

Analysis the Status of Ecological parameters in Development of Mashhad Metropolis

Dr. Barat Ali Khakpoor¹, Marjan Akbari^{2*}

¹ Associate Professor of Geography and urban planning, Ferdowsi University of Mashhad, Iran

^{2*} Ph.D. candidates of Geography and Urban Planning, Ferdowsi University of Mashhad, International campus, Mashhad, Iran (corresponding author)

Abstract

Nowadays, Changes in technology and industrial cities have important and main role in conversions of environmental ecology. In order to, the aim of this research is Analysis the Status of Ecological parameters in Development of Mashhad Metropolis. Applied methodology is based on descriptive-analytical approach. We have used documental method to collect information about case study region. Results show that in principle, the establishment and development of a city more than anything else are dependent on the condition or geographical location because the natural phenomena have a strong effect on the location, extent, spheres of influence, physical development and urban morphology.

Key Words: Ecological parameters, Mashhad Metropolis, city, urban regions

1. Introduction

Nowadays, Changes in technology and industrial cities have important and main role in conversions of environmental ecology. In fact, pollutions of fuel from industrial centers and their residuals, irregular usages of minerals and chemical materials in industry and husbandry have

destroyed urban and rural environment and made unpleasant impressions on societies living and humans (Fanni, Khakpour & Heydari, 2014; Ebrahim Zadeh & Jokandan, 2008). Thus for regulating destructive effects of these environmental damages, the most important and the simplest solution is developing greenbelt. The extension and expansion of green belt in different countries is related with natural environment and progression of each country. In the view of Couch and Dennemann (2012) while economic Development may be a legitimate policy goal, to be sustainable it must be achieved within the context of reducing the ecological footprint. The central value of sustainable development can be boiled down to a balance among the three „E“: environment, economy, and equity. As illustrated in God's chalk, sustainable development seeks to reconcile the conflicts among economic development, ecological preservation, and intergenerational equity; three conflicts exist among sustainable development value (Tavakoli & Heydari, 2012). City is an alive and dynamic system which parks and green spaces are part of it. They are valuable because of the effective role of them to reduce the urban density, completing and improving the functioning of educational facilities, cultural, residential and reserve land for future expansion of the city. (Karim Zadegan, 2003). The distinguishing characteristic in the third millennium is planning based on principles of sustainable development in line with nature and all activities related to urban issues. Ecological concepts and consequently ecological parks refer to a comprehensive and integrated set of measures which create coordination and balance between the constituent elements of the park in order to establish sustainable development. It means that environmentally friendly plants are not the only matter, so at the same time recycling and saving energy is also considered. We can say that it includes such a wide scale of ecological indicators of environmental variables energy and material usage (Rahnama, 2009). The World Commission on Environment and Development (WCED) (1987) defines sustainable development as “development that meets the needs of the present without compromising the ability of the future generations to meet their own.” It requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life. Moffat (1994) acknowledges the holistic nature of sustainable development as well as its focus on the parts and Dahl (1997) emphasizes the definition's accountability of time and responsibility towards future generations. (Abbas Poor, 2007; Rahnama & Razzaghian, 2012). Cities have always been shaped and developed influenced by various factors and forces. Basically the city is a social - economic

phenomenon. Man to live and work and communication, gather on a limited area of more or less dense and gradually create cities. Cities transformed with social evolution, demographic shifts, economic changes and technological innovations (Richard, 2002). With the increase of population and development of investment and activities the structural organization of cities are experiencing fundamental changes (Saeednia, 1999). So cities will always be bigger physically and more complex structurally as living organisms. Following this physical development of the city, economic, social, cultural and above all ecological and environmental conditions are also gradually changed (Listokin, 2002).

