

## Review

## Tehran's spatial structure and its periphery using GIS - (Tehran's urban region) - an overview

**Authors:**

**Mohsen Mohammadkhani<sup>1</sup>,  
Abbas Malek Hossieni<sup>2</sup> and  
Majid Shams<sup>2</sup>**

**Institution:**

1-PhD student, Geography and Urban Planning Department, Geography Department, Malayer branch, Islamic Azad University, Malayer, Iran.

2- Assistant Professor and Faculty member, Geography Department, Malayer branch, Islamic Azad University, Malayer, Iran.

**Corresponding author:**

**Abbas Malek Hossieni**

**Email ID:**

mohsen.mohammadkhani.up@gmail.com

**Web Address:**

<http://ecologyresearch.info/documents/EC0326.pdf>

**ABSTRACT:**

Tehran's urban region has reached to its considerable weight of concentration of activity and population and it is facing with a countless number of the problems and challenges. Therefore, in order to figure out the underlying reasons behind such a spatial structure's evolutions and changes that the urban region has undergone we are in need of analyzing the governing conditions building and functions through dealing with various effective factors and the challenges formed thereof in various periods of time. Moreover, a program-based approach has been adopted and a series of practical measures have been taken in line with the recognition of the environmental potencies, demographic trends and the quality of the population and activities' distribution to deal with the elaboration of the approaches appropriate and proportionate to the conditions dominating the temporal, geographical, textural and social features of this national metropolitan city. The pertinent feature of the current study is the adoption of a novel approach which has been acquired and utilized from the nationwide experiences during the recent decades and the evaluation of the common normative methods formed through the valuable experiences gained worldwide for the purpose of urban planning and development. In the meantime, according to the new requirements and the modern objectives pursued by the urbanization development plans such as globalization, environmental conservation, sustainable development, social welfare expansion, improving the leisure time goals and activities, enhancing the urban look and visage and generally "sublimating the urban life quality", newer attitudes and perspectives have been formed regarding the area of urban planning which directs the change in the city of Tehran's region spatial structure towards adopting novel strategies such as concentrated decentralization approach and multiple node metropolitan areas.

**Keywords:**

Tehran urban region, spatial structure, multi-node metropolis, Concentrated Decentralization

**Article Citation:**

**Mohsen Mohammadkhani, Abbas Malek Hossieni and Majid Shams**

Tehran's spatial structure and its periphery using GIS - (Tehran's urban region) -an overview

**Journal of Research in Ecology (2017) 5(1): 642-667**

**Dates:**

**Received:** 08 Mar 2017    **Accepted:** 08 May 2017    **Published:** 12 May 2017

This article is governed by the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which gives permission for unrestricted use, non-commercial, distribution and reproduction in all medium, provided the original work is properly cited.

## INTRODUCTION

Accumulation and centralization of the population and the human activities in limited regions of Tehran and Alborz Provinces breadth (Tehran urban region) has been followed with negative and adverse outcomes among which one can point to the cities imbalanced textural development, the emergence of suburban neighborhoods, poverty and the degradation of the life standards, the lack of service centers and finally imparity in enjoying facilities (Hesamiyan *et al.*, 2004).

Being allocated with a great many of the national functions, the city of Tehran demonstrated the country's economical growth and blooming within a short period of time, but the adverse and negative effects thereof gradually came to the surface after a while (Dehaghani, 2008) since the city become the destination of many of the immigration trips and, consequently, besides the problems recounted above, the city became confronted with other challenges such as the air pollution, congestion and overly high and extreme population burst, extra-neously intensive traffic and so forth. To resolve the abovementioned problems there are numerous programs and plans codified in a national and regional level and the status quo of the conditions signifies the complete failure of such plans. In fact, the slow growth and the harmonic expansion of the city of Tehran has undergone rapid changes since the recent century turn and this has been happened *via* the state and governmental affairs concentration therein and the establishment of the new institutions and the modernism period requirements and obligations have all doubled the pace of such rather rapid changes. In such a manner that during the recent two decades the population in the city of Tehran has almost doubled and then this hastily hurried growth has been continuously kept on going on and it was in 1956 the population increased about 1.5 million people. During these years, Tehran has been little-by-little confronted with problems which have never been there before and they are somewhat unprecedented. To organize such a

situation, two major actions were taken. The first of these actions was decentralization from Tehran and alleviation of the poverty and deprivation in the other regions in the country and it was also decided that the industries had to be relocated within a 120-km distance from the city and also there was made encouragements to investment in other regions and this approach was also continued and persisted after the Great Islamic revolution. The second action taken in this regard was the preparation of a comprehensive and all-inclusive plan for the city of Tehran the studies about which were started in 1966 and it was enacted and encoded as a law in 1970 and also a committee was established to inspect and supervise the city's development process. In this comprehensive plan, no image of the formation of highly populated centers in the periphery of the city of Tehran had not been envisaged, for example the formation of the city of Karaj (with about 40 thousand people population at the time) and Islamshahr and Gharchak (Shabani, 2010).

After the Islamic Revolution, simultaneously with the people's raid to the cities with the hope to benefit from extensive free of charge or cheap land assignments, the criteria of "two floors on the pilot or basement" substituted the diverse criteria from the previous comprehensive plan. The ministry of accommodation and city building also placed the revision of the first comprehensive plan and the preparation of the city of Tehran's (comprehensive) reformation plan at the top of its agenda since the mid-80s (Shabani, 2010). In the second comprehensive plan, the city's population was increased from 5.5 million people in the first plan to about 7.65 million people in the second one. In this cross-section of the time, the city of Karaj and many of the other cities and villages in the regions also experienced expansion and Islamshahr, Gharchak and many of the other numerous new centers appeared. The area at the periphery of the city of Tehran was brought to attention in the second comprehensive plan, but it recommended the establishment of five new cities to locate the popula-

tion in Tehran's region without considering the cities and the villages already existing there and the creation of such cities has been found devoid of any significant effect on the accommodation ordering and the relocation of the city of Tehran's population. With the cessation of the government contributions and emphasis on Tehran's municipality self-adequacy and autonomy, it was decided that the credits required for the fast renovation of the city of Tehran should be provided through the method of making use of the lands. Such a policy became the base of the actions with the termination of the imposed war and the outset of the stability and reconstruction period and it was at this time and through the process pointed out here that the organization plan enacted in 1991 was discarded and it never became a gold standard for the actions to be drawn upon and no detailed and integrated plan was prepared for it. During the years from 1966 to 1996, the population at the periphery of Tehran (the cities and the villages located in Tehran province) increased from a basic 700 thousand people to over 3.5 million people (Ibid). It is evident that the city of Tehran could not remain a safe island surrounded by such a huge population volume, with all its intrinsic deprivations and abundant deficits. Thus, the topic of "the management and the preparation of the city of Tehran's urban system and the cities in the periphery" was placed on top of the state's agenda list since 1996. The objective of such a plan was organizing the accommodations and the population relocation and activities regulation and ordering within the regional territory of Tehran metropolis (Shabani, 2010). The main strategies of such a plan were decentralization from the city of Tehran's limits, corroboration of the peripheral population centers in terms of social, economical and service providing aspects aiming at the relative self-adequacy and their reduction of dependency on Tehran. The actualization conditions of the plan were the creation and establishment of a single managerial unit at the metropolitan regional level, informal resolution of the accommodation problems and the de-

velopment and rebuilding of the peripheral deprived and poor centers. Within the frameworks of the plan, the city of Tehran's population control plan, with the maximum number of 7.65 million people, was again highlighted and the city of Tehran was considered as playing the role of a capital city and a metropolis in a regional and global level. The main suggestion pointed out in the plan was the "establishment of a single urban management institution" which never was practically practiced despite its enactment and the rest of the suggestions made by the plan were practically left infertile and barren.

The result of the failure and/or the abandonment of the policies and the programs set in the entire national and regional macro-level plans were mess and disarray of the proper activities and population distribution within its spatial structure. Thus, in the present study it has been tried to combine and blend various information layers in order to prospectively evaluate the territorial potency of the land in respect to the existing residential centers and their population evolution trends during various census periods to provide for the possibility of coming up with more facilitated optimum spatial structures suggestions. The most common sustainable management methods, in a nutshell, are the ecological evaluation of the resources and preparatory zoning of the land use potentials (Ahssani, 2007). Such a zoning procedure underlines the identification of the potential and active talents of the region in order for the sustainable and unstable lands to be recognized (Rajaei, 2003) in which it is endeavored to determine the different zonal breadth potentials. GIS with its high capability in managing the data and presenting new outputs is an efficient tool for the identification of the population relocation auspicious regions (Karam, 2005) and it is in need of the inputting and producing appropriate information layers, in the first place, according to the data and informational layer application and usage objectives. In this process, the functions which have been used include buffering, adjacency and juxtaposition calculations, distance value and different over-

laying analyses (Kou *et al.*, 2002).

### Statement of the problem

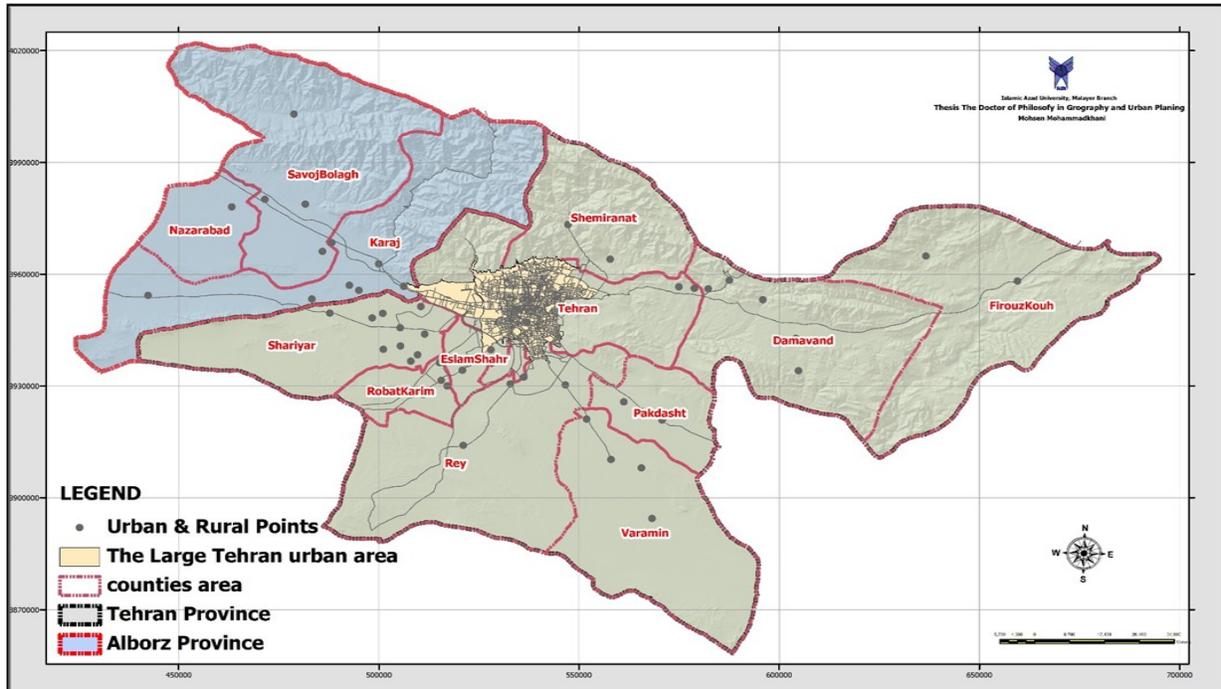
Nowadays, the increase in the business, administrative and industrial centrality of the city of Tehran has brought about conditions which in spite of the relative reduction of the population growth rate in comparison to the previous decades, the peripheral residential points including the cities, villages and boroughs have been selected and occupied as place of dwelling by the emigrants who have come to Tehran for living and finding a job and they mostly are forced to move to the peripheral cities and villages for living and working because of their inability in securing their life and accommodation costs and expenditures. In between, the recent policy-making procedures in the area of urban development tend to accumulate and amass the residential locations and villages within the format of newly-established cities and taking independent service providing opportunities for these cities and villages into consideration in order to attract the city of Tehran population spillovers. In other words, what is now called the villages around Tehran has changed its role for the time being.

The northern villages in Tehran play a dormitory role and the southern and western villages have been formed around playing laboring attraction roles (Tavakkoliniya, 2012). Some of these villages have either turned into cities or faced with unofficial and informal problems and difficulties. Based on the census conducted in 2011 in Tehran Province and Alborz Province there are about 51 cities which have almost doubled in contrast to the previous census and about 42 cities out of this number have had less than 50 thousand people most of which have been formed via the aggregation of several villages. The important thing of the matter in the future policy making attempts is that they should take this fact into consideration that supposing that the emigration streams to the region are stopped, the current population will not be experiencing reductive changes. So, how is it possible to improve the current status? Are the improper

and inappropriate life conditions which have been the result of the centralization and accumulation of the communities and activities within certain areas organizable and guidable? How and where?

