conditions for realization of sustainable development as well as previous approaches and it has caused inadvertent and maybe uncontrollable expansion of matrix development.

6-3- Social

5) *Prevention from formation of urban suitable density*

The principle of city density and rising of the congested population is a product of human's need to space that is considered as the first condition in study on urban sustainable development. It is under the light of this idea that urban planners have tried to improve the existing densities by identifying the permitted level for density depending on place and position of urban areas thereby to prevent from inadvertent and unnecessary expansion of cities rather than increase in intensity of using the existing spaces.

But principle of increase in urban densities has been affected by the conducted assignments within the framework of Mehr Housing Policy and thus rising of the extent of cities zone while principle of optimal productivity and using of the existing spaces are ignored.

6-4- Matrix- environmental

6) *Creation of disorder in backbone and form of city matrix*

One of the major effects of this policy is its role, which plays in disruption of city main skeleton, especially in small-sized cities. Urban matrix form is disrupted under effect of assignment of wide lands and joining them to city zone despite of the existing unused and barren lands and a type of disorder emerges in urban appearance and view that is caused by dispersed and discontinuous developments in a relatively wide part of vacant lands (Dalalpoor, 2000).

7) *Disruption in various performances at spatial scale*

The various performances that is related to the extent of using space and size of density is assumed as the second condition for realization of ideal urban sustainable development so it mainly contradicts to expansion of urban areas and out-dispersion of urban activities and performances at area scale. In other words, as the space is expanded regardless of type of activities and performances the variation and diversity of urban performances reduce in all space. In the studied sample and under the influence of expansion of residential areas and thus increased need size to urban services and facilities, the possibility for formation of various performances is divested within several scales in space and it causes dispersed performance of activities throughout the city.

7. CONCLUSION

It has been tried in this essay to evaluate Mehr Housing Plan in Sanandaj Baharan Township as the greatest project in Sanandaj city after recognizing the urban sustainable briefly and review of land and housing in terms of global approach and in terms of social, economic, and ecologic parameters. And finally it was accurately characterized that in which field the execution plan had weak or strong points in order to be able to think for solution. The derived results can be classified with respect to giving response to main question in this study, as follows:

- ❖ The high effect of Mehr Housing Plan on growth and increase of construction and thus in industry and services sectors, which reflect the necessity of government's constant attitude and special view toward supporting from Mehr Housing Plan.
 - ❖ Along with the advantages of positive economic impacts of Mehr Housing Plan, this plan is exposed to several disadvantages in this national project that may make heavier pan of negative points and unreasonable this plan economically. These disadvantages include lack of optimal topology since execution of this plan was mainly aimed at omission of land price from housing total value but not it is observed that billions of Rials have been spent only for huge size excavations in this zone. At the same time, one can refer to some cases like rising costs for creation of facilities and equipments and urban administration and increase in transport costs in household portfolio in the next development.
 - ❖ In ecological review of this study, one may refer to execution of this project in public lands and including lands with natural resources and also destruction of Abidar ecosystem. And some advantages of execution of this project comprise of prevention from creation of informal settlements and destruction of ecosystems in more important points of this city.
 - ❖ In general, Mehr Housing Plan is based on reducing role of land cost from the final cost of the property and this issue has been defined based on the status quo throughout the country and in megalopolises in particular. Nevertheless, this approach has some general defects, which can be generally mentioned as imbalanced and unplanned development in cities. In fact, lack of employing technical criteria in topology of projects and of course restricted alternatives with respect to the existing emphasis on use of public lands and national sources have caused in many cases that topology of projects contradicts to the given goals and bases in urban development plans and generally with urbanization principles.
 - ❖ The other essential point is that this policy affects on master plan which is responsible for guiding and next development of the city and on some occasions it leads to serious changes in process of operation and the period after it. Given that master plan is responsible for analysis of cities structure and definition of outlook and next spatial organization of the city, Mehr Housing Plan may challenge it and it will cause unbridled expansion of urban spatial organization.
 - ❖ The possibility of formation of functional variation is divested in the studied sample under the influence of expansion of residential areas and thus rising of the needed size of urban services and utilities within several spatial scales and it leads to disperse performance of activities throughout the city.
 - ❖ There is no doubt that government's achievement in execution of this key plan may have many effects on resolving the problems of Iranian youth, which provision of housing is especially considered as one of their infrastructural problems and also create positive and noticeable impacts on them mentally and spiritually among the families. This issue can be deemed as one of the goals for strategy of social justice expansion (Hataminejad, 2001).
 - ❖ Along with advantages of positive effects in Mehr Housing Plan, this national project is exposed to some disadvantages and faults in which the paramount points of them include the current given lands in Mehr Housing Project, not considering cultural conditions (various types of housing), and other cultural problems so addressing these problems and damages will cause success more than ever.
- Despite of all these interpretations, no one should be suspicious in the goals, which have been considered in turn by Mehr Housing Plan since planners and practitioners of this plan have tried to assign housing to low-income groups and this may in turn is a fully positive attitude and goal. But with respect to the results, hypothesis of this study can be certainly verified and it may be implied that although this policy is intended to lower housing cost and deduct the class gap among social deciles by providing one of the essential needs (housing), in some cases, it may distract the main objectives of designers and planners without evaluation of several aspects of sustainable development and the result of this measure will be the aforementioned social and economic and environmental consequences so at present it is exposed to total reject (Fig-8). But this question is still remained unanswered that is continuance of executing this plan reasonable by considering aspects of urban sustainable development in the future?

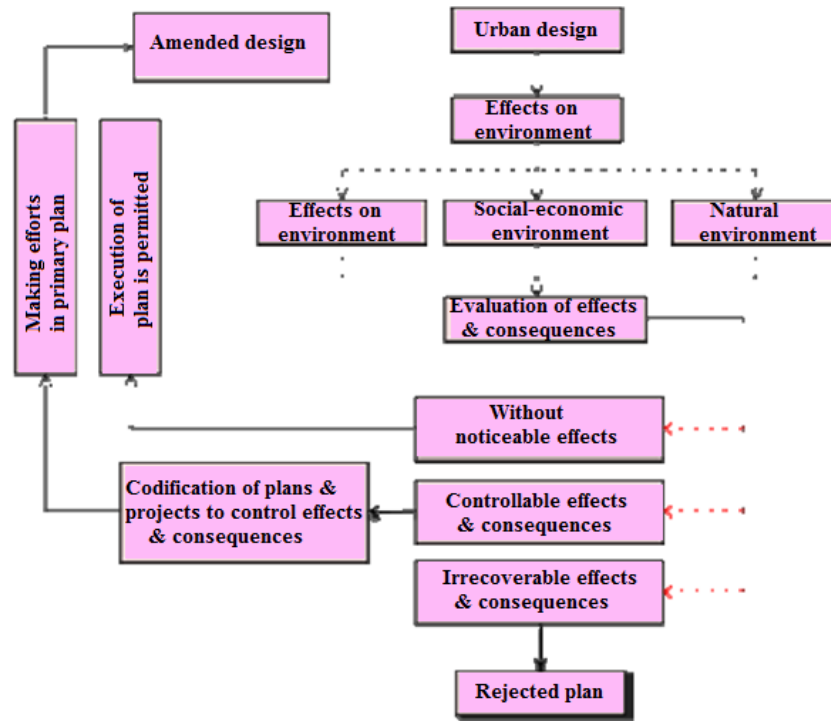


Fig 8. Conclusion graph of Plan evaluation

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Study and Analysis of city networks in the Coastal Provinces of Persian Gulf (Hormozgan and Bushehr)

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Abstract- Industrialization and pseudo-industrialization, decline of agricultural sector and spread of exogenous development patterns of city-based, leading to the formation of massive migrations of rural-urban, extreme population centralization and emerge of large cities and metropolitans in the Iran in the last hundred years that its result was imbalances in the city network urban system and polarization of city networks at national, regional and province level. In this paper, using a quantitative-analytical method and utilizes first two major characteristics of the city (with indices of urban primacy , both city: Mehta, Kitzenberg, Moomaw_Alwosabi) and decentralization indicator (entropy factor) and using quantitative categorized method (number of people) state of the network and urban hierarchy system in both coastal province of the Persian Gulf (Hormozgan and Bushehr) in the period 1966 to 2011 is analyzed. This results represent the urban primacy phenomenon and focus throughout the studied period (despite a gradual decline in some measures) and imbalance and disproportionate in the area of city network, are studied. Generally disproportionate, concentration and polarization of city network in the Hormozgan province due to 7- Bandar Abbas city and its distance 7 times than second city in population, is higher than the Bushehr province.

Keywords- City Network, Urban Hierarchy, Urban primacy, Bushehr& Hormozgan

I. Introduction

A. Statement of problem

Contrary to the balance process in the city networks of developed countries, with industrial revolution and as result of expansion of urban-rural relations and consistency and development in all aspects of economic, social, political, institutional and physical is occurred, in developing countries which have colonial past and are largely under the economic, political and cultural dominance of West or still continue, it can be said that the imbalance process in the city network at

the beginning of political and economic dominance conditions or practically proportional absence with minimal impact on industrial development took place. In these countries in the early stages of the clutter of urban lattice balance, pole or main poles of these communities and growth population of urban centers were the main factor in the urban development [2].

Growing trend of urbanization in recent decades in Iran, along with the extreme migrations and villagers' controversial issues to urban areas of country, especially in large cities are such factors have been proposed Iran cities system model with unbalanced spatial distribution. [3]. Generally population dispersion is not in equilibrium in the Iran and despite changes in the city network of Iran; appearance of population settlement and cities does not get a good picture. The current pattern of settlement and distribution trend also more inclined towards the imbalance and uncertainty and will change. If the dispersion system in the national level goes toward balance but persistent tendency to centralization and concentration of activities and people in several urban centers tends to unbalanced polarization, and all its side effects will be continued. Such response of the population and activities could adversely affect the settlement systems of population [23] and in such circumstances; most development allowable policies at national and regional levels lose their effectiveness and will have not the expected results. [7]. Looking at the pattern of population distribution in the urban centers of the country in the last 50 years have been shown fundamental change in the city network and urban hierarchy pattern both in the national and regional levels. Emergence and growth of megacities in the country and large urban centers at the regional and provincial level, increase in large-scale small towns and rural-towns under 10,000 people, change the city network of country from galactic network to chain, existence of an urban primacy phenomenon at national, regional,

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provincial level, and generally creating an imbalance in the distribution system and population dispersion at the urban center of the country are of such changes. Overcoming urban primacy in the provinces of country is more resulted of political desire in outside and inside of the province, if the alignment of the two, first political desire is increased in the province [21]. Of course this is a problem faced by many developing countries and historical periods, inequality has increased in population size and distribution of cities [25]. In the present article is using data from existing systems in city networks and urban hierarchies pattern in the coastal provinces of Bushehr and Hormozgan provinces in the northern coast of the Persian Gulf and the special features are homogeneous geographical area, the model of a little bit, be analyzed. Of course this is a problem faced by many developing countries and during historical periods, inequality has increased in population size of cities and its distribution has increasing trend [25]. In the article are attempted using exist statistical data, city network system and urban hierarchies pattern in the coastal provinces of Bushehr and Hormozgan in the northern coast of the Persian Gulf and having special geographical features are homogeneous area, using quantitative models, are analyzed.