Background

Framed by issues of housing and exponential population growth, the phrase sustainable urban development“ contains a redundancy. While it is clear that much of the development occurring in urbanized areas of the world is unsustainable – in the literal sense of representing patterns of growth that cannot be replicated continuously across the remainder of human time without bringing about its own end- it is arguable that there can be no truly sustainable development, in the same literal sense, that is not also urban development (Callender, 2013). Bentivegna et al (2002) began to outline the principles, under-lying concepts, model, vision and methodology of an integrated sustainable urban development. A city as a complex and dynamic organism is always changed and transformed , it's a place that forms human's ideals and experiences and has a serious role in providing it's resident's welfare, health and relaxation . Our today's urbanization is a product of ideas, thoughts, experiences and actions that has been obtained by different generations at historical period (Habibi, 1996). By appearing the effects of current changes and their contradictions; actions to solve problems of new urbanism became necessary, this paradigm rose from the United States of America and was the end of city dispersion and a movement to substitute mechanical life and a return to traditional designing. Through the first two decades of 20th century, cities of America improved as compact neighborhood with mixed uses but this matter began to change on the basis of zoning necessities and modern architecture and increasing cars and after the second world war, a new development system was formed in America based on displacing neighborhood's together with serious land use isolating and often know as an development or CDS (Zali & Qanbari, 2012).

Physical development of the city can have negative effects on the natural environment and the ecological capability of the city (Srivastava & Gupta, 2003). Before creating cities or large projects that require more capital and safety conditions addition to socio economic studies should be particular attention to ecological research in the natural and physical environment of cities, if we accept that the main goal of urban planners is urban welfare by creating a better environment, healthier and more favorable (Malczewski, 2004). Because to achieve sustainable development and effective and efficient use of resources depends on comprehensive and accurate understanding of the possibilities and limitations that we face in achieving the desired status. Organizing geometries may be rectilinear, curvilinear or naturalistic since it is not its look that matters so much as its biological functioning. At its best, each park connects fragments of open space into a comprehensive network, both to increase human well-being and benefit natural system. The Ecological Park strives to realize an older vision of the city as a garden, blurring the distinction between the two. Yet it also employs the most up to date methods to minimize such impacts of city life as urban runoff, air pollution, and traffic noise. Through the design of healthier open spaces, it echoes the nineteenth- century notion of parks as the “lungs of the city”. (Cranz, 1982).

Sustainable development implies the adoption of a holistic view of the interdependent relationship between human society and the natural environment. It acknowledges the links between the impact of human activities (particularly economic activities) on the functioning of physical and social environments, and vice versa. Sustainable development is also concerned with “development” - that is, the meeting of essential human needs and improvements in the quality of life. Sustainable development has been presented, therefore, as the means for providing an integrating framework for the reconciliation of human economic and social needs with the capacity of the environment to meet such needs in the long term. Cities are complex human-dominated ecosystems and human activities make them different from natural ecosystems in several aspects such as climate, soil, hydrology, biodiversity composition, population dynamics and flows of energy and matter (Alberti, 2008). Main human impacts of urban ecosystems are rapid population growth, unplanned urbanization and inadequate infrastructures. Rapid population growth affects the quality of city services such as housing, public infrastructure, social facilities and causes a crisis in living conditions. Unplanned urbanization

provides a threat to the health and safety of human beings, as well as urban productivity, and combined with inadequate infrastructures, it accelerates environmental degradation. This brings us to the main point: to build a sustainable community for future generations, cities need to redesign many of their technologies and functions with ecological principles. As cited by Williams (2000, p.11), eco-planning refers to "strategies and techniques that combine urbanism and nature to create healthy, civilizing, and enriching places to live". It means "a living area governed more by nature than legislature; and a sustainable human settlement based on ecological balance, community self-reliance, and participatory democracy". Eco-planning is a fundamentally multi-dimensional concept, providing a wide range of environmental, economic and social benefits to local governments, developers and the community as a whole. Environmentally, it creates ecologically effective green areas, reduces ecological risks, and improves the quality of water, air and soil. Economically, it prevents urban sprawl and traffic congestion, provides better utilization of existing infrastructure. Socially, it reduces health risks, improves the quality of urban life and city services (e.g. health, education, transportation, recreation) (Galifianakis, 2006). So with all these benefits, this research will present further opportunities to turn unsustainable urban areas from a problem to a future resource as sustainable environments.