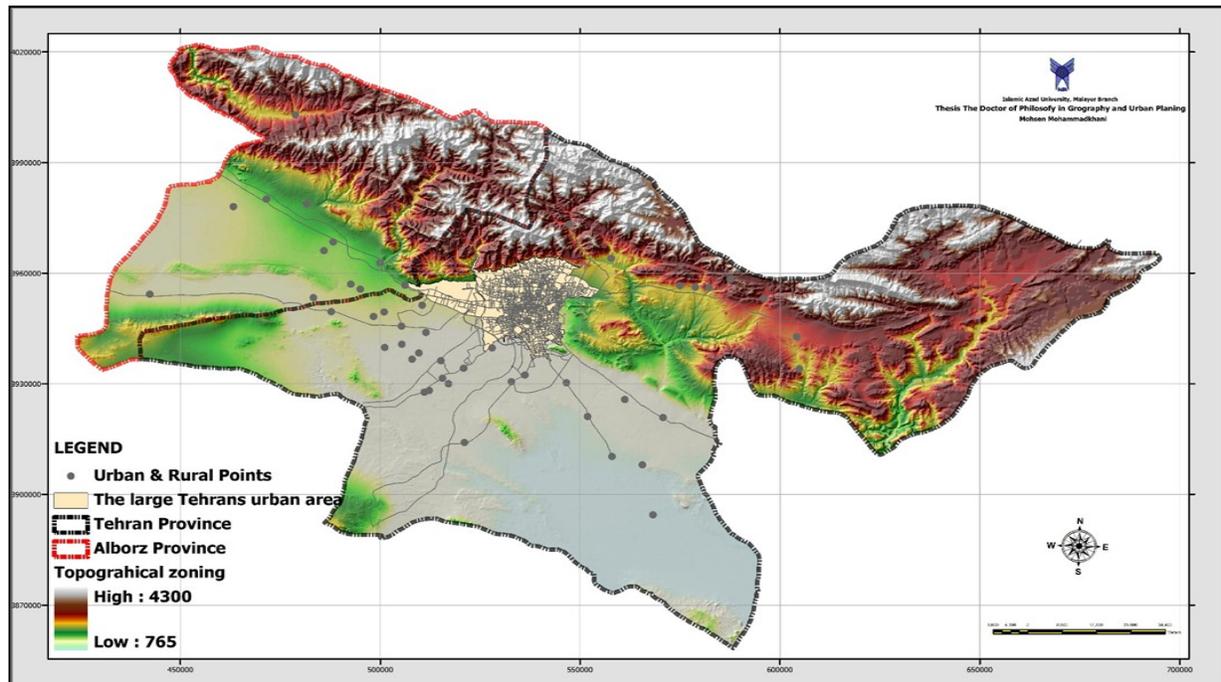
### Study area

Tehran urban region with an area of about 18800 square kilometer involves provinces such as Tehran and Alborz. It is located in the northwest of the Dasht-e-Kavir desert and southern part of the Alborz mountain range. According to the latest country classifications, the region encompasses 15 counties, 37 sections and 83 boroughs (Figure 1). The number of urban points reaches to 51 cities and 1319 inhabited villages (Ministry of interior, country division office, 2011). From geomorphological perspectives, Tehran urban region can be divided into three parts of mountainous, foothill and plains (Figure 3). The mountainous section of Tehran's urban region is the part of a central Alborz and it includes heights above 1500 meters and it continues up to the northern border of the area (Figure 2). The natural conditions act as barriers to the establishment of the cities and large villages in this region but the existence of the appropriate climate and beautiful landscapes and scenes and the winter sports facilities have practically caused the region to be used for summer stays and as a resorting area and spending the leisure time by the citizens (Alemzadeh *et al.*, 1999). The southern margin of the Alborz elevations are comprised of foothill alluvial plains within a height ranging in the elevation from 1000 to 1500 meters above sea level and this land is currently being used for the agricultural purposes (Figures 2 and 3). This breadth of the land which is situated in the area between the northern elevations and the southern desert-like region enjoys a semiarid climate. The important rivers of the region such as Karaj, Jajrud and Damavand flow in the plain and they originate from the northern heights. Tehran and Karaj plains are of a 900 meter to 1500 meter elevation in the southern section of Alborz heights and they are stretched in a region from



**Figure 1. The study area political divisions**

Source: Plots were created by the author by the use of the country division information, Ministry of Interim, 2011



**Figure 2. Topography**

Source: Plots were created by the author by making use of the 1:25000 maps obtained from the country's mapping organization (National Cartographic Center, 2009) and preparation of the plots in GIS environment

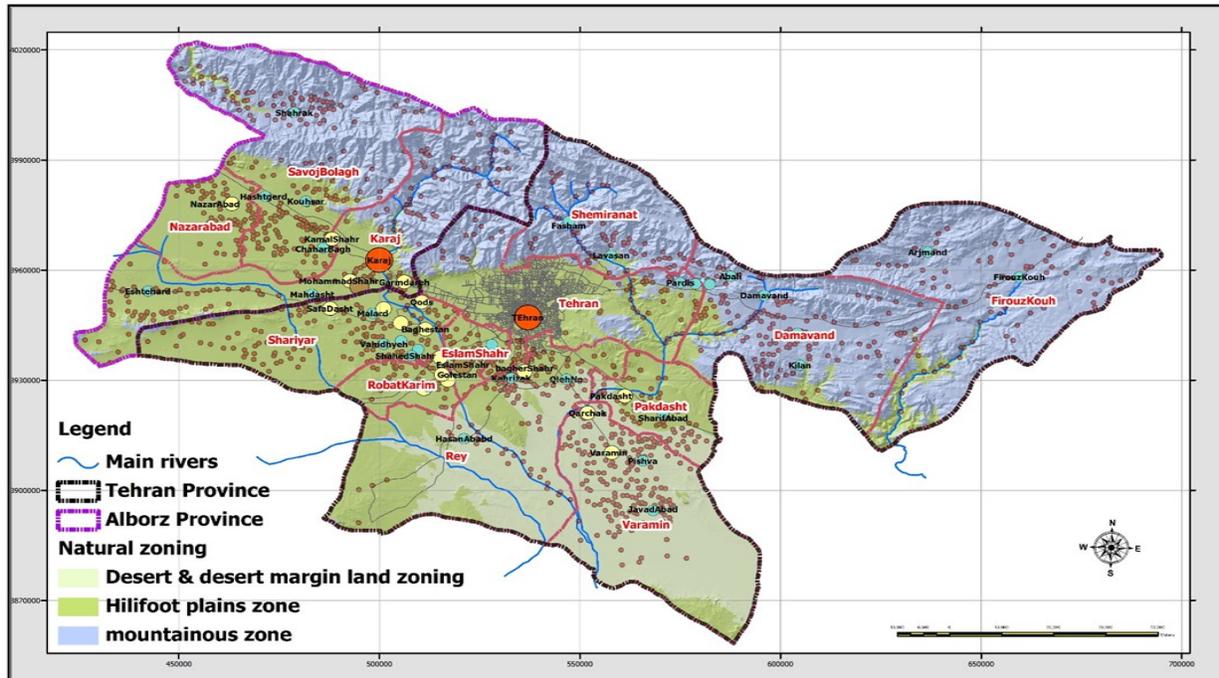


Figure 3. Natural classifications

Source: Plots were created by the author by making use of the 1:25000 maps obtained from the country’s mapping organization (National Cartographic Center, 2009) and preparation of the plots in GIS environment

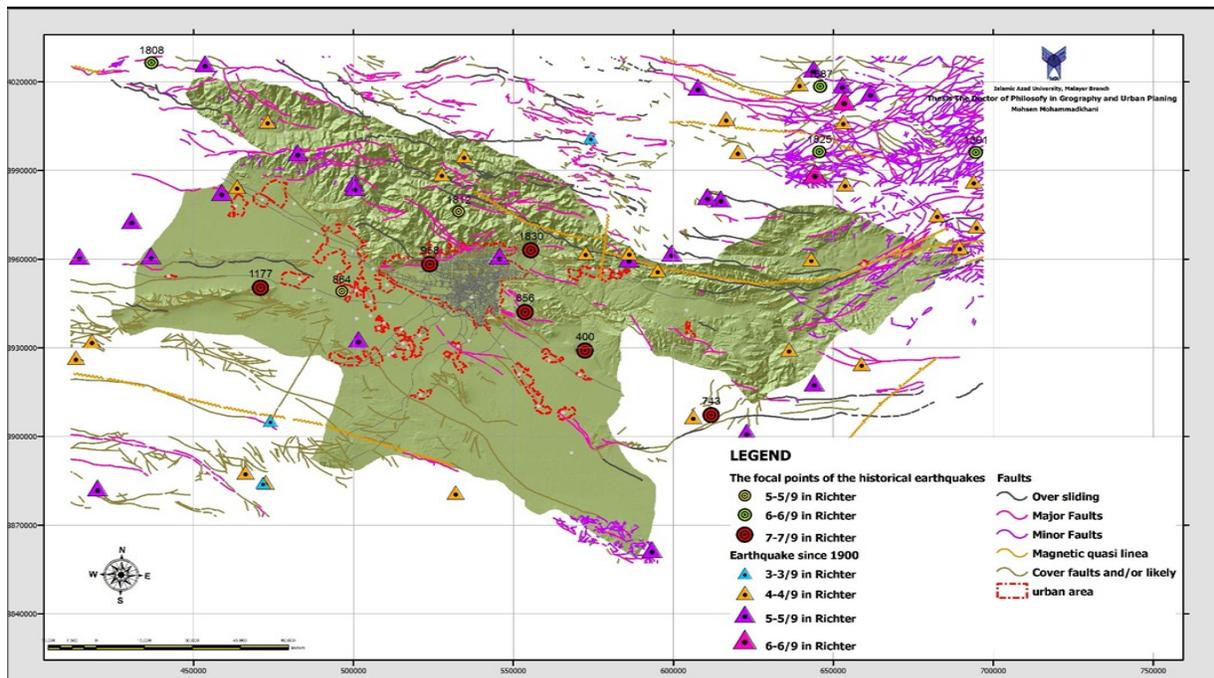


Figure 4. Faults and historical earthquakes

Source: Tehran’s urban system plan (Alemzadeh et al., 1999), Iran’s architecture and city-building research center and Tehran university geophysics association (TUGA 2012).

Hashtgerd and Eshtehard to Varamin in the east. The region which has dales with shallow to semi-deep gravel-bearing soil with a 20 to 40 percent slope involves about 20% of the entire region area (Alemzadeh *et al.*, 1999).

Regarding the geological features of Tehran urban region (Figure 4) the important thing that can be highlighted here is that the region is exposed to earthquake and the past history of the earthquakes occurred within the city of Tehran breadth and the area in its vicinity and also the situation, mechanism and the regional faults morphology are all implying the fact (Alemzadeh *et al.*, 1999).

Based on the existing information, the most important active faults in the city of Tehran's urban region are the Masha-Fasham fault, North Tehran Fault, North and south Ray Fault. Of course, it has to be pointed out here that this possibility of other latent faults may have been concealed underneath the sedimentary layers of the region. Under such conditions, the exact detecting of location of such faults is deemed to be difficult and the occurrence likelihood might not be identical and similar everywhere (Alemzadeh *et al.*, 1999).

**The survey of the method of population centers (urban, rural) establishment**

Subsequent to the urban system diversification and the increase in the other large and medium sized cities shares, Tehran's population quota of the country's urban population in the years between 1978 to 2011 have witnessed a decrease from 28% to 20% and the city of Tehran's urban region quota has also been reduced from 30.5% to 28% of the total urban population. Following this descending change, the population accommodation pattern reached to 51 cities in 2011 from its seven cities in 1966 and the number of the cities with more than 50 thousand people increased from one city to eight cities. The city of Tehran embraced about 88% of the region's population in 1966 and this was reduced to 65% in 2011. The first characteristic which has to be highlighted in the population accommodation system evolution plan within the city of Tehran's urban region is the reduction in the emi-

gration quota of the regional population growth. In the decade from 1978 to 1988, about 1.7% of the 4.4 growth rate of the region stemmed from migration. This regional population growth rate was reduced to 0.4% in the years from 1986 to 1996. In other words, the natural growth of the population and its internal relocations has played a far more significant role in the region's accommodation system evolution. The second important feature is the reduction in the city of Tehran's share of attracting the surplus population from 82% in the years from 1966 to 1976 to 57% in the next decade and about 29% during the recent decade which is reflective of the accommodation centralized evolution pattern to a decentralized and scattered pattern. The third attribute which needs to be underlined here is the weakness in the small and medium-sized old cities of the region in attracting the extra population and the emigrants repelled from the city of Tehran. The abovementioned cities attraction potential was about 8.4% of the surplus population which was estimated based on two census conducted over the region in the years from 1966 to 1976 which experienced an increase in the next decade to 25% and it reached to a high value of over 29% within the span of the third decade, this was while the new cities and the self-propelling residential areas which had attracted about 5% of the surplus population within the first decade afforded to attract about 11% of the population within the last decade and the non-urban locations quota of the surplus population increased from its basic value of 3.9% to 31%. The suburban life share of the region also experienced a 2.2% increase within the 1976-1986 decade and it only underwent a 3-percent increase in the next decade (Zarghami, 2009). The fourth characteristic is the expansion of the informal accommodation aspects in the region. The extant estimations signify that the informal accommodation rate that has increased from about 5% of the regional population in 1976 to 11% in 1986 and 19% in 1996. In 1996, almost 1980 thousand people of the total population lived in the cities or towns which have been developed informally and have turned

into cities or were still regarded as the informal villages or towns (Zarghami, 2009). The city of Tehran's population quota of the total country population suffered a decrease in the later years but the population growth still continued and according to the United Nation's forecast in 2025 it will reach to 9.5 million people which will be increased to over 10 million people after a short while Zarghami, 2009).

### **The survey of the population evolution in the urban system**

In 1976, the total population of the then existing 18 cities was 4869911 people out of which approximately 94% lived in the city of Tehran, 2% were accommodated in the city of Karaj and the remaining part lived in the lower than 50 thousand people classes (Figure 5 and Diagram 1). In 1976, the region's urban system characteristics included the followings: 1. The wide gap between the metropolitan Tehran and the other cities, 2. The existence of a city with a population of more than 1 million people and the absence of any cities with a population class of between 250 thousand to 1 million people within the region's hierarchical system, 3. The great majority of the cities was comprised of the lower population classes, 4. The lack of medium sized cities within the urban network and disorganization in the hierarchical system; all of which are considered as the other traits of the city of Tehran's urban system in 1976 (Gheybi and Jajarmi, 2011).

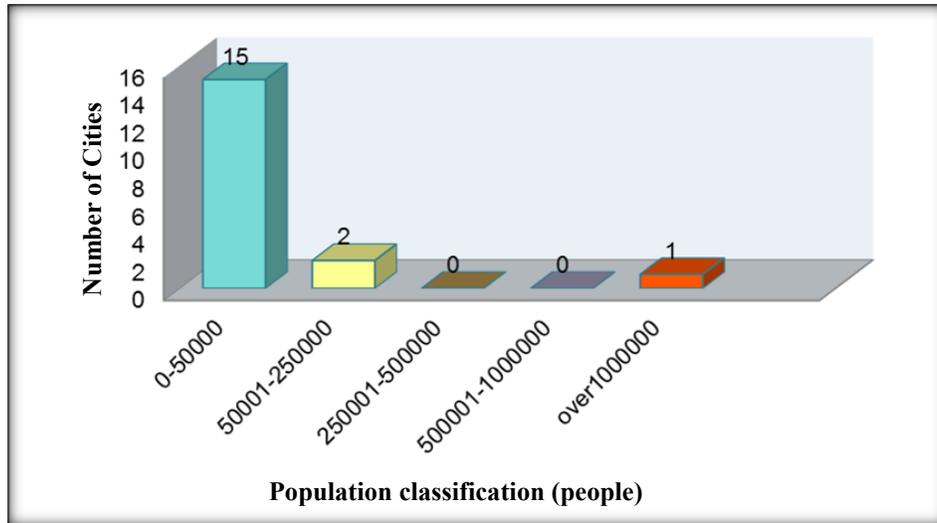
In 1986, the population of the studied cities reached to 6993013 with a 2-million-people increase. In this year, more than 86% of the population were only dwelling in the city of Tehran. The city of Tehran (the study area) had 19 cities in 1986 and only 3.93% of the urban population lived in a large city (Karaj) with a population of over 250 thousand people and 4.55% of the population lived in two medium cities with a population of between 100 and 250 thousand people (Islamshahr and Raja'eeshahr) and 4.72% if the remaining population were scattered in 15 small towns (Figure 6 and Diagram 2). The urban system feature of the region in 1986 included the

followings: 1. The emergence of a city in a 250 thousand to 500 thousand people class for the first time, 2. The increase in the small cities quota of the urbanization along with their reduction in quantity, 3. The reduction in the city of Tehran's share of the city-dwelling population in the region in contrast to the past decade and its increase in the other classes, as well (Jajarmi and Gheybi, 2011).