II. Theoretical basis

A. Concept of city network

City network is said to a set of cities are linked in the geographic space, such as rings and proportionate to extent to mutually functions of commercial, financial, industrial, cultural, tourism and business have different development and growth [15] and within the city network are linked and complementary or competing and rival each other [8], with the difference that in these relationships one's share is more and other less [16].

The emergence of a city network and how to form spatial patterns in a region or country that historically takes place, with several geographical, historical, economic, political conditions are related.

In Iran city network follow the general rule [1]. From the perspective of system can be seen city network as a set of cities that also interact with each other and in particular combination with a hierarchy of roles and functions, plays a key role in the national and regional development [14] and as main location where most of the population settled and population displacement) had great importance in planning [25] and are not only limited to the collection of a body of urban settlements, but streams (population, capital, factors of production, ideas, information and innovations) and communication between the settlements are included as well [19].

John Shoart knows city network as arrangement of various cities are linked by most important commodity and information flows and led to the dynamics of the system [9].

B. The concept of urban hierarchy

Urban hierarchy in terms of cities population, geographical nature, role, location is determined. Situation which city has in

the pyramid of cities mother entitled global city (city world), national, regional capital, medium city, small city and rural, it is determiner of the urban hierarchy. Urban hierarchy is related to scale in which the city is placed [8] and briefly the classification of cities is according to their importance in the network [20] and best shape of organization is space. [17]. A city network, which is formed as a result of geographical condition with a specific spatial order can be classified quantitatively (population) or qualitatively (the their importance and role) and in an order of the base and height in a row or rank are placed behind each other that called the "urban hierarchy" [23].

C. Urban Primacy

Experts in diagnosing the extent of regional inequality in developing countries, often tends to discussing a specific kind of spatial inequality that is called urban primacy. In fact, it is often emphasized that such a phenomenon will occur in developing countries [4].

This law does refer to a situation in which a city itself involves large number of heterogeneous of population. In some cases, size distribution in original city is product of outer or external influence on the settlement pattern. For example, in many today third world countries, major cities have grown due to colonial intervention force. Bangkok is one such example [10].

Friedman and Kalincson (1967) first do not know the city as a phenomenon apart from the "excessive urbanization".

They believed that excessive urbanization happen due to over concentration of urban activity that one of its phenomenons is urban primacy[11]. From Mark Jefferson's view urban primacy happen when the largest city in an urban network first to be few times than second city [18]. According to Clark, city primacy in the hierarchy of population size of cities is placed in the first row and differences in population with the second city have high level [3].

UN knows features of urban primacy a high concentration of urban population of countries in a city or urban set [29].

Infrastructure to attract industry, create jobs, onset migration and ultimately lead to urban primacy [26] and this phenomenon by state and national governments, which are located in prime cities, should be encouraged [27]. John Rennie and Luis Mauricio in 2009, urban primacy indicator is considered in the national level of 21 countries. According to results of this study, the maximum amount of urban primacy belongs to Thailand with 9/48 and the lowest amount belongs to Benin with /58 [28]. Negative impacts of urban primacy growth on urban network in each country are obvious. Identify this phenomenon can force planners and designers to adopt policies and measures to address this problem [5].

In Iran, like other developing countries, the pre-capitalist of urban network is relatively homogenous; it means every area has its main city.

But in the last century with the emerge of evolution caused by periphery capitalism need to super concentration was its inherent component, state of this network disturbed and creating one or two metropolitan in each country galactic system in the urban network was turned into a chain relationship.

This has led to greater focus of Metropolis and the loss of the medium relationship (between the small towns and

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intermediate) [1], which its results is emerge urban primacy in the national, regional, provincial levels and imbalances in the city network and urban hierarchy at all courses in the last municipal census from 1956 to 2011 in the Iran.

III. Research Methodology

According to the study, research method in this paper is (quantitative-analytical). Initially referring to a demographic statistics relating to census of statistical centre of Iran, required data were extracted. To analysis urban network state, two major indices: urban primacy (with the urban primacy indicators, two cities, Mehta, Kitzenberg and Moomaw_Alwosabi) and decentralization indicator (entropy factor) is used. As well as to determine the status of the urban hierarchy, a quantitative classification method (population) based on official census data for the period 1956 to 2011 are used and the results in the form of statistical tables, graphs and maps are prepared and in the Arc Gis software is displayed.

V. Introduction to the study area

Scope of this research is Bushehr and Hormozgan provinces. These two provinces with a total area of about 98,653 square kilometers in the northern coast of the Persian Gulf and Makran Sea are located. These two provinces have a total of approximately 1525 km of water border (Figure 1). Special geographical conditions, restrictions of coastal plain that sometimes will be placed the sea and the mountains in close contact with each other, hot and dry climate, limited water resources and soil, very poor communicative situation and far from communicative networks and urban systems in the country, limiting fishing activities [22] and forming a formal and informal sea business sector and major oil and gas fields, as an important factor in attracting population in this area, which is part of the common features of these two provinces can considered them as homogeneous unit in the regional studies and research fields.

Figure 1: Location map of the study area



Drawing: writers

IV. Analysis of Results

A. Systems for urban network

AA. Number of cities and urban population

Number of cities of both coastal provinces of Hormozgan and Bushehr in a 50-year period, had increasing trend.

Number of cities of Hormozgan province, from 5 towns in the 1966 reached to 32 in 2011 and number of cities of Bushehr province from 4 cities in 1966 reached to 32 cities in the year 2011. As well as the number of urban population also has an increasing trend in both provinces. Urban population of Hormozgan province from 53,000 persons (15/3 percent) to 788,471 persons (50 percent) and urban population of Bushehr from 54623 persons (21/54 percent) to 704,753 persons (68/22 percent) have increased (Table 1&2).

Table 1: The change in the urban population and number of city in the study area

Number of city		Urban Population		year Year
Hormozgan	Bushehr	Hormozgan	Bushehr	
5	4	53000	54623	1996
12	6	123462	127497	1976
18	11	308199	306075	1986
22	13	443970	394489	1996
28	29	661325	577465	2006
32	32	788471	704753	2011

Source: author's calculations based on data from the Statistical Center of Iran& Zanjani[12]

Table 2: The change in the Urbanization percentage in the study area

Country	Urbanization percentage		year
	Hormozgan	Bushehr	
37/98	15/3	21/54	1996
47/03	26/7	36/65	1976
54/3	40/4	50	1986
61/31	41/8	53/05	1996
68/4	47/1	65/16	2006
71/38	50	68/22	2011

Source: author's calculations based on data from the Statistical Center of Iran& Zanjani[12]

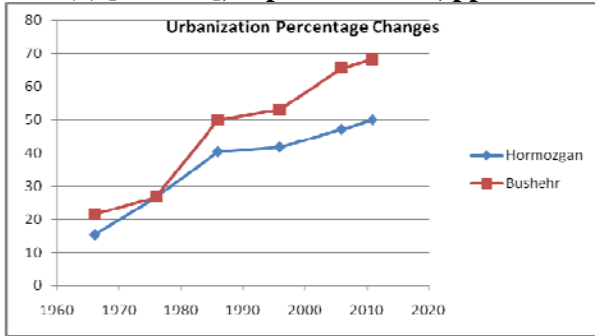


Figure 2: Percentage change in urban study area

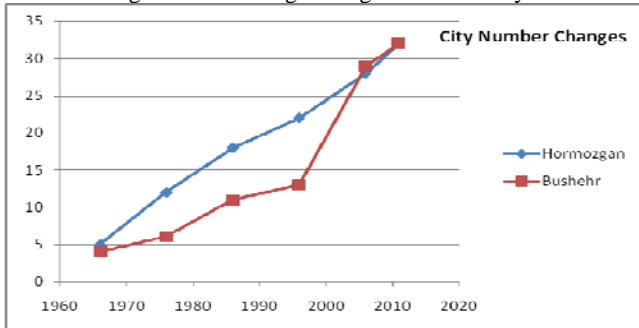


Figure 3: Changes in the number of cities in the study area

Table 3: The share of the first population city in the total urban population of the study area (Bushehr)

Share of Urban Population (percentage)	Population of first city (person)	Urban Population (person)	year
Bushehr city	Bushehr city	Bushehr(province)	
43/1	23547	54623	1996
46/24	58958	127459	1976
39/46	120787	306075	1986
36/41	143641	394489	1996
29/43	169966	577469	2006
26/09	183905	704753	2011

Source: author's calculations based on data from the Statistical Center of Iran

Table 4: The share of the first population city in the total urban population of the study area (Hormozgan)

Share of Urban Population (percentage)	Population of first city (person)	Urban Population (person)	year
Bandar Abbas	Bandar Abbas	Hormozgan	
65/33	34628	53000	1996
71/26	87981	123462	1976
62/45	201642	308199	1986
61/62	273578	443970	1996
57/35	379301	661325	2006
55/26	435751	788471	2011

Source: author's calculations based on data from the Statistical Center of Iran

B. Urban hierarchy

According to a study based on quantitative classification (population) its results are presented on the tables 5 and 6, Bushehr and Hormozgan provinces in 2011 have a urban hierarchy network relies on the 4 classes (small city, medium city, area minor center, rural or urban center). Features of both provinces in this part, is lack of population class of large city and metropolis. In the Hormozgan province due to specific reasons, including massive migration that takes place in Bandar Abbas (in the period 1996 to 2006 the number was 82,009 as immigrants arrived in Bandar Abbas and due to number of immigrants had rated 18 in the country. [24]. This city in near future years placed on the large class and as metropolitan area in the southern regions of the country (Hormozgan, Kerman, southern Sistan and Balochestan province) will appear. Other important features of the urban hierarchy of both provinces are high number of the village class-cities below 25 thousand people. So that 84 percent number of cities in both provinces are placed in this class. These phenomena can be found on the political-administrative desire of the executive management in the country to increase the number of city in the country.