Case Study

Mashhad is the country's second large city and is located in the northeastern province of Khorasan Razavi. The city is located in 36 degrees and 17 minutes of north latitude and 59 degrees and 36 minutes of east longitude than the Greenwich. Mashhad consists of twelve regions and has a population of approximately 2,815,541 people according to the 2011 census. This city as one of the metropolitan is faced with the growing population and in this regard the city is developing increasingly in horizontal direction. Due to this issue it is necessary to consider appropriate direction of development. Considering these factors suggests the ecological assessment of the physical development of cities and examined in the present study.

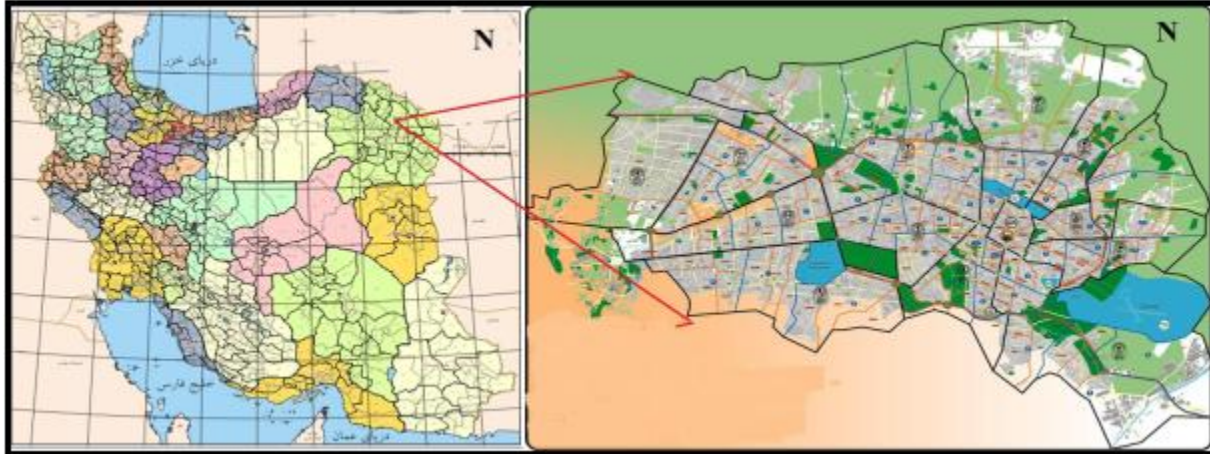


Fig.1. Case study region

Source: Ajza-Shokouhi & et al, 2013.

Methodology

In present study the data were collected from libraries, documents and field study. In the case of library, data were collected by studying books, articles and internet. Then, field study was done and including observation, discussion and filling questionnaire and data were analyzed by using a qualitative range. For further clarification of the issue data were analyzed in SPSS and Excel software. Information has been collected on their ecological characteristics using questionnaires (open and closed questions), along with interviews. This information is collected in two documents and field ways. The research hypothesis is a qualitative hypothesis concerning the possibility of applying the principles, criteria and standards for urban ecological parks.

Results

Physical growth of cities and rapid population growth has been unbalanced and uncoordinated. Physical chaotic and uncontrolled urban development is one of the problems of the urbanization and modern cities. This affair in recent decades in addition to change the structures of towns, has been a great influence on the role acceptance of cities and has made uncertain adaptability of the future physical development of the cities. It can be said that physical development is a dynamic and persistent process in which its physical boundaries and the physical space increase in vertical and horizontal directions in terms of quality and quantity (Delir, 2006). The rate of increase of a population is a parameter basic to a great many ecological models. It is, however, an abstract quantity, being a combination and summary of age-specific mortality and fecundity. Perhaps

more than any other parameter, the value appropriate for use in a model is context-dependent, varying both with the structure of the model and the model's purpose. In broad terms, estimates of rare required in two sorts of models: deterministic models, often of interspecific interactions or harvesting; and stochastic models, often used for population viability analysis of single species. Most deterministic models aim for a qualitative and general representation of population behavior so that statistically rigorous estimation methods are not necessary. The main problem is to ensure that the rate being estimated is appropriate to the context of the model. Stochastic models, usually of single species, are likely to be directed at answering quantitative questions about specific populations and will thus require estimates that are as accurate as possible.