The general investigation of the information pertaining to 1996 indicates that the population hierarchical system of the region has been defined within the framework of three cities of Tehran, Karaj and Ismalshahr on the top and 100 to 250 thousand people populated cities incorporate three out of the total 25 cities and 19 towns have also come to existence in the form of small and very small cities with areal and sectional functions in the hierarchical system (Figure 7 and Diagram 3). The urban system enjoyed the following features in 1996.

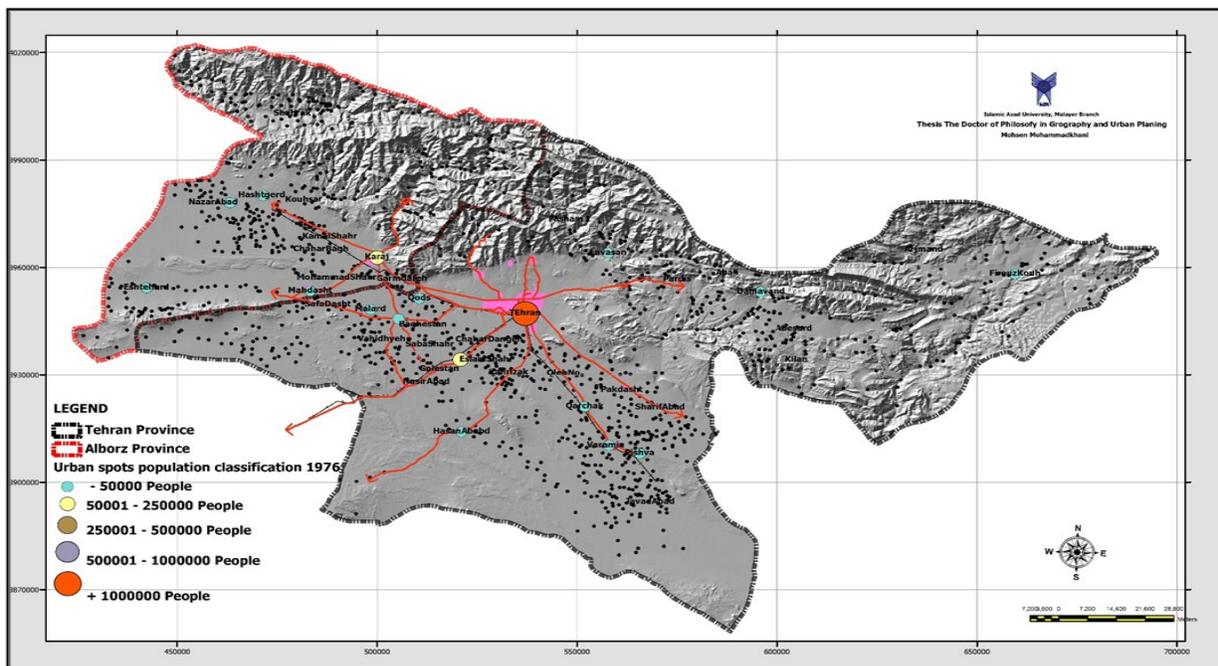
1. The decrease in the urbanization quota of the city of Tehran and positive orientation towards medium and intermediate cities,
2. The appearance of a city with a population of approximately 1 million people in the city of Tehran other than the metropolitan Tehran,
3. Filling of the gap between the classes in the urban system for the first time during the study years,
4. The increase in the number of the cities in medium population classes (Jajarmi and Gheybi, 2011).

In 2006, the urban population of the region reached to 12252517 people. In other words, the urban population increased from 86.2% in the years from 1996 to 2006 that is to say that it experienced a 1.5 percent increase but the growth rate decreased from 2.48% to 2.46%. During the ten-year period from 1996 to 2006, the number of the cities increased from 25 cities to 51 cities. The metropolitan Tehran quota of the urbanization percent indicates a considerable reduction in contrast to 1996 in such a way that it decreased from 75.84% to 63.64% with a 12.20 percent decrease (Figure 8 and Diagram 4). The urban system in 2006 enjoyed the following features:



**Diagram 1. Urban locations population classification in 1976**

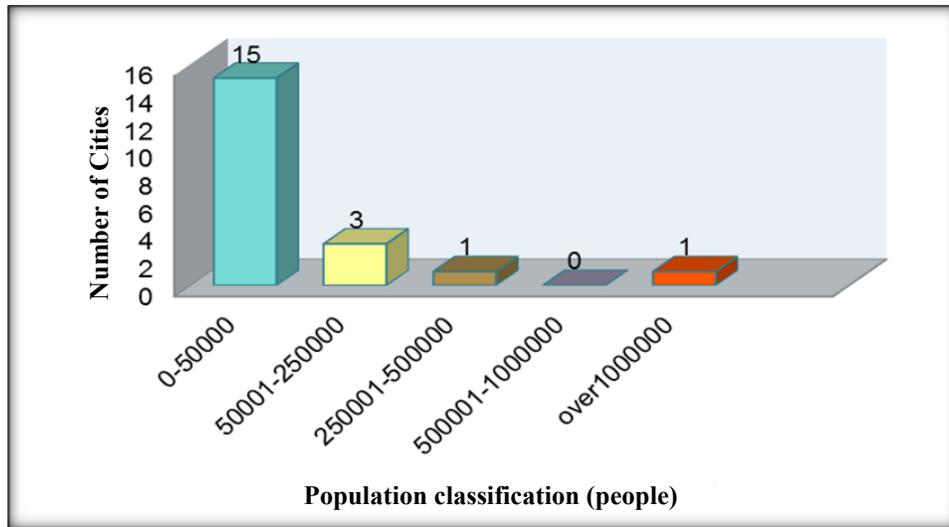
**Source:** Graph was drawn by the author by using the statistical data obtained on 1976 from the Iranian statistics center (Iran's statistics center, 1976)



**Figure 5. The urban spots population classification in 1976**

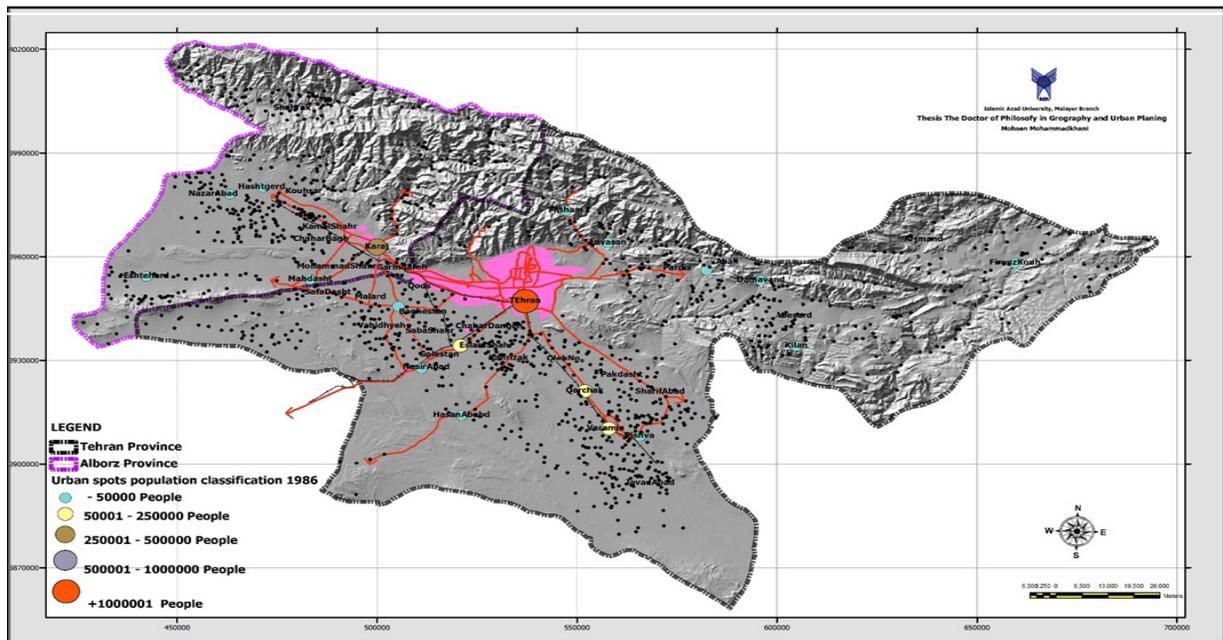
**Source:** Basic plotting were done by the author by making use of the country's mapping organization's data basic plots (National Cartographic Center, 2009) and the statistical data obtained in 1976 by the Iranian statistics center (Iran's statistics center, 1976)

1. The emergence of a city with more than 1 million people population other than the city of Tehran within the urban network for the first time,
2. The reduction in the gap between the second city and the first one,
3. The increase in the number of the small cities in contrast to the past decades,
4. Filling of the gap between the city of Tehran and the other cities as a result of the appearance of the large and medium sized cities in the regional level (Jajarmi and Gheybi, 2011).



**Diagram 2. Urban spots population classification in 1986**

**Source:** The graph was drawn by the author by making use of the statistical data obtained in 1986 from the Iranian statistics center (Iran’s statistics center, 1986)



**Figure 6. Urban locations population classification in 1986**

**Source:** Basic plots were done by the author by making use of the country’s mapping organization’s data basic plots (National Cartographic Center, 2009) and the data obtained through a census conducted in 1986 from the Iranian statistics center (Iran’s statistics center, 1986)

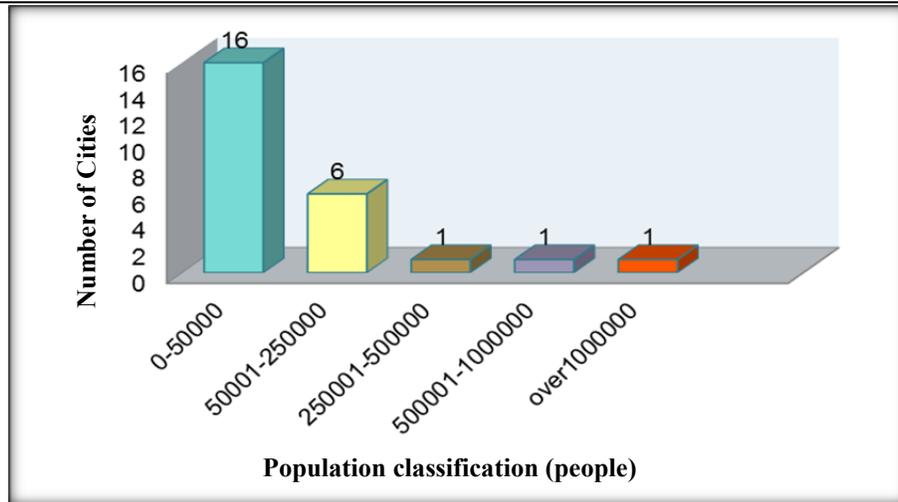
The urban system in 2011 has more or less enjoyed the same features pertaining to the previous period (Figure 9 and Diagram 5):

1. The existence of a city with a population of more than 1 million people other than the city of Tehran in the urban network,

2. The closing of the gap between the second city and the first one,

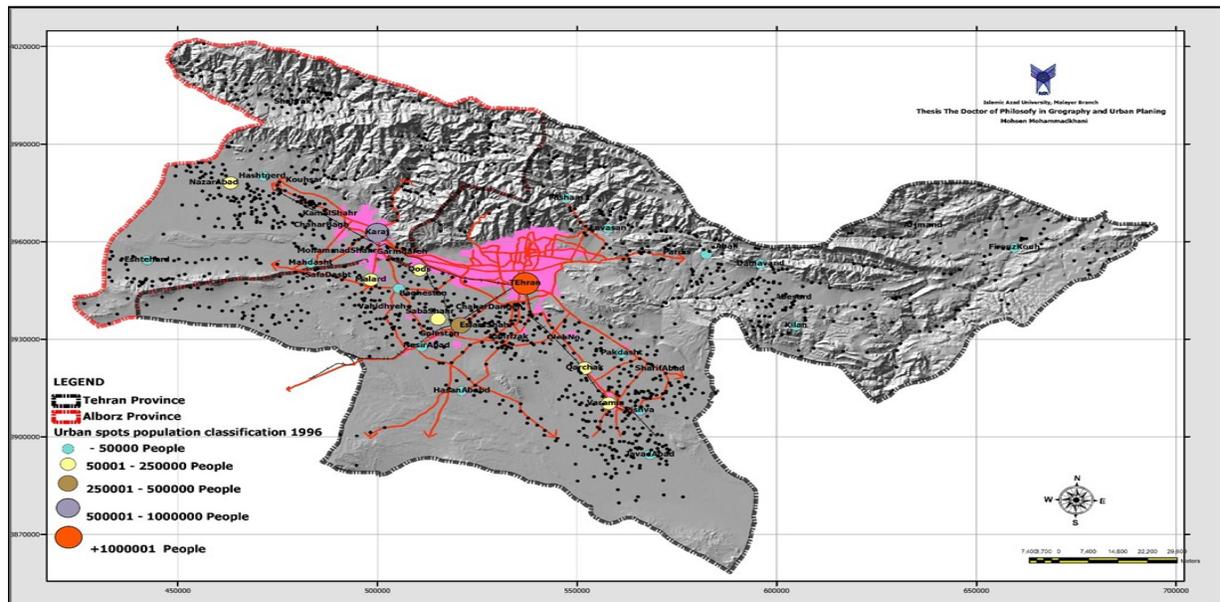
3. The increase in the number of the small cities in respect to the previous decades,

4. Filling of the gap between the city of Tehran and the other cities as a result of the appearance of the large and medium cities in the regional level,



**Diagram 3.** Urban spots population classification in 1996

**Source:** The graph was constructed by the author by making use of the data obtained through a census conducted in 1996 by the Iranian statistics center (Iran’s statistics center, 1996)



**Figure 7.** Urban center’s population classification in 1996

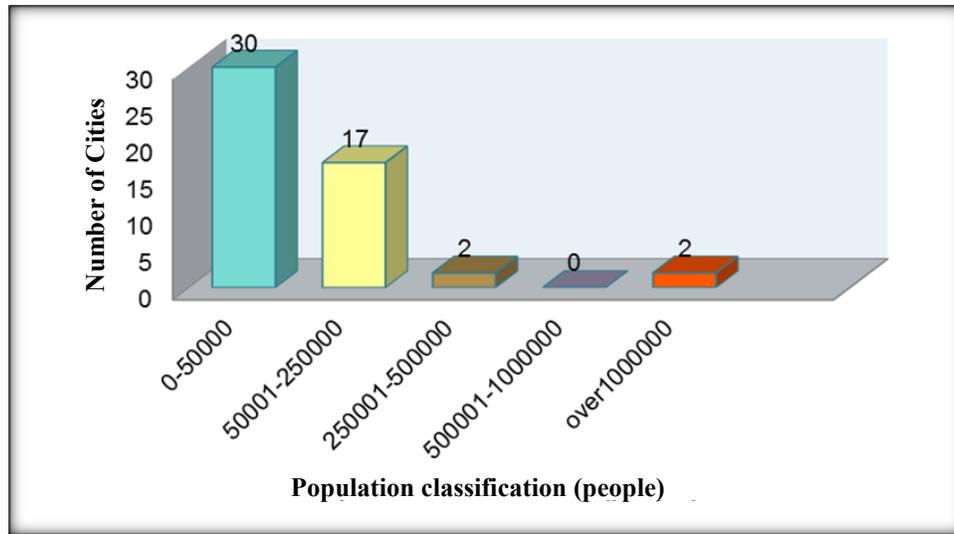
**Source:** Basic plots were done by the author by making use of the country’s mapping organization’s data basic plots (National Cartographic Center, 2009) and the data obtained through a census conducted in 1996 by the Iranian statistics center (Iran’s statistics center, 1996).