Table 5: Pattern of urban hierarchy of the Bushehr province in terms of population categories (2011)

Share of urban points (percent)	Share of urban population (percent)	Number of urban points	Population categories (person)	Level name	Grade or size (level)
-	-	-	Above 1500000	Metropolis (National metropol)	One
-	-	-	-1500000 500000	Large city (Regional metropolitan)	Two
6/25	42/45	2	-500000 100000	Medium city (District metropolitan)	Three
3/12	9/57	1	-50000 100000	Area minor center	Four
6/25	9/47	2	-25000 50000	Small city Urban center	Five
84/38	38/51	27	Less than 25000	City- rural	Six
%100	100	32	-	-	Total

Source: author's calculations based on data from the Statistical Center of Iran

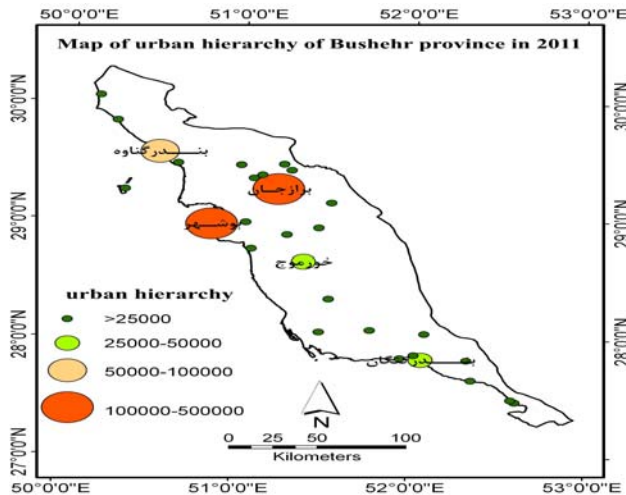


Figure 4: Map of urban hierarchy of Bushehr province in 2011

Drawing: writers

Table 6: Pattern of urban hierarchy of the Hormozgan province in terms of population categories (2011)

Share of urban points (percent)	Share of urban population (percent)	Number of urban points	Population categories (person)	Level name	Grade or size (level)
-	-	-	Above 1500000	Metropolis (National metropol)	One
-	-	-	-500000 1500000	Large city (Regional metropolitan)	Two
%3	55/26	1	-100000 500000	Medium city (District metropolitan)	Three
%3	8/2	1	-50000 100000	Area minor center	Four
%9	11/71	3	-25000 50000	Small city Urban center	Five
%85	24/83	27	less than 25000	City- rural	Six
%100	%100	32	-	-	Total

Source: author's calculations based on data from the Statistical Center of Iran

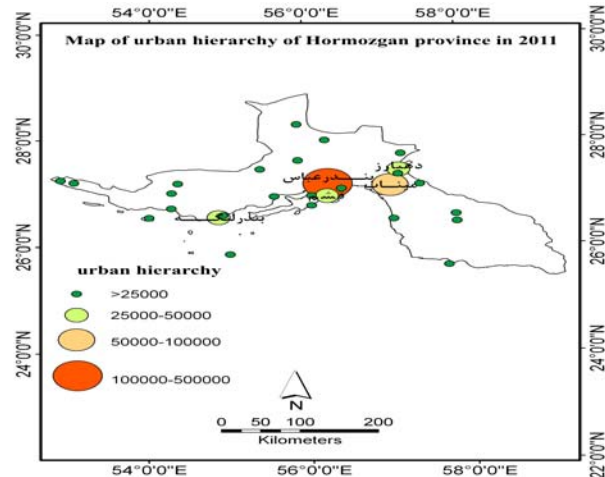


Figure 5: Map of urban hierarchy of Hormozgan province in 2011

Drawing: writers

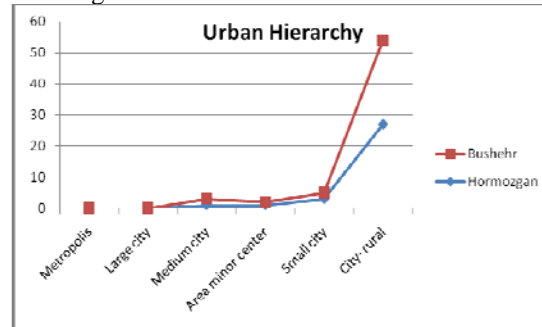


Figure 6: Graph of urban hierarchy in the study area in 2011

VI. Amount of urban primacy

A. Urban primacy indicators

The results of calculation of selected indicators show that urban primacy phenomenon in all census period 1966 to 2011 and exist in all five selected indicators but gradually have been declining for some indicators. According to the results in Tables 7 and 8, urban primacy phenomenon in the Hormozgan province is higher than the Bushehr province so that indicator of both cities in 2011 for the Bushehr province, was 1/82, but for the Hormozgan province this indicator in 2011 was 6/89, which indicates the formation of uneven and polarization city network in the Hormozgan province. Also based on proposed Richardson values (Table 2) in the four indices of Mehta city, in the Bushehr province we was witness of the desirable preference but in the Hormozgan province in whole of the study period we was witness of superiority. In the Hormozgan province, Bandar Abbas city, with a extreme focus on the political, administrative, economic, communications, business and tourism areas to attract crowds and activity at the provincial level and while away from other cities of province, taken down the possibility of growth and development of the cities with lower category, causing gap and imbalances in the city network of Hormozgan province. But in the Bushehr province due to the economic potential of agriculture in the second population city of the province (Borazjan) and the formation of formal and informal business activities (Bandar Gnaveh), city network is more

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fairly weighted. Distance 1.82 in the first city than second city demonstrated more balanced city network in the Bushehr province.

Table 7: Indicator of urban primacy and focus of Bushehr province

2011	2006	1996	1986	1976	1966	year
						Indicator
0/26	0/26	0/29	0/34	0/39	0/46	urban primacy
1/82	1/82	1/79	1/80	1/86	1/15	Two city
0/90	0/92	0/92	0/94	1/07	0/76	Kitzenberg
.47	.49	.48	.47	.52	.61	Mehta
2/80	2/87	2/97	3/1	3/83	4/07	Momo Valosby

Source: author's calculations based on data from the Statistical Center of Iran

Table 8: Indicator of urban primacy and focus of Hormozgan province

2011	2006	1996	1986	1976	1966	year
						Indicator
0/55	0/57	0/61	0/65	.71	.65	Urban primacy
6/89	6/77	7/55	8/82	4/80	4/80	Two city
3/43	3/35	3/72	3/42	1/88	1/88	Kitzenberg
.77	.77	.76	.79	.71	.65	Mehta
7/82	7/64	8/30	12/44	3/75	3/75	Moomaw Alwosabi

Source: author's calculations based on data from the Statistical Center of Iran

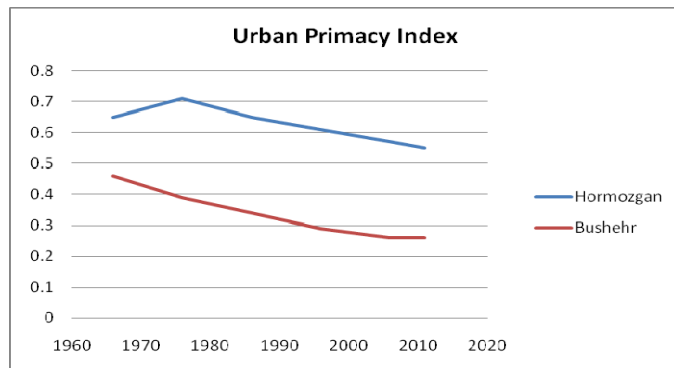


Figure 7: Changes Graph of urban primacy with urban primacy indicator

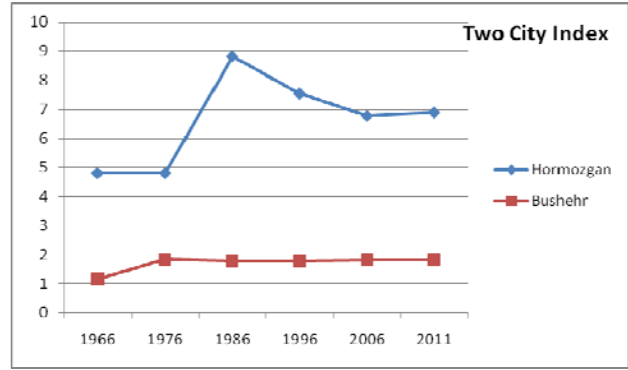


Figure 8: Changes Graph of urban primacy with indicator of both cities

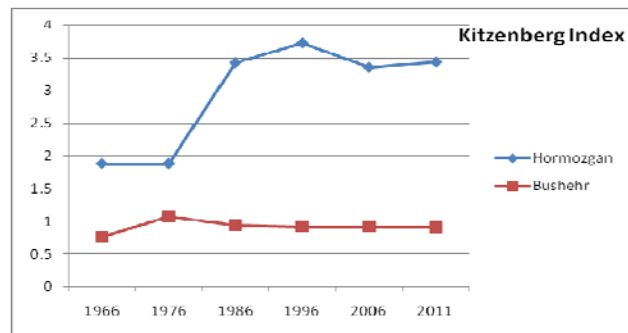


Figure 9: Changes graph of urban primacy with Kitzenberg indicator

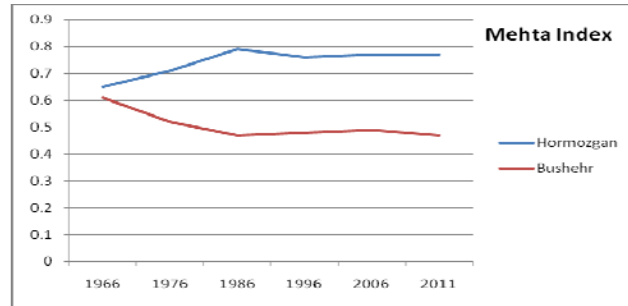


Figure 10: Changes graph of urban primacy with Mehta indicator

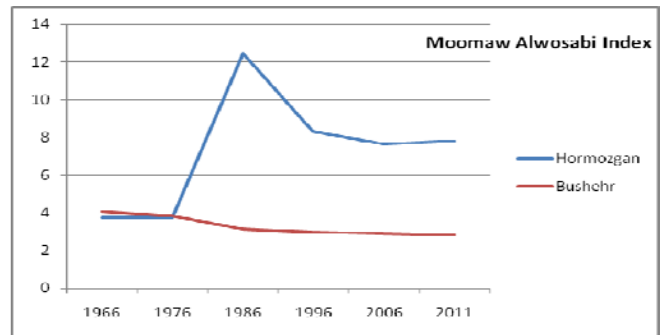


Figure 11: Changes graph of urban primacy with Moomaw Alwosabi indicator

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VII. Indicators of decentralization**A. Entropy Coefficient**

Calculating the entropy of 6 courses of census shows an increase in the concentration and polarization of city network in both provinces has benefit for large and medium cities. According to the results shown in Table 9, lowest concentration for the Hormozgan province in 1966 and highest concentration is observed in 2011, which represents separation of large and crowded cities of the province including Bandar Abbas is other downstream towns in the city network. In the Bushehr province lowest concentration was in 1966, and highest concentration is related to 2011. In the Bushehr province from 1996 to 2011 a gradual increase and decrease is observed the entropy coefficient, But in 2011, shows a sharp decrease in this ratio that indicating the focus on city network of this province in this decade. This can be due to an increase of 55 percent of fewer than 25 thousand cities (towns) and population distance above population category of cities.