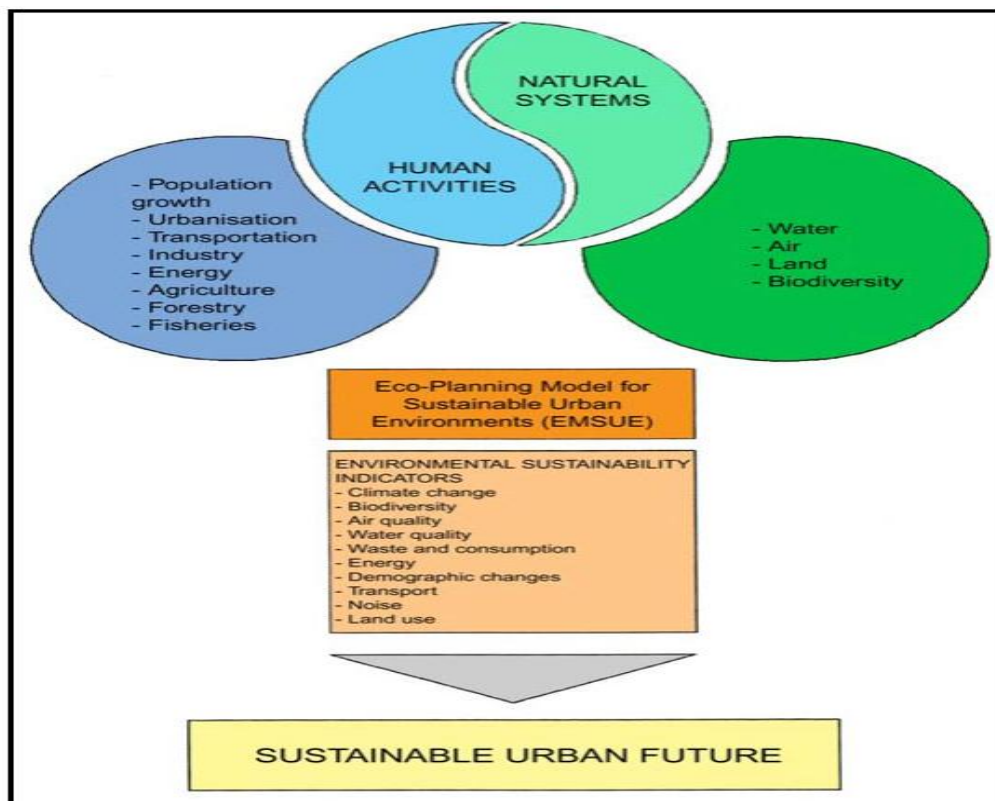


Fig.2. Sustainable urban future in Mashhad city.

The main axis of physical and ecological design have four subdivision of Buildings, Crossings and Pathways, Children's play spaces and Parking spaces each of which has ecological indicators. For example the indicators of Buildings are as follows:

1-Electrical energy from solar cells (photovoltaic), 2-Supply hot water by the solar water heating system,(Piri & Rezaei Rad, 2006) 3-Using mesh sunshade on the windows, 4-Thermal insulated building in shell and roof, 5- Double openings, 6-Sealing vents, 7-Intelligent control systems of comfort quality, 8-Using recycled materials, 9-Using native materials, 10-Roof and other surfaces rainwater collection system, (Amirifard, 1992) 11-Water filtration systems used in buildings, 12-Using large and compact trees in the vicinity of the buildings, 13-Using natural light during the day, 14-composting toilets or fertilizer maker, 15-Waste separation system in the building, 16-Access to bicycle paths, 17-Bicycle parking space near the buildings. The urban land use classification is performed based on “the standard of land use classification and planning in urban system”. Administrative zoning, commercial and financial zoning, iatric and sanitary zoning, and educational and scientific zoning belong to public infrastructure zoning, and residential area of the first class, second class, and fourth class are residential area. This study selected 557 land use polygons, among which, administrative zoning (C1) was 40, commercial and financial zoning (C2) was 100, iatric and sanitary zoning (C5) was 30, educational and scientific zoning (C6) was 42, public green land (G1) was 42, industrial zoning (M1) was 70, and residential area of the first class (R1), second class (R2), and fourth class (R4) was respectively 37, 105, and 90.