5. The country’s division variations and the formation of Alborz province by separating it from Tehran province (Figure 9 and Diagram 5)

**The evaluation of the population evolutions in the rural system**

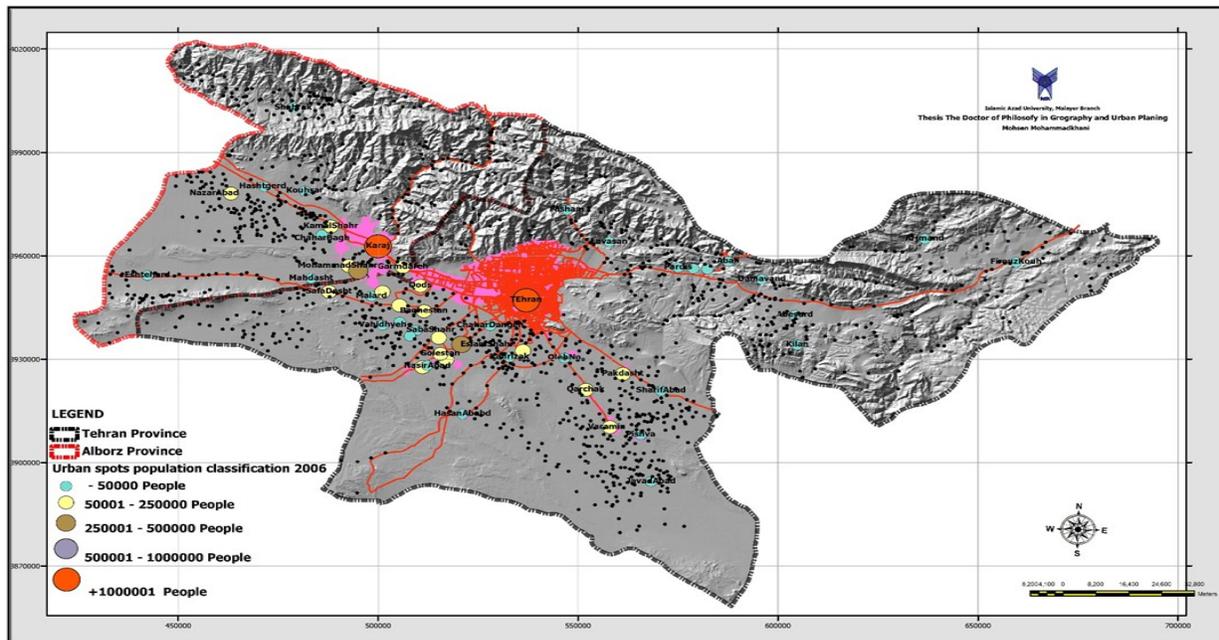
In 1976, about 66% of the rural areas in the region had populations lower than 250 people and the number of the villages with populations between 250 to 1000

people accounted for about 28% of the village count of the country (Figure 10). In 1986, 65% of the city of Tehran’s urban region villages had population less than 250 people and the number of the villages with populations between 250 people and 1000 people were estimated to be 26% of the entire rural spots (Figure 11). In 1996, about 66% of the villages situated in the city of Tehran’s urban region had a population of less than 250 people.



**Diagram 4. Urban locations population classification in 2006**

**Source:** The graph was constructed by the author by making use of the data obtained through a census conducted in 2006 by the Iranian statistics center (Iran’s statistics center, 2006).



**Figure 8. Urban spots population classification in 2006**

**Source:** Basic plots were done by the author by making use of the country’s mapping organization’s data basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 2006 (Iran’s statistics center, 2006).

About 19% of the villages also had a population between 250 people and 1000 people (Figure 12). In 2011, about 59% of the rural spots had a population of lower than 250 people and 24% of the urban region rural spots had a population between 250 people to 1000 people (Figure 14).

Analyzing the population locations evolutions and changes during the years from 1976 to 2011 it can be

concluded that the number of the rural spots with population less than 1000 people had not been following a fixed trend. During all these years, the number of the villages with a population of above 1000 people has always been increasing and as it is observed from the maps the number of the villages with a population between 1000 people to 5000 people and 5000 people to 10000 people and above

10000 people have been constantly elevating.

**Data Analysis**

Analyzing and blending the information layers and the topical maps procured, three distinct breadth or zone were identified to have a determinant effect on the way the population is located and the method the human activities are distributed in Tehran’s urban region. These three zones are: the northern elevations, the middle section and the southern part.

- **The northern heights zone**

The northern heights region is an area which involves the 1500 meter and higher elevation line with a little venial and it continues up to the northern border of the region. This section encompasses about 50% of the regional area. The land in this section is mostly highly sloped and it enjoys a humid and Mediterranean climate. The physical constraints and limitations of the residential centers on these elevated lands, on one hand, and the difficulty to reach to employment centers, on the other, has caused the area to be relatively less populated on these heights (Alemzadeh *et al.*, 1999).

- **The foothill zone**

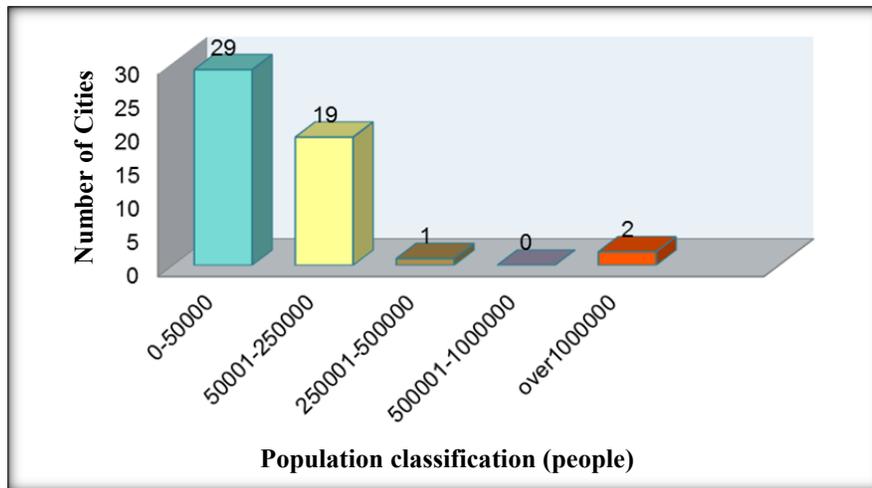
The southern margin of Alborz elevations within an elevation between 1000 and 1500 meters from the sea level constitutes the alluvial hillside plains and these mainly embrace the agricultural lands. The zone which is located in the distance from the northern heights and the southern desert zone has a semiarid climate and the more it is reached to the southern section of the zone the more the humidity of the area is reduced (Alemzadeh *et al.*, 1999). The important rivers such as Karaj, Jajrud and Damavand flow in the plains of the zone in their continuation of their streams from the northern elevations and they were the major source of the agricultural irrigative water requirements, However, with the decrease in the agricultural irrigative water right from the aforementioned rivers, exploitation of the ground water sources was intensified

which is considered as a serious threat to the regional ecosystem (Ibid).

- **Desert land zone and the desert margins**

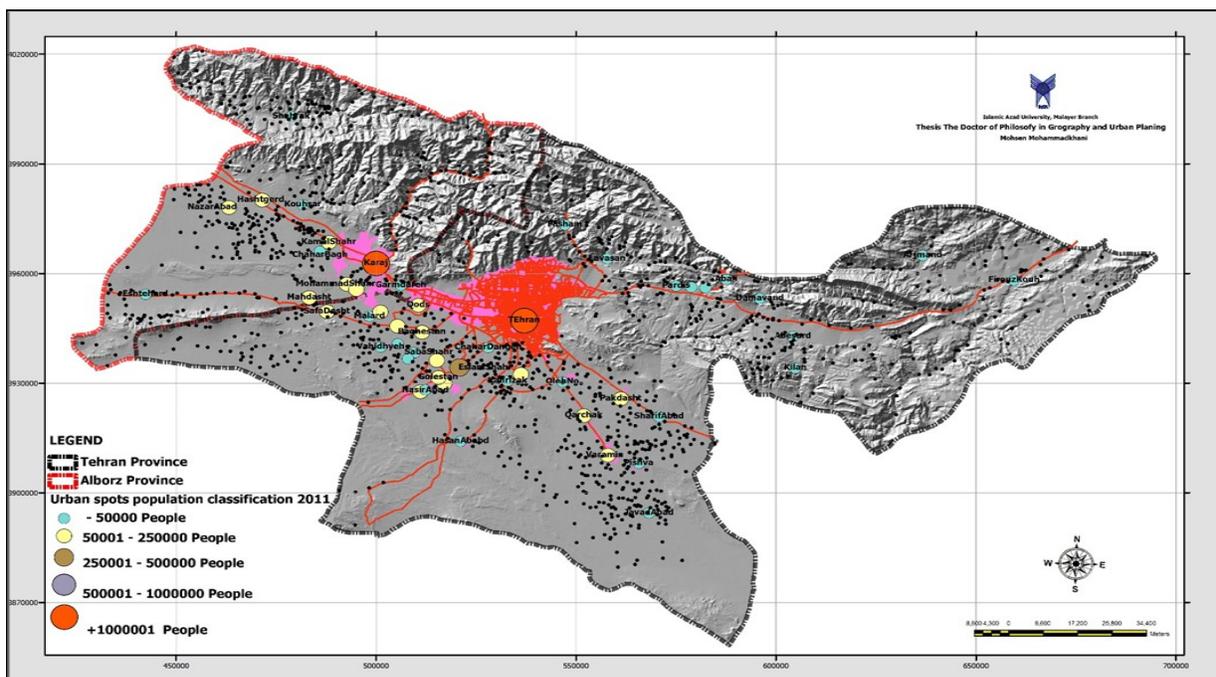
The more we approach to the southern section of the region the more the land salinity is increased and important changes occur in the soil physical texture occurs to the extent that in the southern section the arability of the land is totally diminished. The region which is featured with dales with shallow to semi-deep gravel soil possesses a slope ranging from 20% to 40% and it has been estimated to involve about 20% of the regional area (Alemzadeh *et al.*, 1999).

Recognition of the determinant effects of these three zones on the population relocation changes trend in the city of Tehran’s urban region entails the combination and the pooling of the various data obtained from different census periods with the geographical boundaries of the zones. On the other hand, to elaborate the maps of the population variations in various census periods according to the frequent changes in the political limits and the country classification plans the only reliable element is the residential areas population (both rural and urban sectors) and the perfect reliance on such spots is per se not seamless and it is occasionally accompanied with deficits and flaws. Thus, to form an information bank of the population in the entire residential centers after the statistics are extracted and there are figures and numbers pertaining to the four census periods available and after the population growth rate was calculated, as well, the threefold natural zone is divided into the political limits of Tehran and Alborz provinces and these three zones are divided into regular hexagonal cell networks in order to take advantage of the information extracted from the Statistics Center census data and present them within a level paradigm and, of course, to adjust and alleviate the problem of frequent displacement of the political division lines within the borough and even county level (Figures 15 to 18). In fact, by making use of the population data obtained through four census periods on the urban and rural levels and generaliz-



**Diagram 5. Urban spots population classification in 2011**

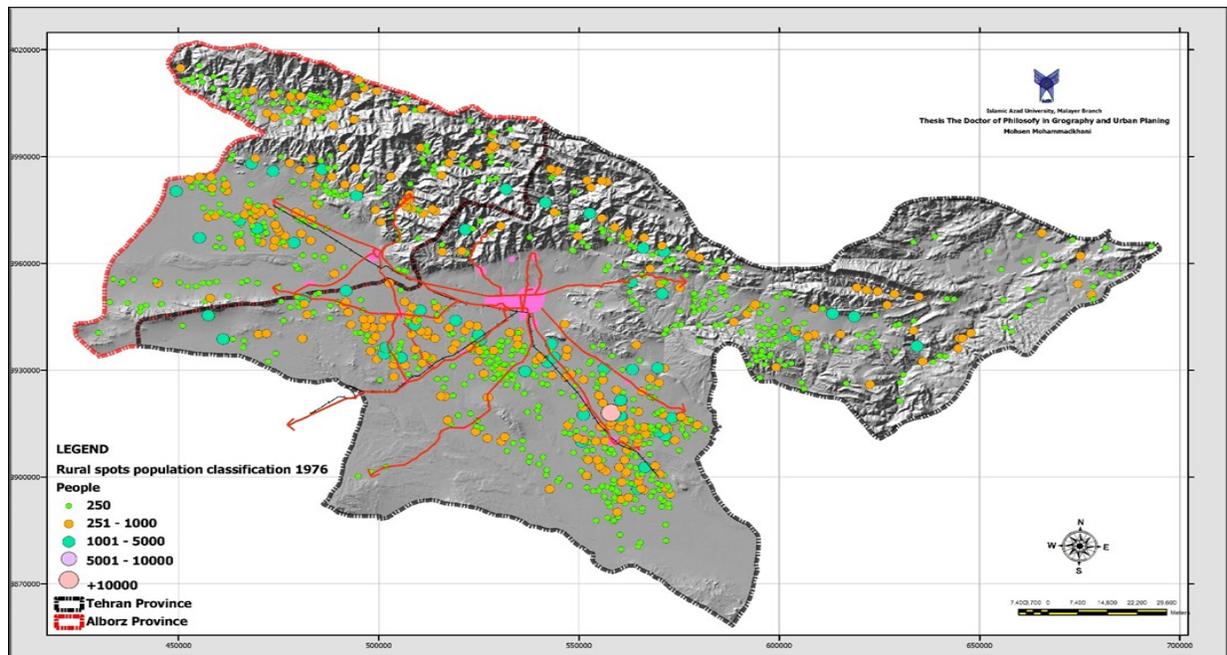
**Source:** Basic plots were done by the author by making data obtained through a census conducted in 2011 by the Iranian statistics center (Iran's statistics center, 2011).