Table 9: The entropy coefficient rate of the urban population of the study area

Relative entropy		Entropy coefficient
Bushehr	Hormozgan	
		Year
.851	.873	1966
.799	.565	1976
.751	.538	1986
.830	.549	1996
.533	.473	2006
.586	.394	2011

Source: author's calculations

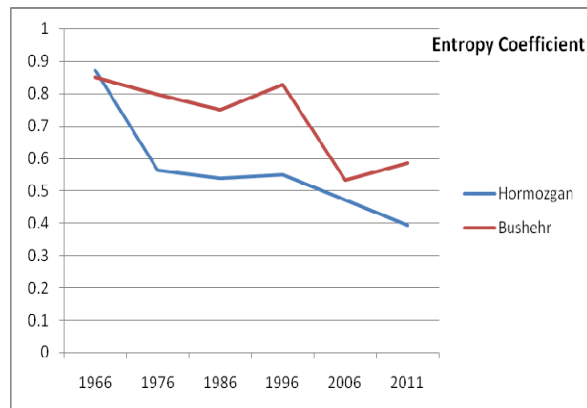


Figure 12: The entropy coefficient rate of the urban population of the study area

VIII. Conclusion

The results of the study of city network and calculation of quantitative indicators in this paper can be outlined as follows:

A) general feature of city network in the study area

- Urban population growth and a decline in the rural population of the whole country during a 50-year period, is the city network characteristics of the both Bushehr and Hormozgan provinces.

- Increase the number of urban areas in the period 1966 to 2011 in the city network in both provinces. In the decade 1996 to 2006 can be the key decade in this area. During this decade, the number of cities than in the earlier period to 50% was more. This issue suggests that government policies in increase urban areas.

B) Urban primacy indicator and focus

- Urban primacy indicator and focus phenomenon throughout the duration of the study (despite a gradual decline in some indicators) exists in both provinces. Indicate that spatial inequality in the distribution of population in the urban centers of study area.

- Proficiency in the first population city during the whole study period (2011-1966) in both provinces. In the Hormozgan, Bandar Abbas, due to the focus of activities and political, administrative, economic, trade, communications and tourism opportunities, attracting population province through immigration, increase its difference from other network cities day by day and cause polarization of city network in this province. Distance between Bandar Abbas and Minab as the second population city in 2011 was 6/89.

In the Bushehr province Bushehr despite political - administrative reasons dominating population space of province during the period of study, and maintain its population status as the first city, difference the second population city (Borazjan) due to economic potential of agriculture for attracting crowds not strong. (1/82) but this difference to other city network is too much.

C) Urban hierarchy

- A very high proportion of under 25 thousand cities (cities and rural – urban centers), with 85% of the number of cities in the urban hierarchy of the characteristics of both the province.

- Cities less than 25 thousand people, despite 85% of the number of cities, only (25% in Bushehr province and 38% in Hormozgan province) of the population of city network are allocated them.

- A very low portion of small (25 to 50 thousand people) and medium city that can prevent polarization of city network and causing the balance in the distribution system of population in the network, are characteristics of both provinces.

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ECOLOGICAL CAPABILITY EVALUATION OF CITY DEVELOPMENT BY USING MCDM & GIS (study area: Sahand)

Ziba Beheshti

Abstract— Present study has been prepared with the aim of determining appropriate application of urban development in Sahand region, Osko city, in east Azerbaijan. High development of Sahand City and the lack of scientific comprehensive studies on ecological potential evaluation of its development, cause to select application ecological potential evaluation of urban development of Sahand City with the multi-criteria decision making MCDM and GIS model, as a topic for the study. In this regard, in the first stage of Sahand's study area and effective physical-ecological parameters in locating city development plan is determined in two sections: 1- Physical (including the geographical reviews, geology, agrology, hydrology, hydrogeology, climatology and ...) and 2- biological resources (including flora and fauna reviews, protected areas and ...). In the second stage, standardization and layer integration of data was done using software ArcGIS and aspects of urban development was determined. In the third stage, analysis is done with the way of ALC and AHP and the map of development ecological potential of Sahand City is being derived and is classified by comparing with the urban development model. Now, the area of Sahand Town is 2,329 hectares and the results show that 3326 hectares, of the total under study area of Sahand identified in 1712 ecological units and with the area of 45200 hectares, have degree 1 power, and 4270 hectares have degree 2 power of urban development plan. Now, spatial distribution of the population centers of the town mostly lies in degree 2 application (average), from whose important reasons are relatively fine textured soils, suitable drainage conditions, and favorable climatic conditions

Keywords— ecological potential evaluation, urban development, Sahand City, GIS

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INTRODUCTION

Independent new cities are planned community that are made with the objectives of decentralization, utilization of resources, strengthening industrial areas, creating a growth pole in lagged areas, regional development and changing the

political and service structure of areas. Because the purpose of creating independent new cities is rejection of the principle resulting from national and regional decentralization policy and to balance in the different areas of the country. These cities in many point of the world especially Soviet are constructed. The satellite new cities are like the planned community which are designed in the metropolitan areas and have strong functional links to mother city. Shape, density and lifestyle of the satellite new cities are considered basically continuity of suburban's residential pattern. In these city don't need to create and provide jobs, because these cities will benefit from the markets of big cities and are related to the central city in services. This procedure is implemented in different countries of the world especially Britain, France and Russia. Harvi Parolof used joined new cities to describe the cities which be constructed within existing cities. Joined new cities are constructed in adjacent to metropolitan and large complex to residential accumulation and also spatial organization and De-congestion of the metropolitan. This pattern has severe population density due to being in the area of major cities and develops very quickly. The theory of joined new cities result in Stockholm urban which was introduced in Nordic countries with relying on the decongestion and modification of cities urban structure especially their capital. These cities have been constructed in Iran especially in Isfahan and Tehran. So that it can be said that many new cities of Iran fall into this range. Overall, the experience of Iran in creating new cities is being considered in two time periods, before and after the revolution, and in two areas: residential cities and related to Industrial and petroleum units (before the revolution) and the planning new movement and designing new cities (after the revolution).

Pattern classification of new towns in Iran New towns of Iran is being classified into five pattern in terms of establishment in operation and space: the organizational-industrial new cities, the satellite new cities, the new cities with independent identity, joined new cities, corporative town, and new cities of Tabriz. Based on the initial attitude about construction of new cities, three satellite town was predicted for Tabriz named Sahand new town, Sofian new town and sis new town which the first one was predicted in Tabriz-Maraghe axis and the second one in Tabriz-Marand axis and the third one in

northwest of Tabriz industrial zone adjacent to Shabestar. As a result of suppliers handling and perspectives of comprehensive plan of Tabriz at that time and because they did not believe to continuous development of city with determination of land Amand in north of airport and Baghmishe in Northeast of Tabriz (which both of them are in Tabriz important faults and the second region have severe topography complications), future development of city was based on these axis and finally with the natural tendency of city to develop along the southeast axis, Sophian and Sis new town didn't reach to the executive level, but Sahand new town although slowly was shaped, but stabilized due to having better conditions.

Following adoption policy of building new towns by the council of ministers, initial proceedings for preliminary localization of new town around Tabriz was laid on the agenda by according to the needs and employment opportunities and other factors affecting the localization, and thus necessary investigations in this area began by experts of the Sahand new town development since Bahman, 1366 which its result is a report named "Locating Sahand new town". With selecting location of Sahand new town in 20 km southwest of Tabriz, new town strategic studies began on considered zone in the area of about 12650 Hectare which has steep terrain and many uneven to determine proper positioning of establishment and designing the town by studying the natural environment and Permissions and nearby population centers.

By according to the limited land available for housing market and also the suddenly rise in the price of land in the city level due to mentioned activities, a group of building owners and managers noticed to Sahand New Town. Also Sahand new town has succeeded to provide a part of necessary municipal infrastructure and to prepare background to attract housing appliers in the middle-class.

I. METHODS

To collect, process, analysis and model different dada and preparation of this study Autodesk map 2004, EXPERTVHOICE, IDRISI, Arc GIS 9.3 are used. To do digitization actions and maps editing

Envi 4.3

To do image processing and providing land use map

Isrisi 15

To do maps normalization and weighting criteria using AHP method and doing multi-criteria evaluation

ArcGis9.3

To create and complete data base of layers, Geo-referencing maps, determining coordinate system and image system, using Spatial analysis functions to analyze multi – criteria and according to high abilities of this software in editing,

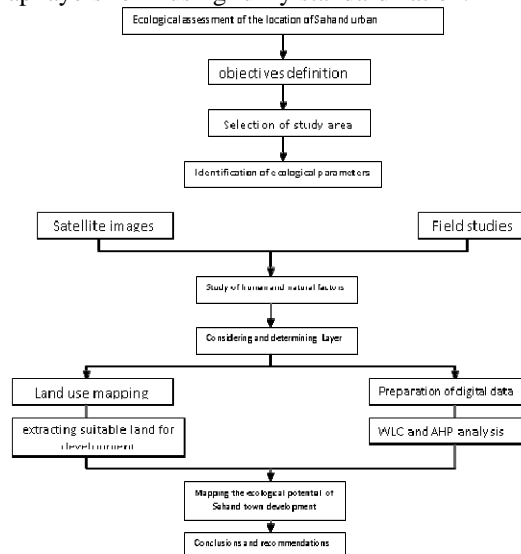
questions and analysis, information layers were created, shorthand and questioned on it.