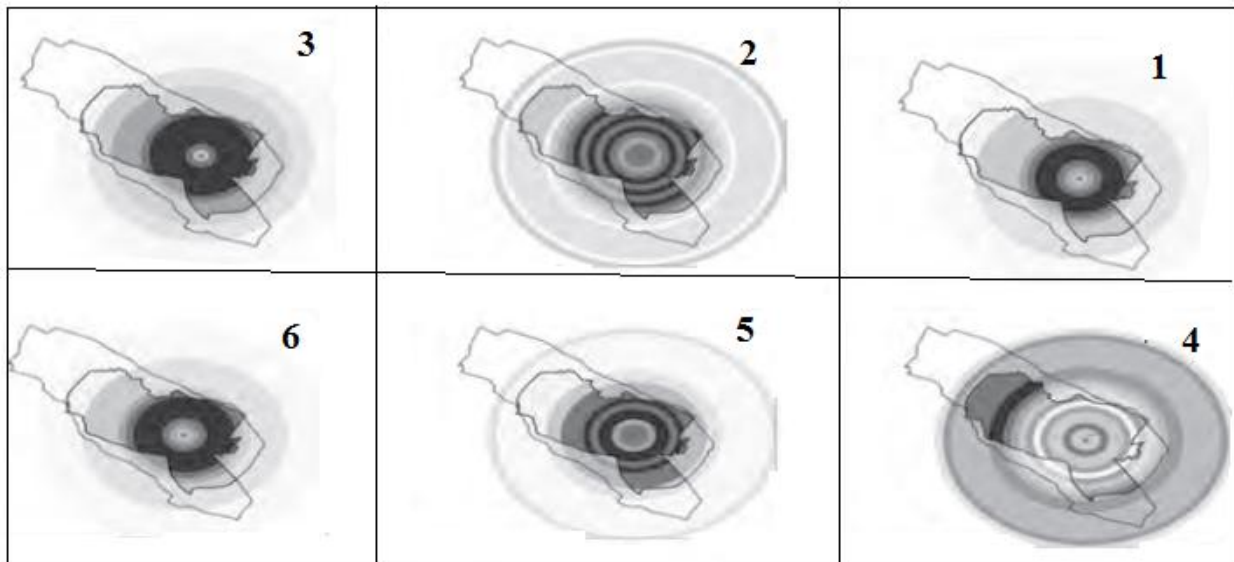


Fig.3. (1) Population, (2) percent population below relative poverty, (3) High Officials, (4) Household per capita income, (5) Job Principle, (6) Simple workers according to concentric circles theory in Mashhad city.

Source: Authors with adoption of Mafi & et al, 2012.

Basically, we can say that in principle, the establishment and development of a city more than anything else are dependent on the condition or geographical location because the natural phenomena have a strong effect on the location, extent, spheres of influence, physical development and urban morphology. Natural phenomena are sometimes as positive factors and sometimes as negative and deterrent factors (Negaresh, 2003). Physical development of the city can have negative effects on the natural environment and the ecological capability of the city (Srivastava and Gupta, 2003). Although the rapid expansion and the atonal composition of Mashhad are due to a set of historical, economic - social, political factors but also have been the source of many problems and environmental crises. Given the resulting environmental crisis, goal of this study is ecological evaluation suburb of Mashhad to determine the direction of future development of the city.

In Mashhad education for sustainable development allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. Education for sustainable development in case study region means including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption. It also requires participatory teaching and learning methods that motivate and empower learners to change their behavior and take action for sustainable urban development. Education for Sustainable urban Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way.