**Figure 9. The urban spots population classification in 2011**

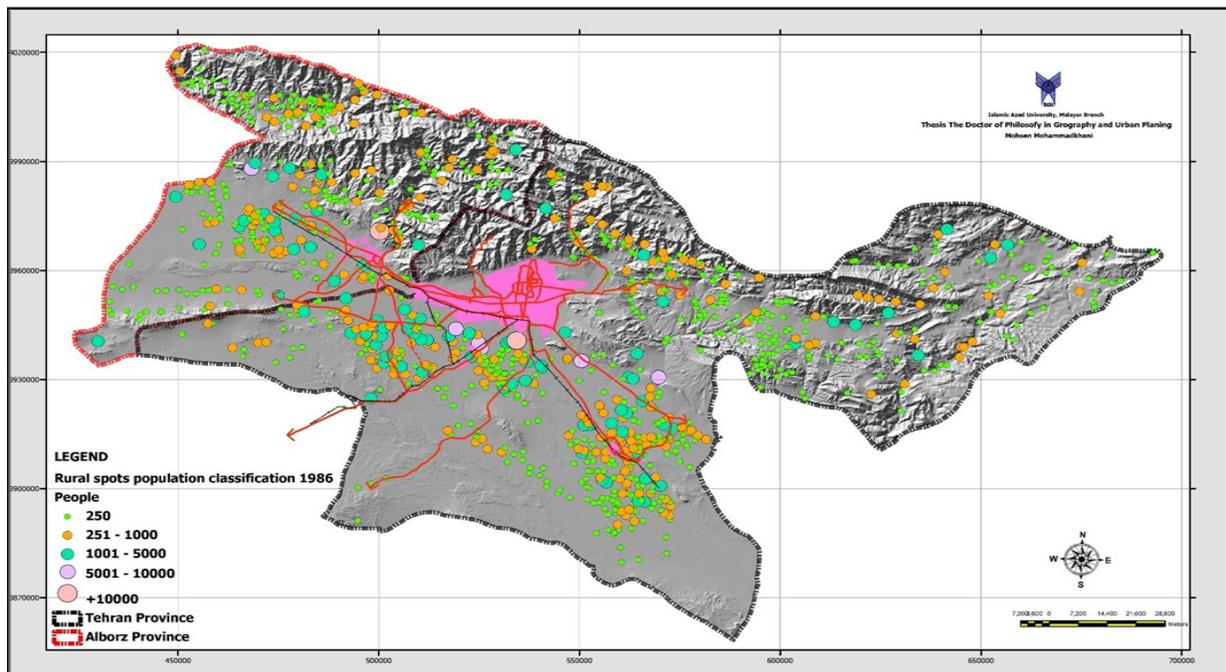
**Source:** Basic plots were done by the author by making use of the country's mapping organization basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 2011 (Iran's statistics center, 2011).

-ing the results thereof to form regular hexagonal cell levels of the threefold zone, the population evolution trend detection has been made feasible in a level format (Figures 15 to 18). What is obtained through the survey of the pooled maps is the inappropriate trend of the population distribution in the entire city of Tehran's urban region level in such a manner that the follow-up studies conducted on the population growth trend in various census periods indicated that the southern areas in the city of Tehran and the city of Karaj (the foothill plains zone) has been raided by the emigrants from the west to the east in parallel



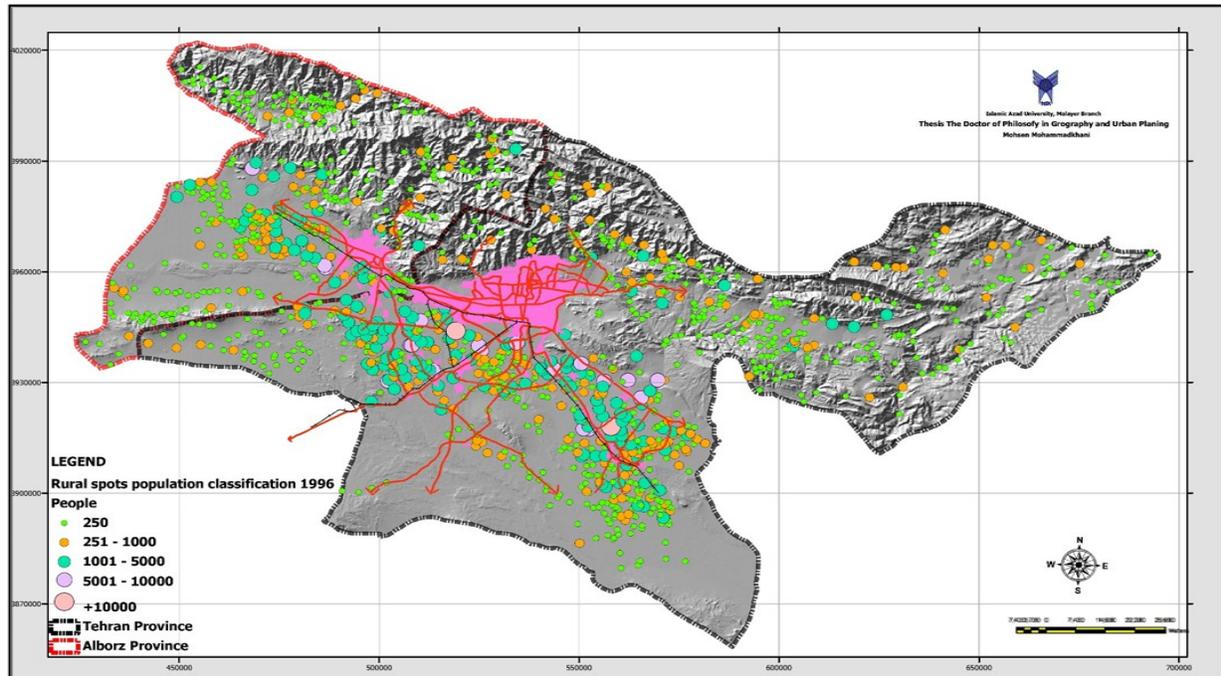
**Figure 10. Rural areas population classification in 1976**

**Source:** Basic plots were done by the author by making use of the country's mapping organization basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 1976 (Iran's statistics center, 1976).



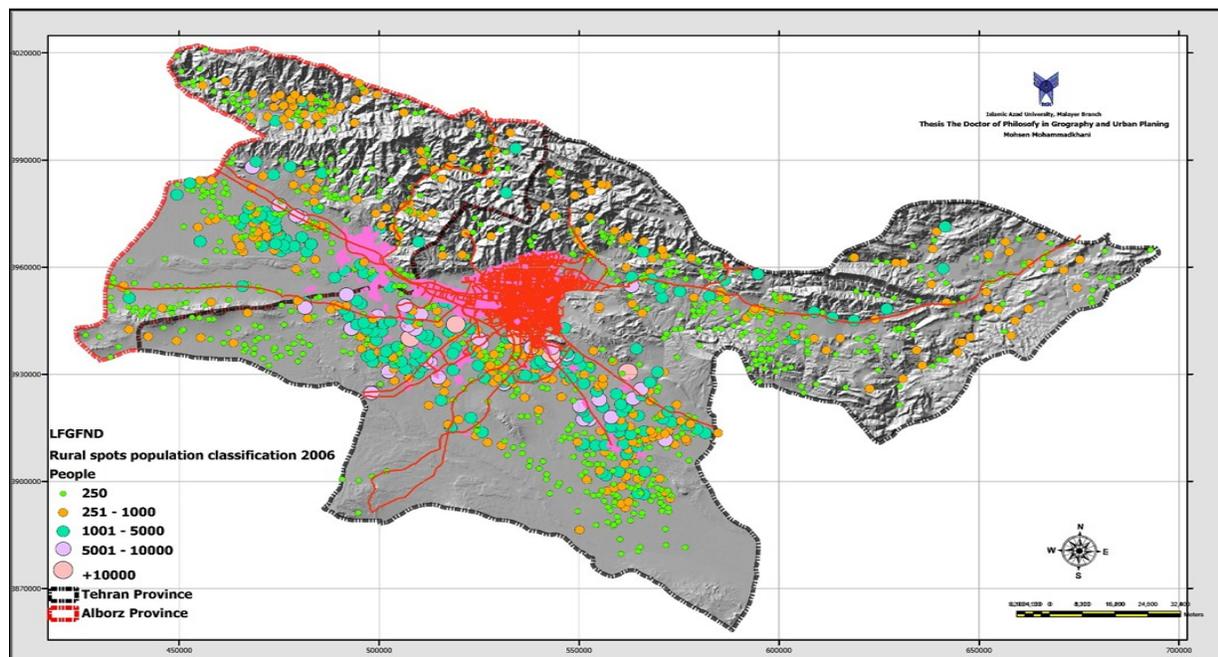
**Figure 11. Rural areas population classification in 1986**

**Source:** Basic plots were done by the author by making use of the country's mapping organization basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 1986 (Iran's statistics center, 1986).



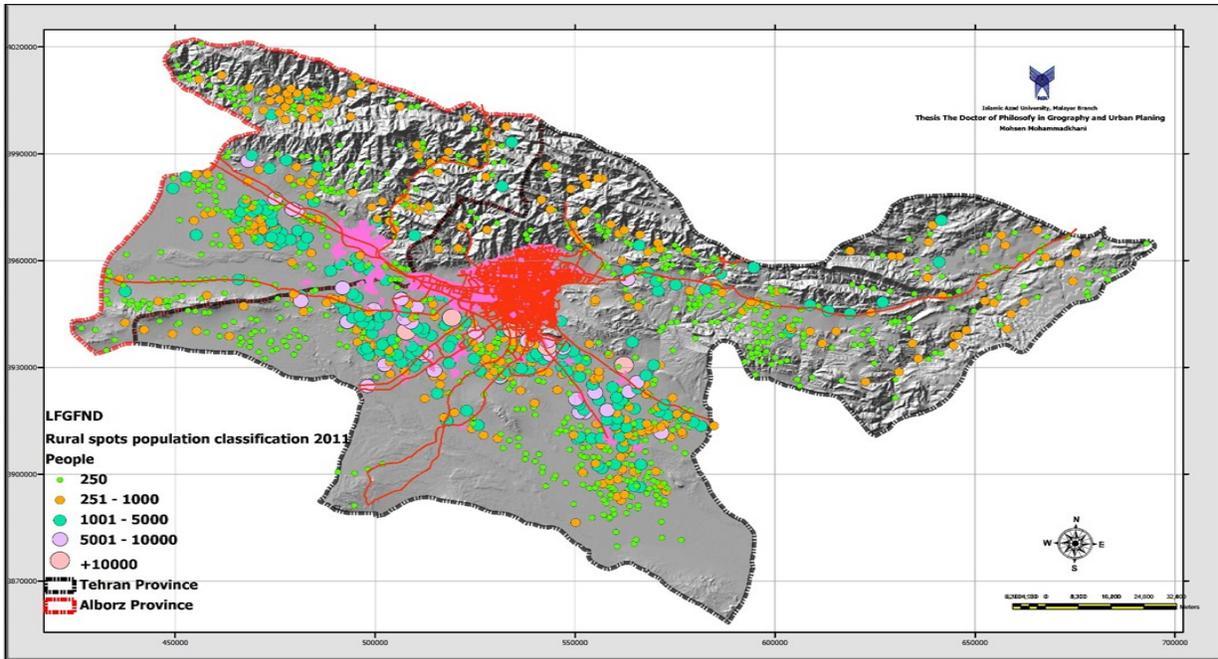
**Figure 12. Rural areas population classification in 1996**

**Source:** Basic plots were done by the author by making use of the country’s mapping organization basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 1996 (Iran’s statistics center, 1996).



**Figure 13. Rural areas population classification in 2006**

**Source:** Basic plots were done by the author by making use of the country’s mapping organization basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 2006 (Iran’s statistics center, 2006).



**Figure 14. Rural areas population classification in 2011**

**Source:** Basic plots were done by the author by making use of the country’s mapping organization basic plots (National Cartographic Center, 2009) and the statistical data acquired from the Iranian statistics center in 2011 (Iran’s statistics center, 2011).

lel with Alborz mountain range (northern elevations zone) and it has sometimes experienced unbelievable population growth (Figures 19 to 22). This strip lies parallel to Alborz Mountain and it mostly encompasses the best agricultural lands of the region with its arable auspicious soil which has been favored by the highest population density and the labor force employed in the large cities and dwelled in the suburbs. The past decades population evolution trend signifies the positive population growth around the large cities such as Tehran and Karaj in contrast to the negative growth rate along the marginal and more distant lands. It means the more we get distant from the major urban centers the population growth rate decreases tangibly and consequently it leads to the growth rate negativity in the border areas of the two Alborz and Tehran provinces (Figures 19 to 22). The continuation of this trend in the future will be accompanied with incomensatable damages among which one can point to the middle cities expansion within the small zone of the remaining agricultural lands (the mountainside plains zone)

and possibly the adjoining of the several of such cities all of which will be bearing no result other than the arable prone soil degradation and the increase in the environmental pollutions and so forth. If such a trend continues and if supposedly all of the population growth positive rate unit levels in the past add up to their population with a 2% positive growth rate in the future the result is the settlement of a rectangular area within the foothill plains zone and along Alborz Mount from the west to the east of the two major metropolitan cities of Tehran and Karaj (Figure 23). In case that such a phenomenon takes place the entire mountainside plains zone which is the center for the settlement of many of the highly populated cities and villages in the urban region for the time being will be getting closer and closer to one another and it won’t be long before the boundary limits cannot be determined and the limits cannot be separated.