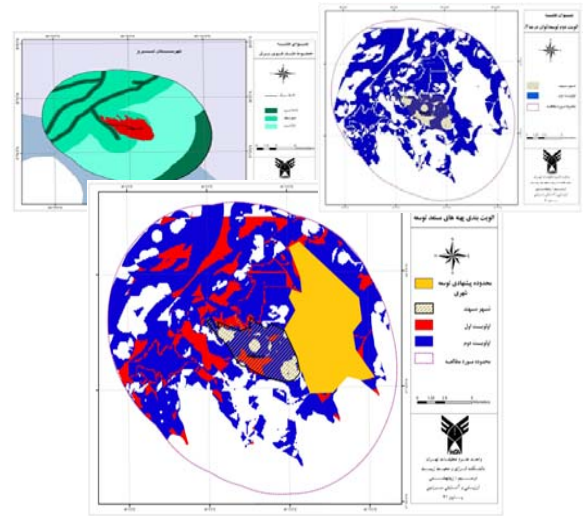
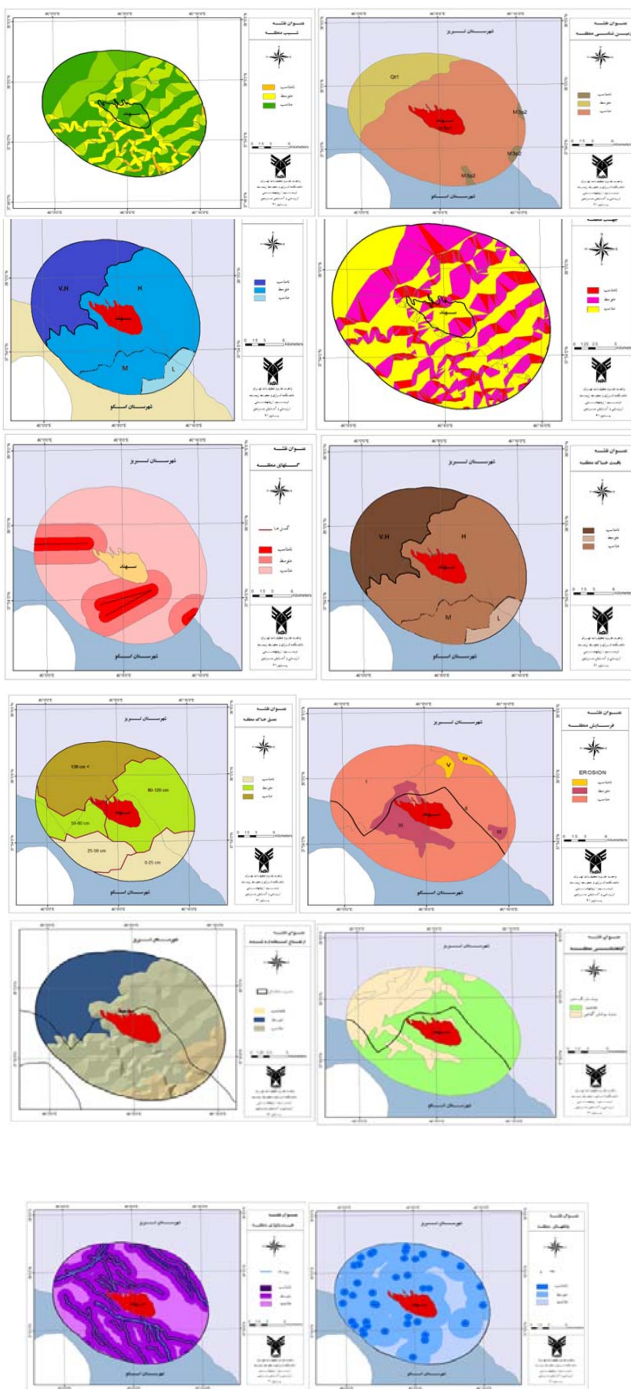
Library method (documentary): in this stage gathering statistics and information and studies in this area (including geological, geology, geomorphology, and vegetation studies), preparation of needed maps is done and available source is evaluate. Generally at this stage, two types of sources are used: A: using books, thesis, papers for basic discussion and theoretical principles, B: using different types of maps and satellite images.

Field studies: including to visit the study area to identify natural features of the area, matching existing maps with the study area and surveying states of zone vegetation and taking ground control points using GPS.

Geographical and statistical analysis the third stage is including data entry and digitization of maps, statistical dada analysis, satellite images processing, information analyzing in database and geographical information system and finally doing analysis of location which for this purpose, the wlc and AHP method had been used.

In this study after correcting operations and satellite images processing Spot, 2005, land use map is extracted. Information analyzing has been done in GIS using Idrisi and ArcGis 9.3 and criteria weighting has done according to weighting method of analytical hierarchy process (AHP) and then the map layers form using fuzzy standardization.





II. CONCLUSIONS AND RECOMMENDATIONS

The final area of development is determined with superposition the map of ecologically appropriate potential and appropriate gradient map from urban perspectives. Dividing the slope is considered 0-8 percent, 8-12 percent and 12-15 and 20-15 percent in the map. It has been suggested that 12-15 percent slope is allocated to green space. Also in suggested new area from creating nodes with inappropriate width was avoided, because it rises Infrastructure costs. In determining new development zone has been tried that topographic lines are used maximum. Surveying results indicate this fact that designed model with AHP also suggest other regions in addition to identify appropriate locations for urban development in acceptable ways. But with implementation of the WLC model, directions to develop is extract that conforms to reality based on field evidence and comparing the results. According to specified development directions in both AHP and WLC model, the best alternative select based on their ranking. The south of the city is surrounded by steep mountains and a part of the mountain range which poses considerably slope now occupied by marginalized. This part of the city not only in not capable to develop, but also because of condition such as the earth shape has relative restrictions. West side have very limited capacity, in the establishment of the metropolitan functions and employment centers in old axis of Sahand-Tabriz. Topographic complexity cause this side of city in the considerations of development and high population don't have determinant role. West side is occupied entirely by large industries and s don't have the development and deployment potential not at all due to the prevailing wind. Development in this side and also southwest should be considered and don't have development potential because decreases the distance of Sahand new town more and accelerate its integrity with Tabriz.

By according final map the east land obtained AHP and WLC model is the major and most natural possible for Sahand development because of having land with suitable steep and sunny and appropriate state of environmental parameters.

Surveying performed studies in this field such as Sahand town comprehensive plan clear this fact that Sahand city has faced with substrate serious obstacles to develop in recent years and inevitably has invaded part of the natural substrate which destruction of the famous gardens in Osko are the result of this attack.

By according to geographical condition and surrounding topography, Sahand town comprehensive plan suggested using land located in east and northeast, suitable direction to develop anatomy of the city, hence the compactness of urban areas is avoided severity in addition to providing sufficient level to develop city. Surveying studied that south side of Sahand meaning Sahand distance between Sahand to Osko, have lush gardens which should be avoided change these lands seriously.

Also relative proximity of the western part of Sahand to large industries make possible to establish non-polluting manufacturing units which is located in along the Tabriz - Azarshahr road.

The important point in AHP and WLC method is selecting correct weights and optimal using information layers, so not allocating the appropriate weights in decisions, despite using different information layers will bring inappropriate results.

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Study of factors that affect flooding in order to reduce natural hazards in areas Yamchi Dam Using by GIS

F. Esfandiari Darabad, S. Parastar

Abstract—Flooding obliterates facilities and causes physical damage and disrupts utilizing of highways and railways. In addition, flood is a barrier for effective drainage and economical use of land for agricultural and industrial purposes. Due to the high current or river runoff in catchment, huge erosion occurs across the basin and eventually creates serious problems in downstream of the falls which is caused by settlement and accumulation of sediment. Upper catchment of Yamchi Dam is the Sub Basin of Balkhly River in Ardabil which is located on the southern hillsides of mount Sabalan. Due to the topographic and climate condition of this basin, flooding is vulnerable here; and this causes damage to rural dwelling sites, farm lands, and communicative pathways. The occurrence of this phenomenon in one hand culminates into soil eroding increasing and soil exacerbation resources, in the other hand forces filling in Yamchi Dam reservoir. Therefore the purpose of this study is to identify factors that contribute to flooding in the mentioned basin. so as to approach above purpose factors such as slope, aspect, and lithology, distance from waterways and precipitation were examined as effective factors in which contributes to flooding; then their data layers in (GIS) and Arc MAP were prepared and as well as geometric factors such as shape, area, and circumference, basin height and rectangular area were assessed and investigated results suggest that following basin study is prone to devastated floods that mainly occur in spring. The results also showed that interfered factors in the flooding basin consecutively include slope and aspect, waterways, rainfall, lithology and the time of concentration and the time of delay. Because basin shape is round, so it shows more reaction which is attributed to shower and flood occurrence. The length of basin waterway is also high, which is indicating a high density of streams and the possibility of flooding occurrence is high, therefore, managerial and protective measurements should be taken in the basin.

Keywords—About four key words or phrases in alphabetical order, separated by commas.

I. INTRODUCTION

Flood is a phenomenon which human has been faced with since the past times and causes enormous physical and financial losses for inhabitants in flooded areas. Statistic and data assessing of damages that is caused by flood in Iran and around the world indicate extended damage of flooding in natural, human and economic resources in different areas [9]. The rising trend of floods in the last five decades show that the number of floods occurrence in the 80s in comparison with the 40s is almost 10 times increased [1]. Ardabil province has been facing flood occurrence in the past and now that the main reasons for the occurrence of floods can include climate, lithology and inhabitants manipulation in the nature. Dams constructing in this areas mainly are due to flood controlling and water supplying. one of these dams is Yamchi Dam which is constructed on the branches of Balkhly Chay River. However, in upstream of this dam, due to various reasons flooding still occurs, and since a number of few studies have

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been carried out in this case, Therefore, doing some studies about the main causes of flooding in the area and its zoning is essential. so It has been tried to give explanation of research about the causes of flooding in the area.

II. Background research

Many studies have been done about flooding and runoff cases So far, so in this study we mention some of them. Alijani (2009) by the means of using daily data's on precipitation, temperature, relative humidity and wind in the years 2006-1961 using Analytical Hierarchy Process AHP method, analyzed the Tehran region and concluded that linear trend of climate hazards is increasing, the heavy precipitation has increased, hot days and pleasant days still are ongoing and the number of cold nights have been declining. Karami and colleagues (2008) have done a study in order to control the risk of flooding in Dough River in Golestan province using hydraulic models in GIS environment. In this study, hydraulic analysis based on flood hydrograph is used in non-permanent conditions in rural and urban areas. Dad rasi Sabzevar (2009) in a research with the title of flood controlling and drought mitigation impacts; methods for identifying flood-prone areas as a first step in the efficiency of flooding in parts of Northern and Razavi Khorasan province has considered with the positioning model and appropriate positioning fuzzy models with gamma 8 / 0, which has higher accuracy than other models. Gholami and colleagues (2009) examined the effect of changes in land using in runoff creation and flooding risk in Kasilan basin. Reviewing the effect of changes in land using is done by the means of utilizing aerial photographs, topographic maps, land using maps and satellite images. Mehdi Zadeh (2012) determines the flood and urban runoffs, using fuzzy ANP model.