In order to assessment of the importance of educational factor and family income dial in sustainable urban development in Mashhad city, we have used of Pearson coefficient to access this purpose. Results show that correlation coefficient couples of variables in Mashhad city in equal situation was 0.672 that means the correlation between household income and education in different regions of Mashhad are vary. Also the ratio of capital income to restricted educational inequality was equal to -0.61. Correlation between the two variables of income inequality and educational inequality was 0.317. With attention to fig (4), we understand that region 4 has a suitable status rather anther region of Mashhad city. Also average education Gini coefficient in highest level is equal to 0.0561 ($R^2= 0.0561$) and income Gini coefficient in lowest level is 0.0 516 ($R^2= 0.0516$)

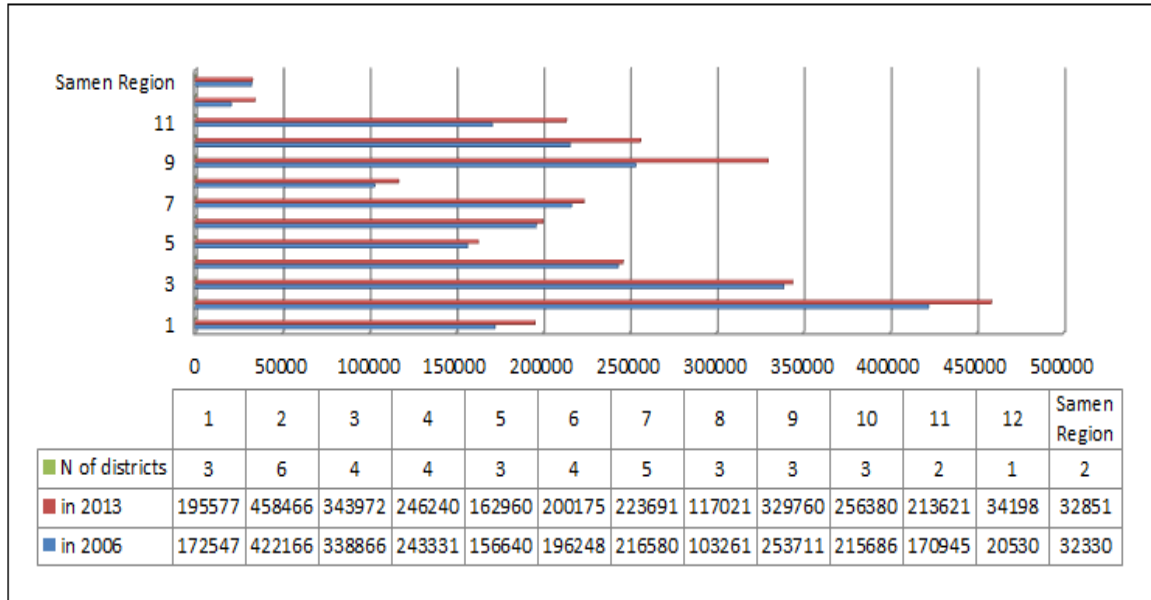


Fig.4. Income Gini coefficient in Mashhad city

The administration of Mashhad city has been distributed between organizations. But there isn't cooperation between organizations. So, the organizations need to cooperate each other. However, there are some organizations for administrating of city, but also the main organization is parks and green spaces organization. For promoting of green space management, gardens official was established in 1961. After that, change to parks and green space organization in 1964. Also, the basic changes were created in structure. The traditional methods were removed and were replaced modern technique for administrating city. In Mashhad city, projects for the enhancement of urban improvement mainly with the arrival of the Islamic city council, the organization of gardens and sidewalks was dedicated to the interests of the native symbols with respect of the economic aspect of nature in Iran.