Although the population and activities distribution in the city of Tehran’s urban region level has been the result of the population and activities scattering and

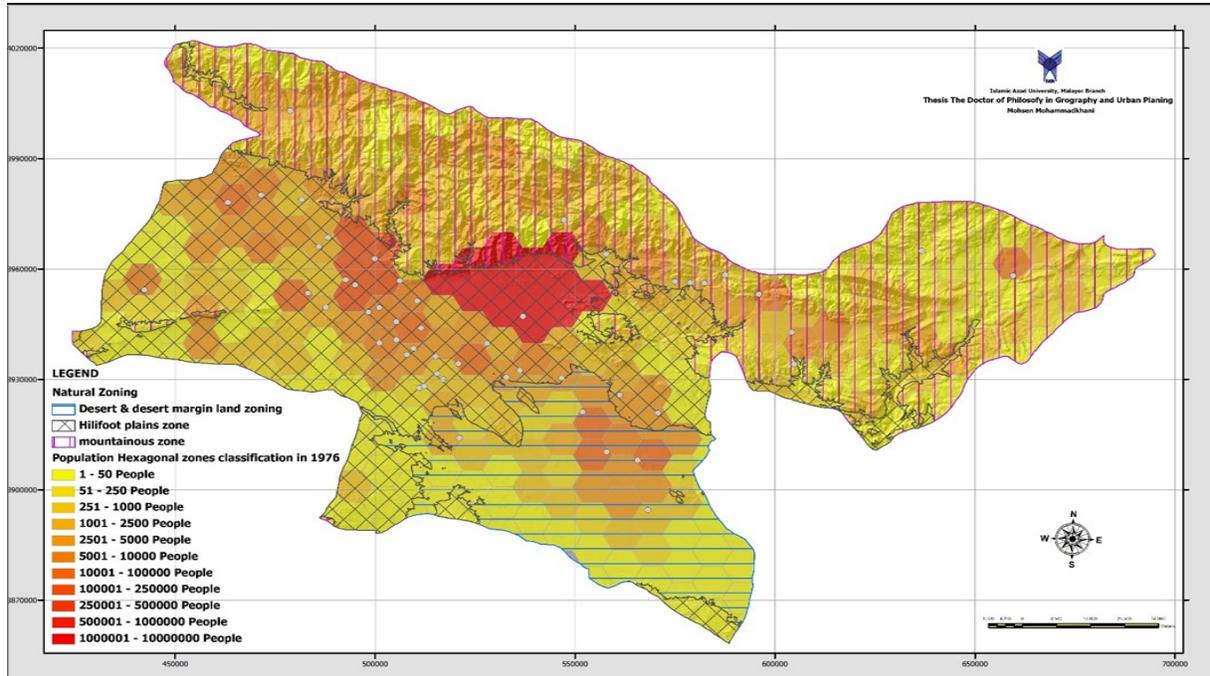


Figure 15. Population distribution within the study area in 1976

Source: Basic plots were done by the author by making use of the statistical data from 1976 acquired from Iran's census center (Iran's statistics center, 1976).

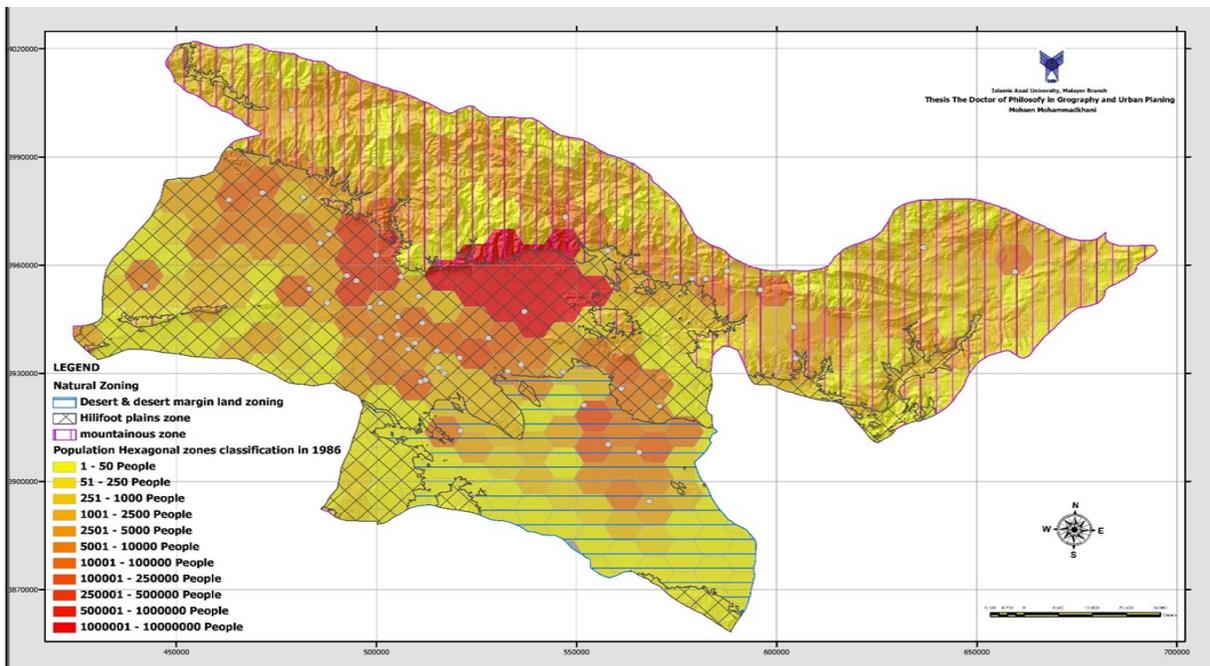
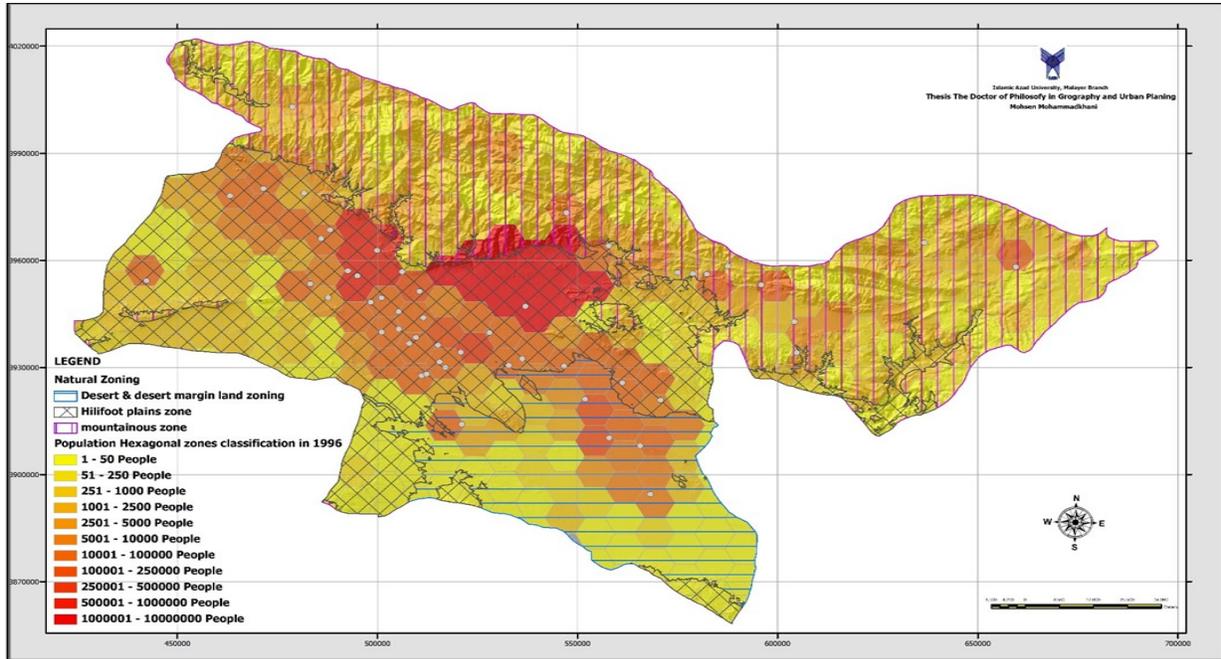


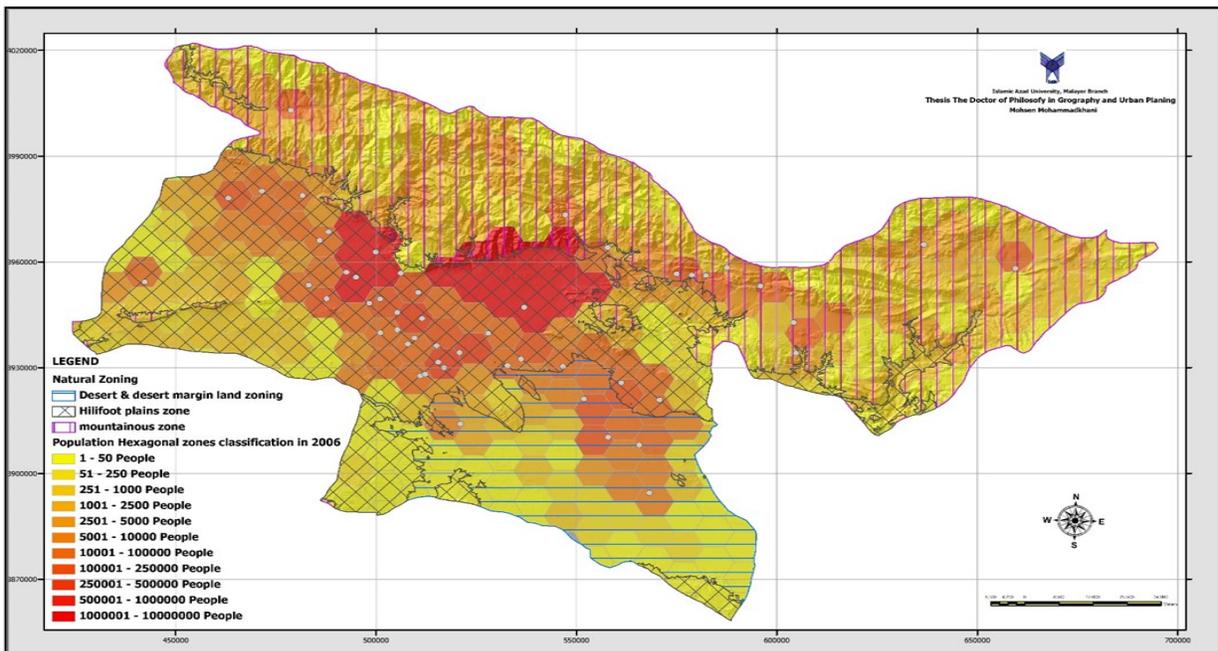
Figure 16. Population distribution within the study area in 1986

Source: Basic plots were done by the author by making use of the statistical data from 1986 acquired from Iran's census center (Iran's statistics center, 1986).



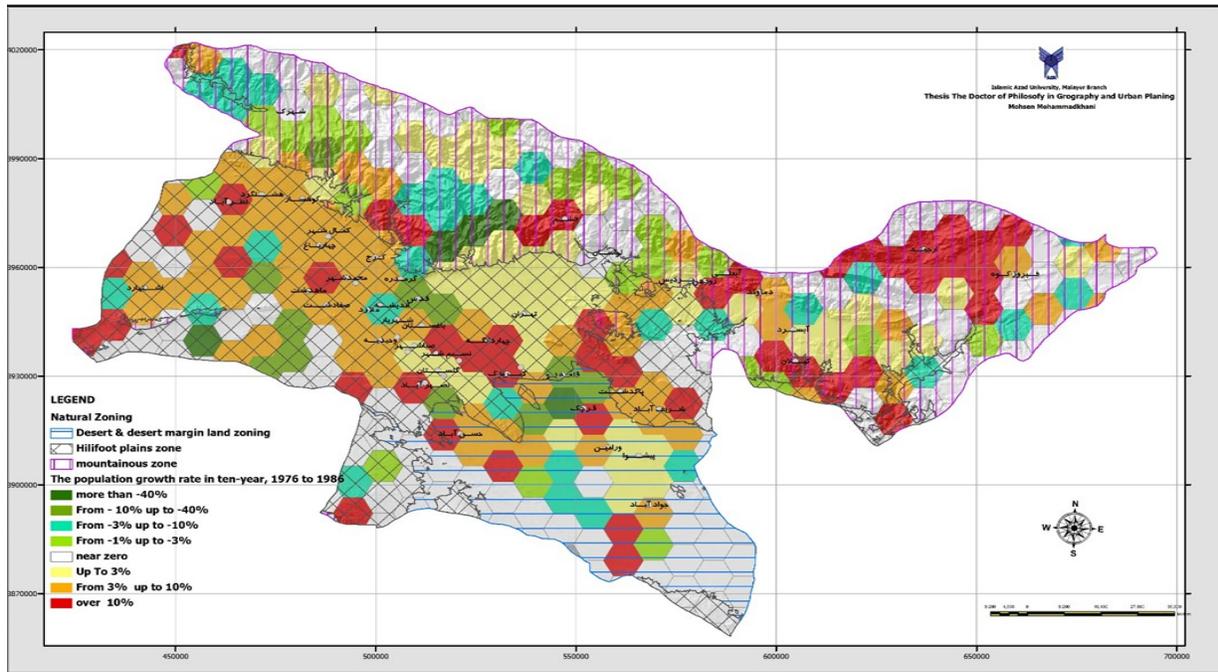
**Figure 17. Population distribution within the study area in 1996**

Source: Basic plots were done by the author by making use of the statistical data from 1996 acquired from Iran’s census center (Iran’s statistics center, 1996).