III. Basin and Dam Positioning

This basin with the area of 719 square kilometer is located in a mountainous region in the northwest of Iran between zones 37 degree and 51 minute, 38 second till 38 degree, 15 minute and 24 second northern and hour circles 47 degree and 64 minute, 35 second and 48 degree and 6 minute and 15 second Eastern. This basin from the west side with the catchment basin of Urumia lake, from the south side with Ghezel Ouzan river basin from the east side with Ardabil, and from the north side is limited to Meshghin Shahr basin. The main drainage of this basin flows from southwest to northeast and is a branch of drainage network in Ghara Sou River which is involved as a part of Aras River. This basin is located in the middle of volcanic mass mountains of Sabalan

in the north and mountains of Bozghoush in the southwest. The highest point of peak Pyramid basin with a maximum altitude of 4505 meters above sea level is located in volcanic mass of Sabalan which the main outfall of Aq Laqan River is the important sub-branches of this basin. The minimum altitude of 1506 meters is the site of Yamchi dam. This basin owns 5 sub-basins or independent hydrological unit.

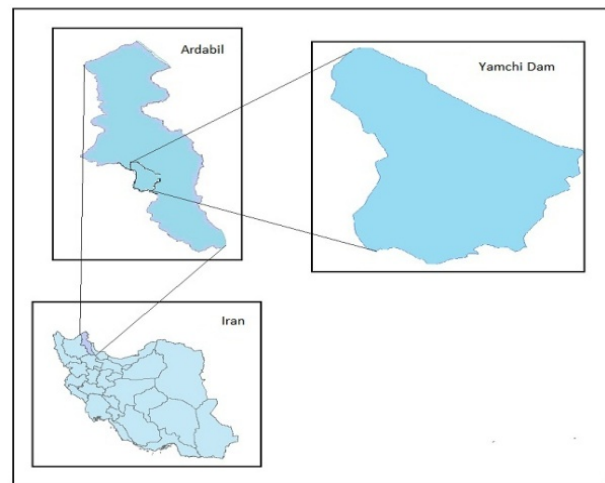


Fig. 1 Map locations Yamchi Dam Basin

IV. Materials and Methods

In this study first relevant theoretical foundations to the topic were reviewed. Then, according to the review of the resources, efficient factors in flood occurrence we determined the following study basin. Afterward we provided the factors influencing the occurrence of floods in the process of environment. Providing information layer elevation, slope, aspect, distance from river out of the numeral topographic map model in counties Nir, Sarein, Kuraim, Noghdli olya, Imam Chay with the scale of 1:50000. The next step is to map the basin range so basin boundary layers obtained digitally, afterward the digital tier level within the curved basin prepared and numerical values for each curve in the amount of descriptive information or open attribute table have logged curve rates within the basin get valued. Thus, digital topographic map of the basin prepared (Fig. 2). due to a detailed analysis of topography of the basin and observing of three-dimensional basin status using digital topographic map of the basin and by the means of utilizing extension (3D) Analyst, 3D map or tin of basin prepared (Fig. 3).

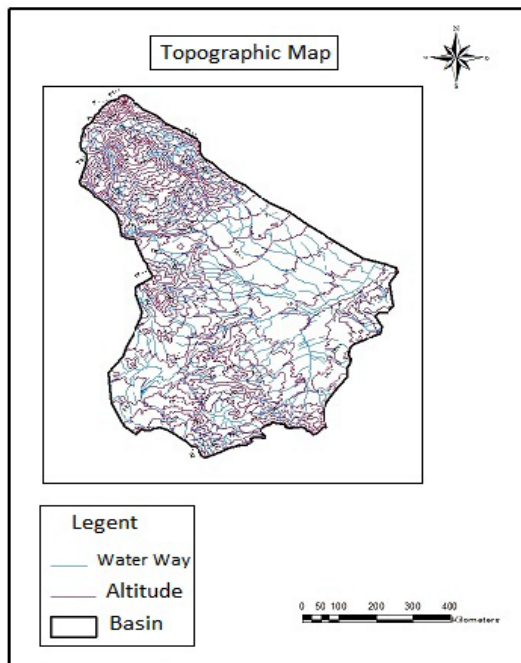


Fig. 2 Topographic map of the study area

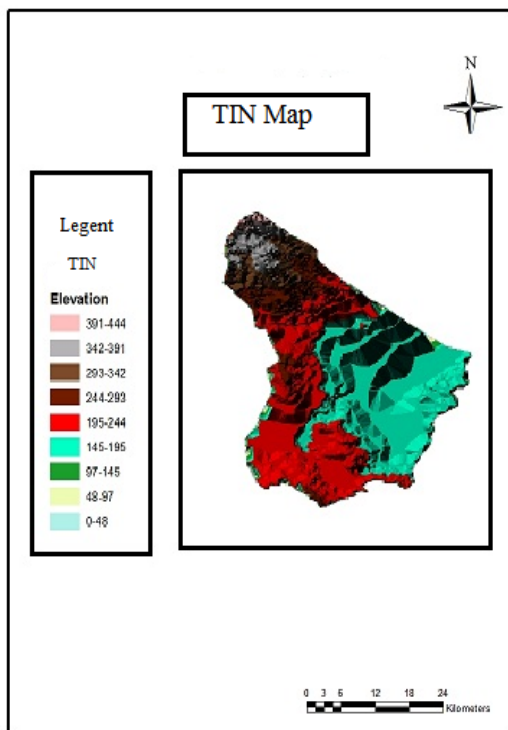


Fig. 3 Three-dimensional map of the study area

V. Analysis of data

1) Slope

The slope is one of the effective factors of flooding in an area. Steeps often cause severe flooding especially in mountainous areas, however in low slopes rainwater owns an ample opportunity to penetrate the soil layers, therefore flooding occurs rarely, unless in rains with high-intensity in which infiltration speed decreases and causes floods (Fig. 4).

2) Aspect

Aspect is one of the independent factors causing flooding and runoff. Generally, the northern hillsides for snow persistence and high humidity (especially in spring) have a big role in flood (Fig. 5).

3) River Basin Network

River basin network is known as the catchments which collect surface runoff in the surface basin and provide guidance to the exit point of the basin. Different classifications have done for runoffs, which the prevalent case is Astrahler method containing primary runoffs without any branches that is determined with number1, and by the means of combination of two number1 runoffs, number2 constitutes and two number2 runoffs constitutes number3. Classification of upper stream basin runoffs of Yamchi dam is indicated by Astrahler method which is provided and classified in GIS environment (Fig. 6).

4) Rainfall

Rainfall is directly affecting the flood and precipitation rate of the basin is directly affected by the height and wind direction. The natural characteristics of each area affect the amount and atmospheric type of precipitation. According to a general rule, the amount of precipitation increases with increasing in elevation. The analysis of the average monthly rainfall at selected stations suggests that during April and May precipitation in the basin is the highest and the lowest rainfall occurs in August. Thus there is a meaning full correlation between rainfall and flooding in the area [5].

5) Lithology

The forming compositors of every region is an important factor in the flooding. Based on the forming compositors the following basin, it can be concluded that the most resistant portions of the basin are northern parts, south and southwest and the central and eastern parts of the catchment basin are the less resistant against the floods occurrence.

6) Focus Time

One of the critical factors in the investigation and establishment of runoff is the time of concentration and latency in which indicate that how much the focusing time is more, more runoff and less infiltration (metropolitan area), while how much the focusing time is less, less runoff and high permeability (dry soils). During the latency, with the increased amount of water which is caused by rain and water infiltration, gradually soil permeability decreases and causing runoff increasing. The focusing time in this basin is 4hours.

7) Soil permeability

Rainfall intensity and velocity are essential factors in flooding which is in association with basin soil. Water only flows on the soil surface which rainfall intensity is more than soil infiltration intensity. Noting that the permeability is one of soil physical properties, hence its value in different types of soils is not same. For example, the average permeability of sandy soils is over 125, loam soils 125 and clay soils 75 mm per hour.

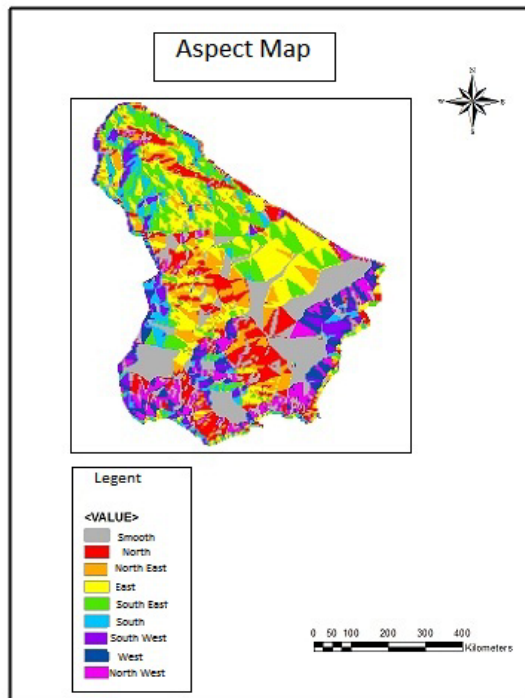


Fig. 4 Aspect map of the study area

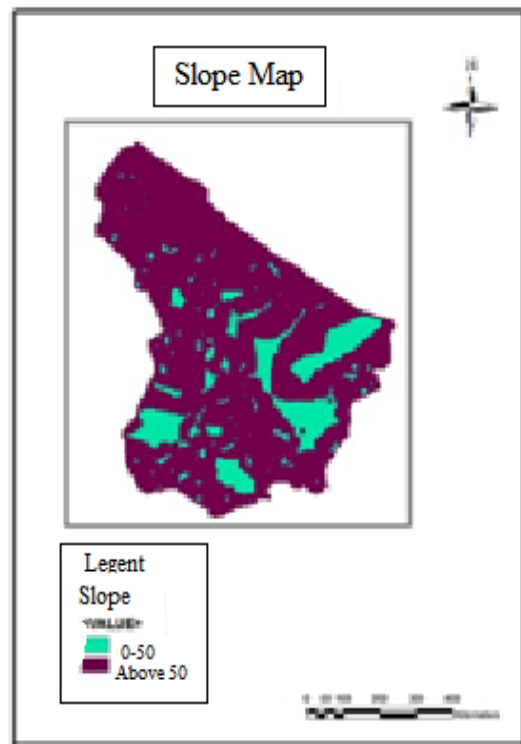


Fig. 5 Map of slope basin

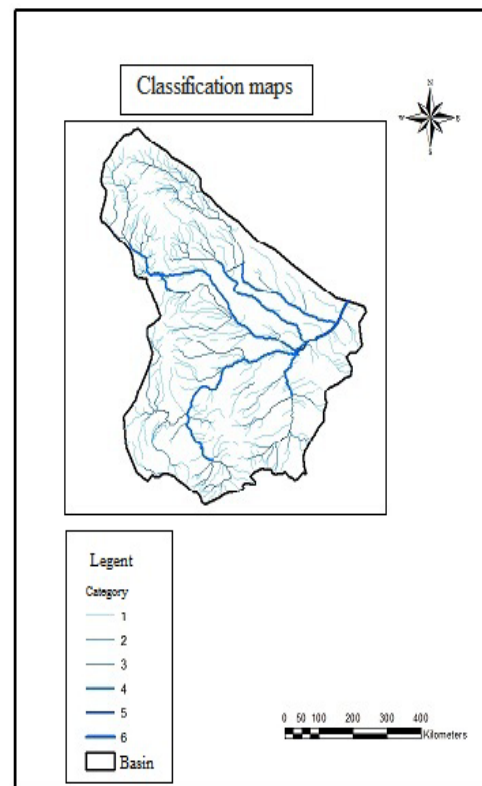


Fig. 6 Classification maps of the river basin

8) Basin geometry properties

Contains of basin area, Basin perimeter, main runoff length, form of the basin average basin width, slope, elevation and topography of the basin, equivalent rectangular and the time of concentration [3]. The following explains each one:

8-1) Area

The most obvious and important characteristics of the basin, is the area; because floods discharge, runoff volume, maximum and minimum discharge, annual average and also the hydrographic form of basin directly depend on this parameter. The watershed area in terms of the area is divided into three categories. Small basins less than 100 square kilometers, average basins between 100 till 1000 square kilometers and big basins are more than 1000 square kilometers. Noting that upper basin area of Yamchi dam is 719 square kilometers, therefore this water shed is considered as the average one.

8-2) The basin perimeter

Is called the imaginary line separating the basin from adjacent basins. Basin perimeter assesses by kilometer or mile. The perimeter of the following basin is estimated 128/9 kilometers.

8-3) The main runoff length

The Main runoff usually is the longest hydraulic path of the basin surface. The length of the largest following basin runoff from the source location in elevation of 4505 meters to Yamchi dam in geographical information system (GIS) is estimated 50 km respectively.

8-4) The Basin shape

Due to the topographical conditions of each region, watershed areas are in various forms. Basins shape can be divided into three major categories: elongated basins, wide basin, and fan-like basins. Due to evaluate the basins shape diverse coefficients are provided and we use some them for the following basin.

8-4-1) The shape factor

Is the basin area ratio to the square of the length of the basin which is shown with Mark (FF). Basin shape factor is 1 and how much the amount is less indicates the basin elongation. Horton shape factor for the Basin is calculated 29/0, and it is approximately similar to the fan-like basin and involves the intermediate state in terms of elongation and being round.

$$FF = \frac{A}{L^2} \# \quad (1)$$

8-4-2) The compression factor

The compression factor or the Gravylyvs factor is the basin perimeter ratio to the basin imaginary perimeter in which its area is equal to the basin area which is calculated from the following equation:

$$c = \frac{0.28p}{\sqrt{A}} \quad (2)$$

If catchment runoff is similar to a complete sphere the compression factor will be equal to 1 and otherwise this is greater than 1, which indicates the deviation from the circular shape. Due to the perimeter of catchment area of study has been calculated 9/128 km, the basin area is 719 square kilometers, according to the calculations of the compression factor for upper basins of the Yamchi Dam 34/1 is calculated. The obtained amount for the basin represents the deviation shape from the sphere.

8-4-3) The elongation ratio

Elongation ratio is equal to the ratio of the diameter of a circle whose area is equal to the length of the catchment area. This ratio is calculated by the following formula:

$$E = \frac{2\sqrt{A/\pi}}{L} \quad (3)$$

This coefficient is for the following basin 0 / 67, indicating that the watershed is approximately compact. Because the obtained value for the following basin is approximately close to 1.

8-4-4) The equivalent rectangular

The equivalent rectangular is a basin that its perimeter changes like rectangular but its area is equal to the basin area. In other words, the equivalent rectangular consists of surface, perimeter, and The Gravylyvs factor in which are equal to the basin. If the Gravylyvs factor is greater than 12/1, the length and width of the rectangle are obtained from the following relations:

$$L = \frac{c\sqrt{A} + \sqrt{c^2A - 1.2544A}}{1.12} \quad (4)$$

$$L = \frac{c\sqrt{A} - \sqrt{c^2A - 1.2544A}}{1.12} \quad (5)$$

For Yamchi Dam upper basin length and width of the rectangle is equal to 59/49 and 55/14 respectively

8-4-5) The average basin elevation

For the upper basin of Yamchi Dam, average elevation of 2160 meters above sea level is obtained.

VI. Conclusions

The flood is one of the Complex and natural devastating phenomenon that leads to great losses each year. Overviewing the basin flood statistics confirms the fact that the majority of flooding occurrence in the upper basins of the Yamchi dam has happened in the months of April and May. Due to the floods occurrence in the following months some factors such as rainfall increasing, snow melting in the upper elevations of the watershed and poor vegetation in the basin are involved in this case. The branching ratio of this basin is relatively high and due to a mountainous area this basin usually faces a large flood occurrence. The slope of this area in Three-quarters of the region is high which leads to intensive movement of rainfall water into the runoff and causing damages by the means of flood occurrence. In the upper basin of Yamchi Dam, physiographic characteristics and geometry properties play an important role in the flood occurrence. The altitude of this basin is fairly high and discriminates the type of precipitation, evapotranspiration rate and condition of vegetation, eventually on runoff and flooding. Considering the results of the study, the following basin has a high possibility of flooding occurrence and must be protected with watershed interactions in the basin to reduce the presumable future flooding.

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Study of affect factors on flooding and crisis management in Yamchi Dam using by GIS

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Abstract—Human life since the beginning up to now has always been associated with the risk of natural disasters. Due to climate variability and temporary instability and destructive condition of Iran, yet is one of the countries that are more vulnerable to natural disasters, that flood is one of the most serious ones. Upper catchment of Yamchi Dam is the Sub Basin of Balkhly River in Ardabil which is located on the southern hillsides of mount Sabalan. Due to the topographic and climate condition of this basin, flooding is vulnerable here; and this causes damage to rural dwelling sites, farm lands, and communicative pathways. The occurrence of this phenomenon in one hand culminates into soil eroding increasing and soil exacerbation resources, in the other hand forces filling in Yamchi Dam reservoir. Therefore the purpose of this study is to identify factors that contribute to flooding in the mentioned basin. so as to approach above purpose factors such as slope, aspect, and lithology, distance from waterways and precipitation were examined as effective factors in which contributes to flooding; then their data layers in (GIS) and Arc MAP were prepared. The results also showed that interfered factors in the flooding basin consecutively include slope and aspect, waterways, rainfall, lithology, and the time of concentration and the time of delay. Overviewing the basin flood statistics confirms the fact that the majority of flooding occurrence in the upper basins of the Yamchi dam has happened in the months of April and May. Due to the floods occurrence in the following months some factors such as rainfall increasing, snow melting in the upper elevations of the watershed and poor vegetation in the basin are involved in this case. Therefore, attention to these issues and providing practical guidelines in the area may reduce the statistics of the future flooding.

Keywords—Natural hazards, factors affecting flooding, Yamchi Dam, GIS.

I INTRODUCTION

In fact flood is increasing in the elevation of water in the river and overflowing of it and occupation of the parts of plains surrounding the river which can lead to damages in residential area and public facilities and can cover human and animal casualties. in some other cases flooding can be

generated by sea or lake level increasing which intensive wind blowing will have impact on it. Flood occurs when soil and the plants cannot absorb the rainfall. Approximately %30 of the average rainfall converts to runoff that rate will increase with the melting snow [4].

Ardabil province has been facing flood occurrence in the past and now that the main reasons for the occurrence of floods can include climate, lithology and inhabitants manipulation in the nature. Dams constructing in this areas mainly are due to flood controlling and water supplying. one of these dams is Yamchi Dam which is constructed on the branches of Balkhly Chay River. However, in upstream of this dam, due to various reasons flooding still occurs, and since a number of few studies have been carried out in this case, Therefore, doing some studies about the main causes of flooding in the area and its zoning is essential.

II Background research

So far, many studies have been done about the flooding and runoff which in this study we refer to some of them. Correa and colleagues (1999) using GIS and hydrological and hydraulic models on the flood plains that are associated with urban development and flood risk, and measured the impacts of land management on flood risk reduction and then proceeded the flood zoning and analyzing [1]. Yang and Tsia (2000) designed a model for the flooding risk zoning, the computation of flood characteristics and indicating floods characteristics in Taiwan which called FGIS. Yang and Tsai in their model, in addition to simulate floodplain, used the curves of depth of damage in order to determine the amount of damages. Platt (2002) in his research called flood risk and its management, described the risk zoning as distinct ways of organizing and managing the risks that posed by natural factors, human or environmental ones which among them flood is so prominent. Rustaie and colleagues (2008) in a study titled Application of Geographic Information System (GIS) in controlling of the urban floods (case study of Tehran province in the northern part), after providing the maps of DEM and TIN of the following basin by the aerial photo and maps, the land status are introduced as the geo-referencing distinct polygon and with compliance of the proposed network flooding to the streets and the pavements and introducing it as the direction of physiographical properties of the city area is extracted. Finally, with a diverse models of Rainfall - Runoff in Urban Designing of the flooding network,

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concluded that the combination can be very effective in reducing the time and cost. Hosseinie and colleagues (2002) in a research about the Application of Artificial Neural Networks in the focused routing of the flood, so found that three-layer Perceptron neural network with two cells in the hidden layer, and obedient to the activities of sigmoid – could reach at good results in flood routing.

III Basin and Dam Positioning

This basin with the area of 719 square kilometer is located in a mountainous region in the northwest of Iran between zones 37 degree and 51 minute, 38 second till 38 degree, 15 minute and 24 second northern and hour circles 47 degree and 64 minute, 35 second and 48 degree and 6 minute and 15 second Eastern. This basin from the west side with the catchment basin of Urumia lake, from the south side with Ghezel Ouzan river basin from the east side with Ardabil, and from the north side is limited to Meshghin Shahr basin. The main drainage of this basin flows from southwest to northeast and is a branch of drainage network in Ghara Sou River which is involved as a part of Aras River. This basin is located in the middle of volcanic mass mountains of Sabalan in the north and mountains of Bozghoush in the southwest. The highest point of peak Pyramid basin with a maximum altitude of 4505 meters above sea level is located in volcanic mass of Sabalan which the main outfall of Aq Laqan River is the important sub-branches of this basin. The minimum altitude of 1506 meters is the site of Yamchi dam. This basin owns 5 sub-basins or independent hydrological unit.