Conclusion and suggestions

Eco city areas in the densely populated cities of today are valued more than before while at the same time are suffering shrinkage due to pressures for more open lands for housing development. The results of this study revealed that green space areas in the Mashhad city during the years 1987–2012 have become isolated and decreased. Even, in some cities per capita of green space land-use is low from optimum range. The green spaces development process of Mashhad city show that the first modern green space is not racemization correctly and different

groups have different idea about this subject but what of many of citizens have agreed about that is the Kohsangi urban park is an old urban park in Mashhad but National garden park in fact is the oldest park in Mashhad city. It has been made in 1952. Then, in order to balancing between urban park, green spaces land-use and other land-uses (such as: residential, commercial, administrative and etc.) were made parks in 1962 decade. The studies show urban green spaces increase to 11.1 km² in 1998 that the numbers of parks are 184. In Mashhad city, projects for the enhancement of urban improvement mainly with the arrival of the Islamic city council, the organization of gardens and sidewalks was dedicated to the interests of the native symbols with respect of the economic aspect of nature in Iran.

References

- Abbas Poor, M.** (2007). Energy, Environment and Sustainable Development, Sanati Sharif University, Tehran.
- Abbas Zadeh, G., Hosseini, A.** 2011. Union of Towns, Habitable Cities, The Benefits of Urban Environmental
- Ajza-Shokouhi, M. Kazemi, KA.** 2013. Ecological capability evaluation for Urban physical development by using Multi-criteria decision- making analysis methods in GIS (Case study: Mashhad City in Iran) International Journal of Emerging Trends in Engineering and Development Issue 3, Vol.6
- Amirifard, H.** 1992. The effect of grass cover and building materials on changes in environment temperature in
- Calendar, P.** 2013. Income expectations, urban migration and employment in Africa. International Labor Review, 104(5), 23.
- Dalir, H, Hooshyar, K.** 2006. Perspective, factors and the elements of the physical development of cities in Iran, Journal of Geography and Regional Development, Num 6.
- Dawkins, C.J. and A.C. Nelson .**2002. Urban containment policies and housing prices: an international comparison with implications for future research, land use policy, VOL.9.
- Dennmann I.** (2013). Sustainable development in the industrialized and developing world, Journal of Geography Education, Number 59.
- Ebrahimzadeh, I. Jokandan, M.** (2008). Analysis and evaluation of development. Research Journal, 30- 34.
- Fanni, Z. Khakpoor, B. Heydari, A.** (2013). Regional development in border cities (A case of Sistan and Baluchestan Provinces), USA, SCS.
- Geography Education, Number 59, Tehran.
- Habibi M.** (1996). "Compiled papers of stable village conference". Islamic Revolution Housing Organization: p.166.
- Hamedan Civil Organization** Islamic council of Tehran metropolis), International Journal of Applied Science and Technology
- Karim Zadegan, H.** (2003). Principles of Environmental Economics, Naghshe Mehr Publication
- Listokin, D.** 2002. A National Perspective on land Use policy alternatives and Consequences, Prepared for the farm foundation.
- Malczewski, J.**,2004, GIS –based land-use suitability analysis: a critical overview, progress in planning 62. Municipality.
- Negararesh, H.** 2003. Use of geomorphology in urban location and its consequences, Journal development and geography Magazine, Num 1.
- Piri, K, Rezaei Rad, H.** 2006. Eco-park, The first International Conference of Superior City, Superior Initiative, Planning, Sahaf Publication.
- Rahnama, M.R, et al.** 2009. A research of Urban Eco-parks, Iranian Academic Center for Education, Culture &
- Rahnama, M.R, et al.** 2012. Strategic Review of Financial Structure of Iran's Local Management (Case study:

Research-Mashhad Branch

Richard, peiser. 2002. Decomposing urban Sprawl. Town planning Review, Liverpool. VOL, 172.No3.

Saeed Nia, Ahmad, 2003. green book, Urban Studies and Planning of Interior Ministry, vol 1,

Srivastava, S.K., and Gupta, R.D., 2003. monitoring of changes in landuse/landcover using multi-sensor satellite data, map india conference. tropical regions, Proceedings of seminar on Green space, Parks and Green Spaces Organization of Tehran

Tavakoli, M. Heydari, A. 2012. Urbanization in Kurdish cities after Islamic Revalution of Iran, A case of Saqqez city, SCS, 10: 25-29.

Zali, A. Qanbari, M. (2012). Sustainable development in the industrialized and developing world.