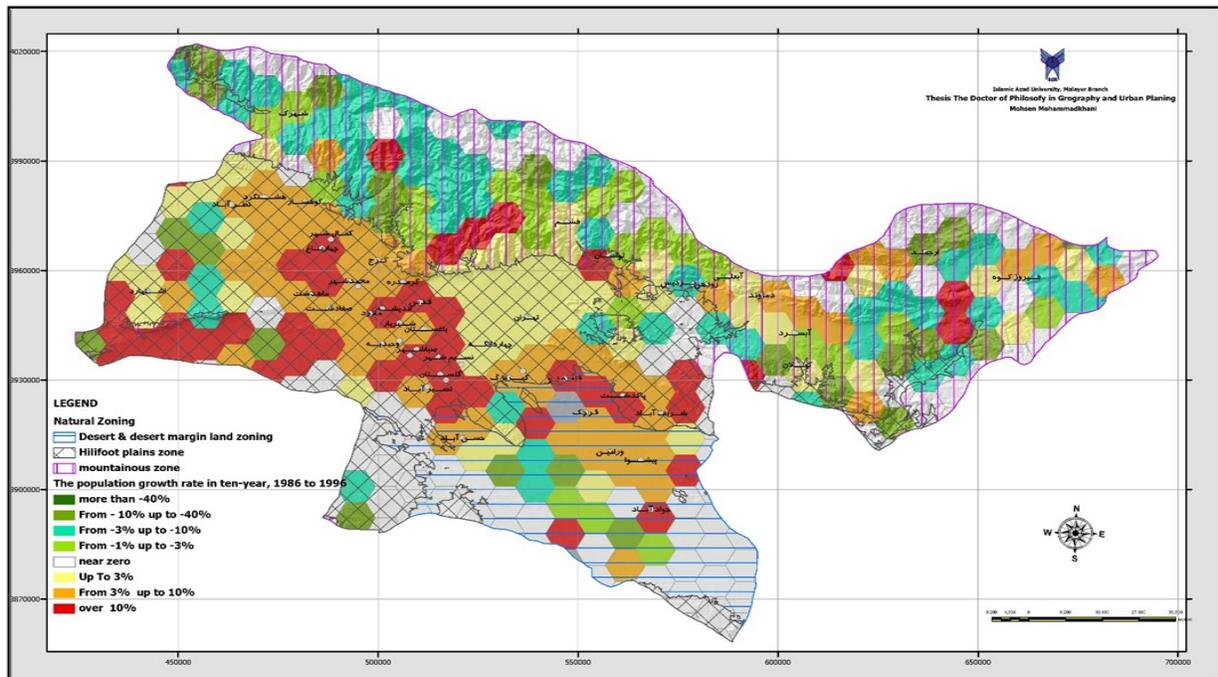


**Figure 18. Population distribution within the study area in 2006**

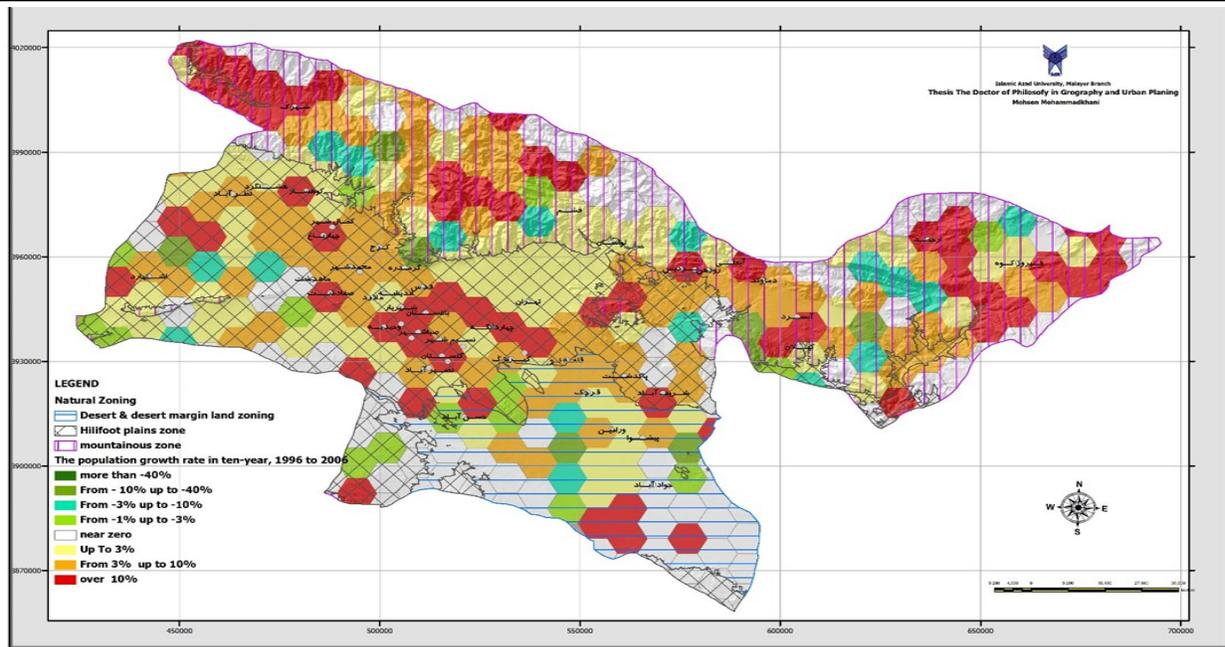
Source: Basic plots were done by the author by making use of the statistical data from the Iran’s census center (Iran’s statistics center, 2006).



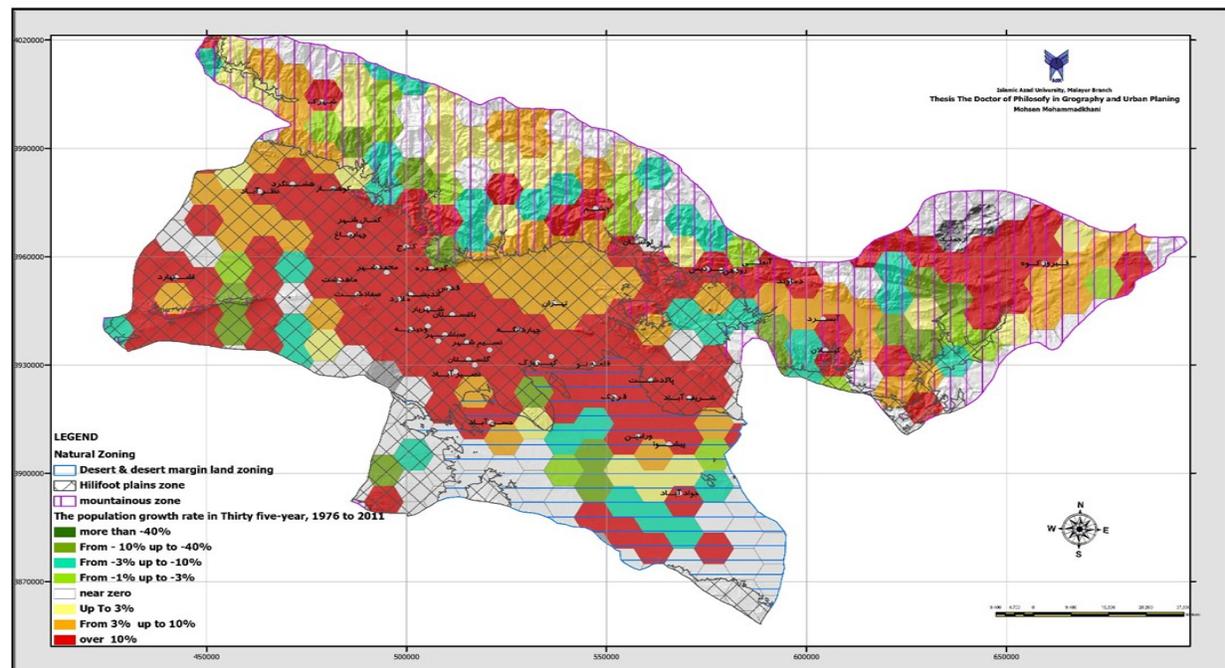
**Figure 19. Population growth rate in the study area during a ten-year period from 1976-1986**  
 Source: Basic plots were done by the author, through GIS calculations



**Figure 20. Population growth rate in the study area during a ten-year period from 1986-1996**  
 Source: Basic plots were done by the author, through GIS calculations



**Figure 21. Population growth rate in the study area during a fifteen-year period from 1996-2011**  
 Source: Basic plots were done by the author, through GIS calculations



**Figure 22. Population growth rate in the study area during a 35-year period from 1976-2011**  
 Source: Basic plots were done by the author, through GIS calculations

dispersal from the city of Tehran’s main nucleus during the recent decades, but such a distribution has been found to have a definite textural structure. In stage before the rapid development of the capital city that is to say up to the 1960s the city of Tehran experienced a “continuous” and “concentrated” growth through the attachment and adjoining of its peripheral population regions and centers. Since the beginning of the population centers growth in the periphery of the city and the formation of the city of Tehran’s urban region the population centers around the main communication axes began enlarging and they generated a sample of ‘paw-like and radial’ structure. With

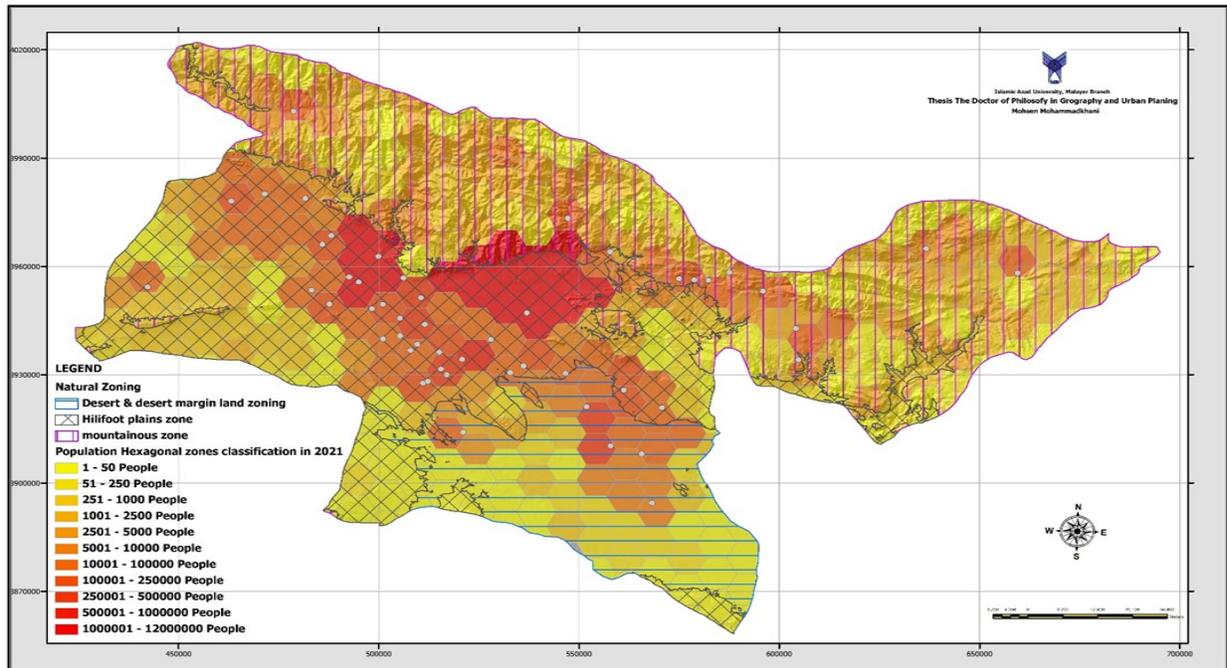


Figure 23. Population growth and distribution estimation in the study area for 2021 (Source: Author)

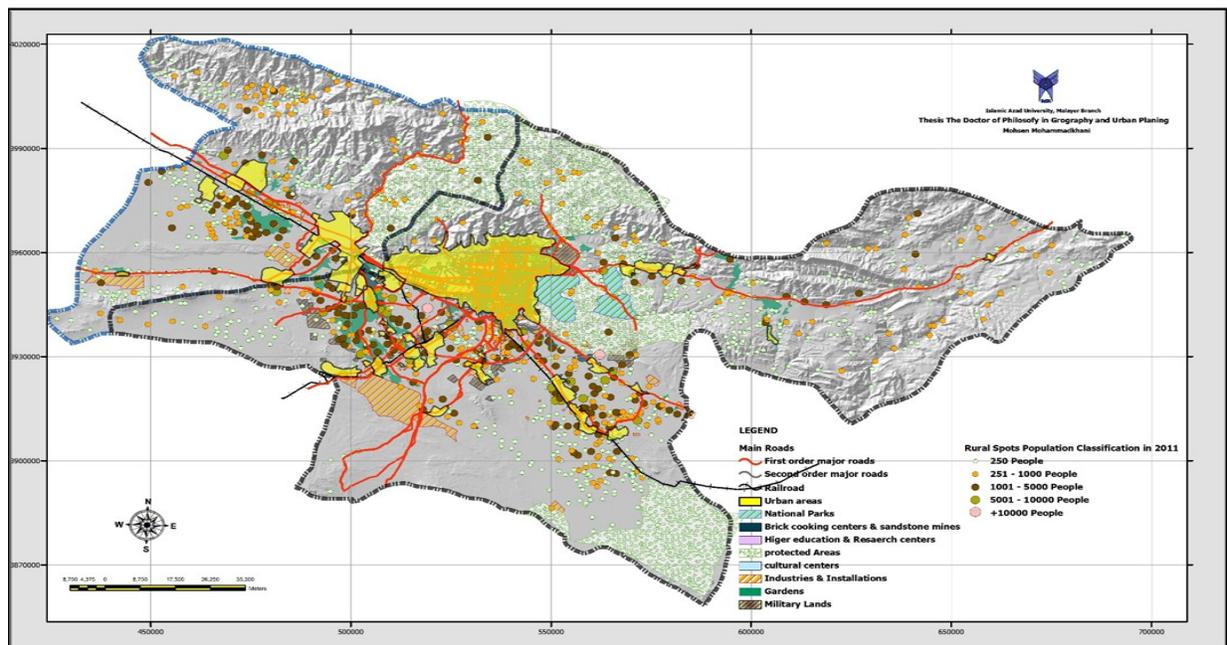


Figure 24. Tehran's urban region spatial structure in 2015 (Source: Author)

the more of expansion and dispersion, the population and activities settlement in the region, some sort of “galaxies” (Figure 24). The result of such a trend is the scattering of were formed around the communication paths and the developing population centers which they had communications with one another plus being connected to Tehran. This method of settlement is a form of a “galaxy-like” textural structure in the region which is now urged to cope with various and numerous problems and challenges the population and activity within the city of Tehran’s urban region level and the interferences made by the various uses and finally intensive disorganization and disordering of the population and activity settlement (Sarraf *et al.*, 1999).

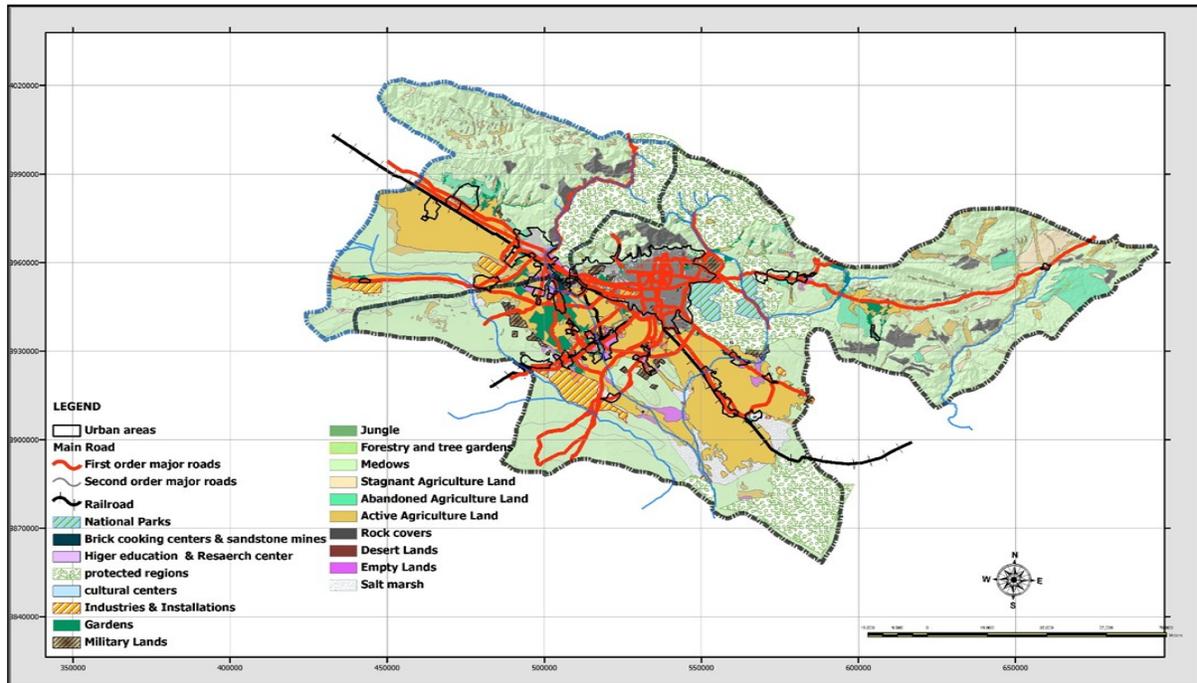


Figure 25. Study area and its land use pattern

Source: Basic plots were done by the author by making use of the synchronized information from the ministry of housing and city-building urban system plan