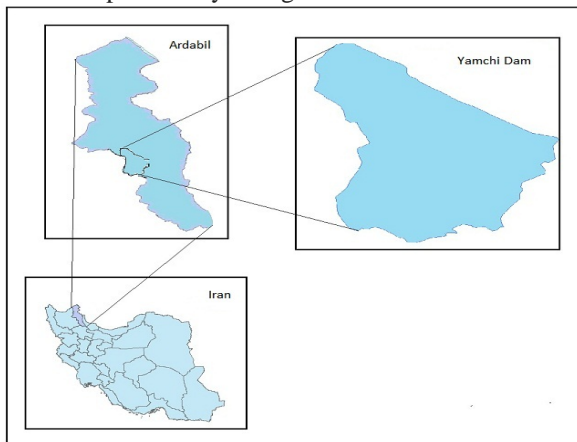


Fig. 1 Map locations Yamchi Dam Basin

IV Materials and methods

In this study first relevant theoretical foundations to the topic were reviewed. Then, according to the review of the resources, efficient factors in flood occurrence we determined the following study basin. Afterward we provided the factors influencing the occurrence of floods in the process of environment. Providing information layer elevation, slope, aspect, distance from river out of the numeral topographic map model in counties Nir, Sarein, Kuraim, Noghdi olya, Imam Chay with the scale of 1:50000 the next step is to map

the basin range so basin boundary layers obtained digitally, afterward the digital tier level within the curved basin prepared and numerical values for each curve in the amount of descriptive information or open attribute table have logged. curve rates within the basin get valued. Thus, digital topographic map of the basin prepared (Fig. 2). Due to a detailed analysis of topography of the basin and observing of three-dimensional basin status using digital topographic map of the basin and by the means of utilizing extension (3D) Analyst, 3D map or tin of basin prepared (Fig. 3).

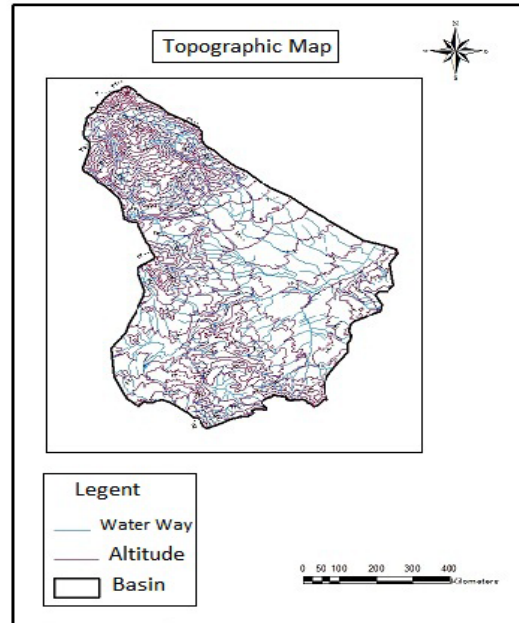


Fig. 2 Topographic map of the study area

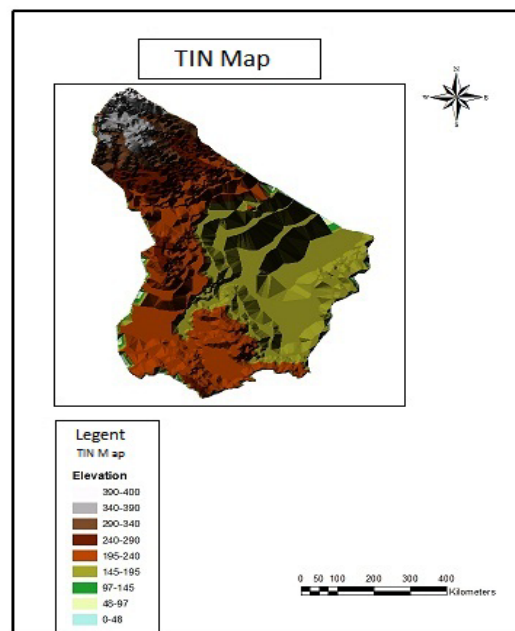


Fig. 3 Three-dimensional map of the study area

V Analysis of data

1) slope

The slope is one of the effective factors of flooding in an area. Steeps often cause severe flooding especially in mountainous areas, however in low slopes rainwater owns an ample opportunity to penetrate the soil layers, therefore flooding occurs rarely, unless in rains with high-intensity in which infiltration speed decreases and causes floods (Fig. 4).

2) Aspect

Aspect is one of the independent factors causing flooding and runoff. Generally, the northern hillsides for snow persistence and high humidity (especially in spring) have a big role in flood (Fig. 5).

3) River Basin Network

River basin network is known as the catchments which collect surface runoff in the surface basin and provide guidance to the exit point of the basin. Different classifications have done for runoffs, which the prevalent case is Astrahler method containing primary runoffs without any branches that is determined with number1, and by the means of combination of two number1 runoffs, number2 constitutes and two number2 runoffs constitutes number3. Classification of upper stream basin runoffs of Yamchi dam is indicated by Astrahler method which is provided and classified in GIS environment (Fig. 6).

4) Rainfall

Rainfall is directly affecting the flood and precipitation rate of the basin is directly affected by the height and wind direction. The natural characteristics of each area affect the amount and atmospheric type of precipitation. According to a general rule, the amount of precipitation increases with increasing in elevation. The analysis of the average monthly rainfall at selected stations suggests that during April and May precipitation in the basin is the highest and the lowest rainfall occurs in August. Thus there is a meaning full correlation between rainfall and flooding in the area [5].

5) Lithology

The forming composers of every region is an important factor in the flooding. Based on the forming composers the following basin, it can be concluded that the most resistant portions of the basin are northern parts, south and southwest and the central and eastern parts of the catchment basin are the less resistant against the floods occurrence.

6) Focus Time

One of the critical factors in the investigation and establishment of runoff is the time of concentration and latency in which indicate that how much the focusing time is more, more runoff and less infiltration (metropolitan area), while how much the focusing time is less, less runoff and high permeability (dry soils). During the latency, with the increased

amount of water which is caused by rain and water infiltration, gradually soil permeability decreases and causing runoff increasing. The focusing time in this basin is 4hours.

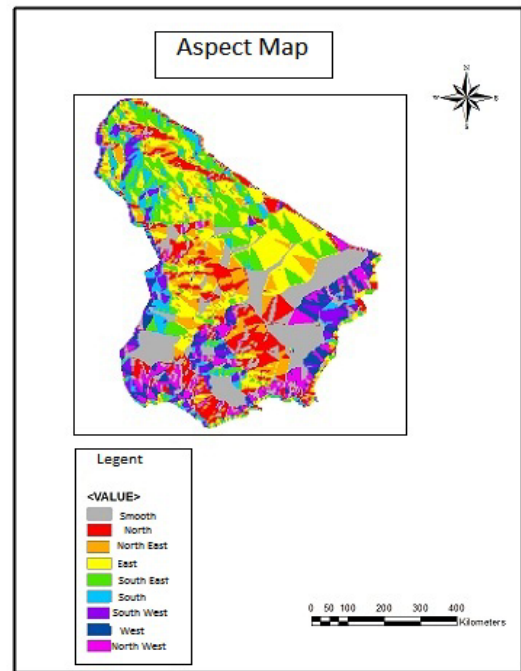


Fig. 4 Aspect map of the study area

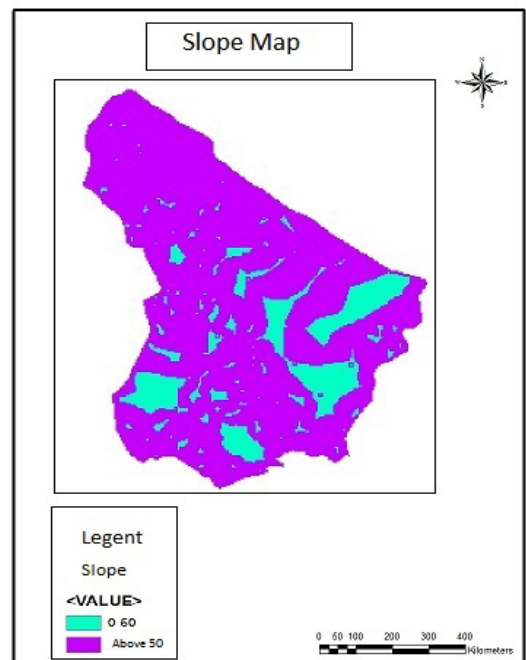


Fig. 5 Map of slope basin

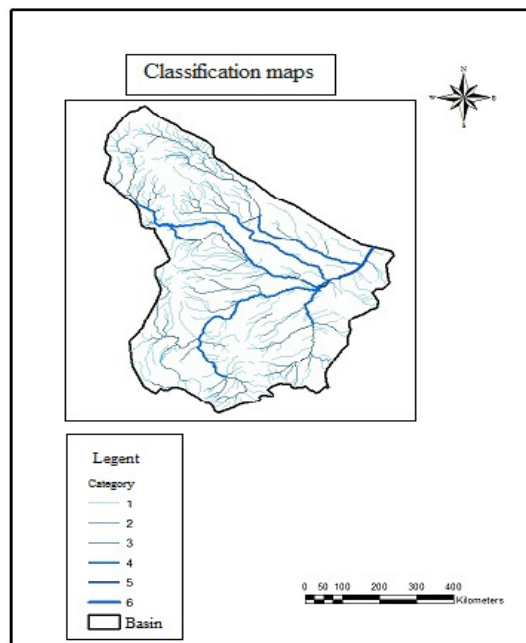


Fig. 6 Classification maps of the river basin

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VI Conclusions

The flood is one of the Complex and natural devastating phenomenon that leads to great losses each year.in the Northern West of the country because the climate is semi-arid and mountainous and due to high rainfall variability, including areas that are prone to devastating floods . One of managing methods of the flood dealing is the flood zoning. Overviewing the basin flood statistics confirms the fact that the majority of flooding occurrence in the upper basins of the Yamchi dam has happened in the months of April and May. Due to the floods occurrence in the following months some factors such as rainfall increasing, snow melting in the upper elevations of the watershed and poor vegetation in the basin are involved in this case. Therefore, attention to these issues and providing practical guidelines in the area may reduce the statistics of the future flooding.

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