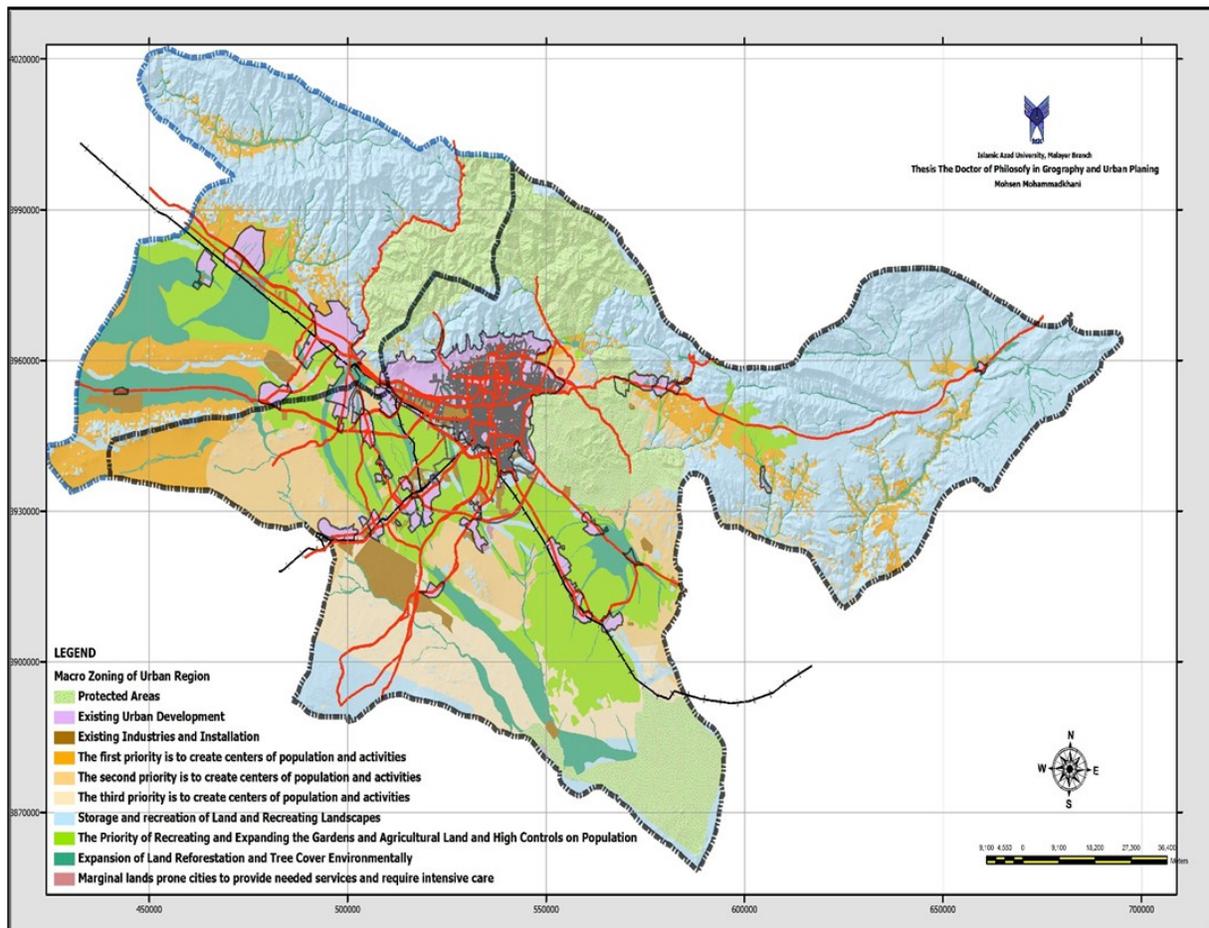
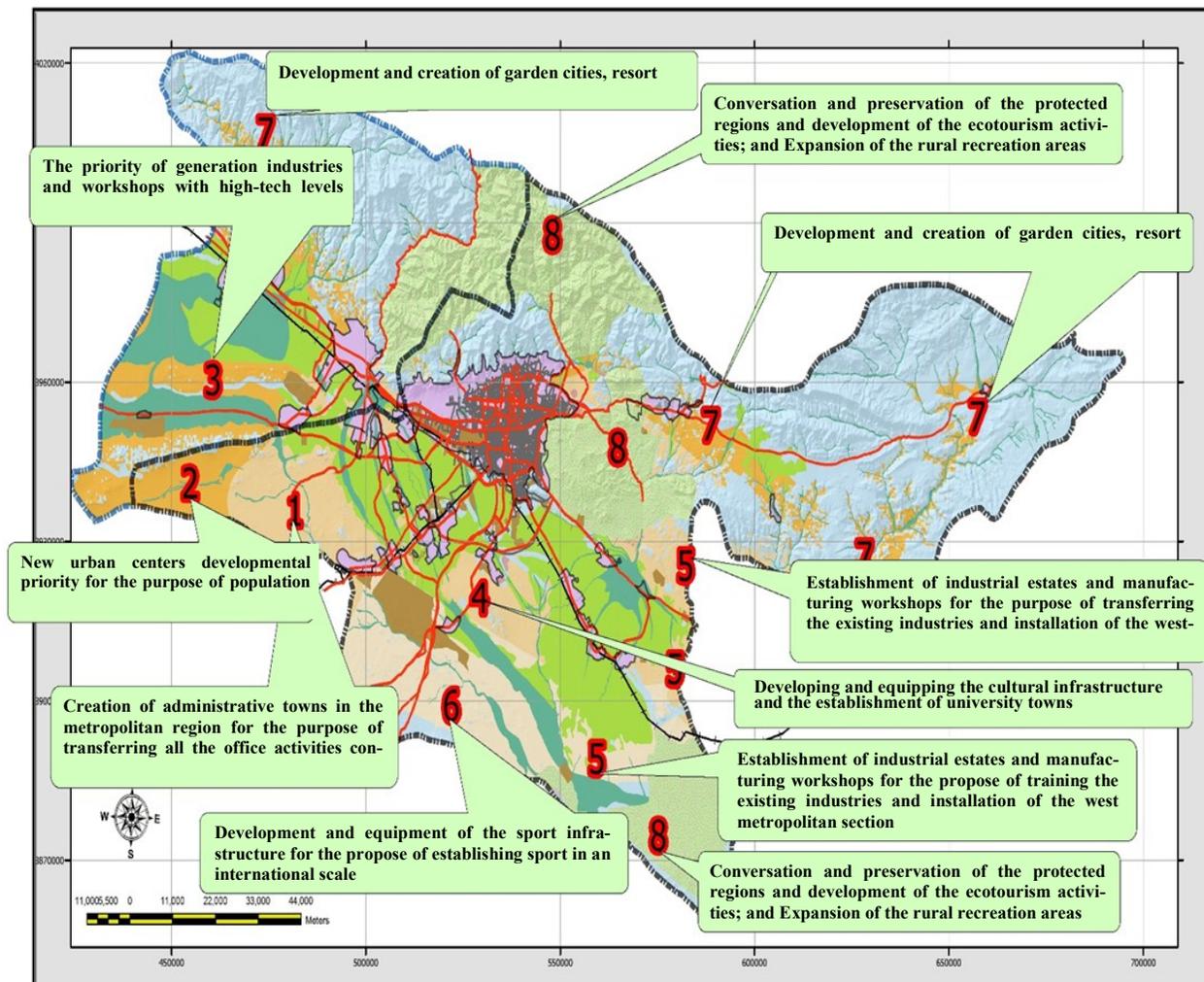


Figure 26. The study area macro-level zoning



**Figure 27. Tehran’s urban region macro-level zoning based on environmental competencies and the suggestions made for the generation of various land uses in a macro-level**

The residential systems came to existence through the spontaneous process mentioned above are devoid of any urban identity and they are faced with the intensive lack of urban facilities and equipment and they are extremely dependent upon the city of Tehran’s central nucleus in terms of services and employment (Figure 25). The peripheral residential centers are lacking any sort of social and economical diversity and they are almost uniformly comprised of low-income social classes who have been repelled to the areas outside the city of Tehran as a result of the land market pressure and housing in Tehran and solely with the standard of “the land availability in the periphery”. The low-income groups seem to be not the only ones who have followed the standard of “land availa-

bility” in their settlement method and the state organizations and the private ones also have taken the same very criterion of the “land availability” in their establishment of their activities (Figure 25).

**CONCLUSION**

The result of the population-textural evolutions in the city of Tehran’s urban region has been a peer urban network in its wide spectrum and due to the special spatial-textural structure of Tehran’s urban region and its adherence to the unique social and economical characteristics it seems to be in need of particular attention and coherent policy-making procedures in a national and regional level. In summary, the results obtained from the study of the

problems and the challenges stemming from the concentration of the population in the city of Tehran and the population expansion in Tehran's urban region can be outlined as below: the change in the land uses and getting the agricultural lands entered into a market and demolition of the green areas, the non-purposeful use of land as a result of scattered constructions, traffic congestion and the underlying networks lack of capacity, loss of the identity and local communities features, air, water and soil pollution, destruction of the water basins and watersheds, the annihilation of the natural landscapes and the wild life, downgrading of the quality of life and the deficiency in the affordable accommodation supplies, the increase in poverty and two-level classifications within the urban region.

Therefore, the spatial planning of the city of Tehran's urban region is seeking to contextualize and form the social-economical functions and contents through adhering to the today's programming theories (Figure 26). The general policy applied regarding the population centers outside the urban areas according to the objective of "creating scattered concentrations" is the controlling of such centers growth, particularly in the area in the vicinity of the city of Tehran and Karaj and keeping it within the natural population growth limits. The textural development pattern in the city of Tehran's urban region (in case of taking effective and strategic intervening actions) provides for the actualization of the multifocal and galaxy-like models, "a city with multiple nodes and numerous active role playing centers in the periphery in order for the decentralization policies to be instantiated" (Azizi, 2009). Under such conditions, meanwhile removing the unnecessary and improper functions along with the city of Tehran's being the capital city from Tehran's main nucleus, regional centers (like Karaj and Islamshahr) and centers with conditions auspicious for the establishment of the population and activities besides appropriate functions proportionate to their coverage field can participate in national specialized division of labor and create an equi-

librium in the urban sliding and the extraneous and additional coming and going (Figure 27).

Such a strategy is called concentrated decentralization. In fact, the spatial planning within the city of Tehran's urban region level applies three types of elements for controlling and navigating itself which are: the elements which provide service to more than one municipality (like regional centers, industrial and academic institutions within the metropolitan region), the ubiquitous elements present everywhere which make use of a unified evolution and policy (like the conservation of the agricultural lands and increasing the density in some of the regions and preventing from urban slides), elements which are stretched constantly within regional levels (like green areas, public transportation and underlying networks) (Mozaffar, 1992). In the spatial planning presented according to the indices required for each of the "land" elements it has been tried to predict and determine a location with the highest consistency. In fact, the suggestions made based on the city of Tehran's urban region strategic policies are mostly based on the environmental competencies in line with resolving the urban region problems and it has been in pursue of the concentrated decentralization strategy for the purpose of population and activities spatial distribution and navigation within the regions deemed appropriate in terms of natural potentials (Figure 27).

## REFERENCES

- Ahssani N. (2007).** The introduction of a method for implementing sustainable management over territorial ground based on IUCN standards in Kurdistan Province. *The Seasonal Journal of Iran's Meadow and Desert Researches*, 14 (4):539-558.
- Alemzadeh A, Mahna, Kaywan Pajoo K and Getmiri B. (1999).** The city of Tehran and the peripheral cities. urban system plan, Iran's city building and architecture researches and studies center. *The Seasonal Journal of Natural Studies*

- Azizi M. (2009).** Urban design and planning: Density in city building, the principles and the standards of determining urban density, 1<sup>st</sup> ed, Tehran University press. 286 p
- Geophysics [Internet]. (2012) [TUGA]** Tehran university geophysics institution . <http://www.geophysics.ut.ac.ir>
- Hesamiyan F, Haeri M and Etemad G. (2004).** urban planning: urbanization in Iran, 1<sup>st</sup> ed. Agah press, Tehran, 230 p.
- [ISC] Iran's statistics center in 1976, 1986, 1996, 2006 and 2011.**
- Jajarmi K and Gheybi M. (2011).** The survey and analysis of the city of Tehran's urban evolutions. *Journal of Quarterly Journal of Human Geography*, 11:27-47
- Karam A. (2005).** The analysis of the land appropriateness for textural development on the northwestern road in Tabriz through taking advantage of multi-criteria evaluation in geographical information system environment. *The Journal of geographical studies*, 54:93-106.
- Kou RJ, Chi SC and Kao SS. (2002 ).** A decision support system for selecting convenience store location through integration of fuzzy AHP and artificial neural network. *Journal of computer in industry*, 47:199-214
- Mashhadizadeh Dehaghani N. (2008).** Urban design and planning: an analysis of the urban planning features in Iran, 1<sup>st</sup> ed. Tehran : Iran's science and industry university publication press. 607 p.
- [NCC] National Cartographic Center. (2009),** Tehran's overall NTDB 1:25000 maps.
- Sarrafi M, Kazemiyan GH and MehrAlizadeh S. (1999).** Tehran and the peripheral cities. urban system plan, Iran's city building and architecture researches and studies center.
- Rajae A. (2003).** Urban geography and urban planning : the application of the natural geography in rural and urban planning, 1<sup>st</sup> ed, Tehran: Samt press. 416 p.
- Sarrafi Mozaffar. (1992).** Urban Development and Urban Form. Conveying our Future. Proceeding of the Policy Workshop on Regional Governance. Vancouver, UBC Center for Human Settlement. 55-62p.
- Shabani F. (2010).** A glance at the metropolitan Tehran's development plans evolution trend, Tehran's new comprehensive and the detailed plans (features, objectives and necessities). Tehran: Ministry of Roads and Urban Development of Iran.
- Tavakkoliniya J. (2012).** The survey of Tehran's growth and development. *Journal of Geography and Urban Planning of Zagros Landscape*, 13:79-102.
- Zarghami H. (2009).** A look at the urban evolution and emigration in Iran. Fifth conference on population, Tehran, Iran: Iran's statistics center.

Submit your articles online at [ecologyresearch.info](http://ecologyresearch.info)

**Advantages**

- Easy online submission
- Complete Peer review
- Affordable Charges
- Quick processing
- Extensive indexing
- You retain your copyright

[submit@ecologyresearch.info](mailto:submit@ecologyresearch.info)