



The Physical Transformations due to the Rural Sprawl in Rural Settlements of Hamadan Periphery

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Abstract

Purpose: One of such changes is the rural sprawl and its physical-spatial consequences in rural areas and their surrounding lands which has led to land use change in agricultural lands, gardens and less planned physical changes.

Design/methodology/approach: This study was conducted in a descriptive-analytical method using field works, regular interviews and monitoring of satellite images and GIS maps. This study sought to identify and explain the natural consequences of rural sprawl in the physical area of villages and their surroundings during a 20-year period from 1995 to 2016. The study area included 24 large rural settlements around Hamadan County with an average rural population of 2,800 people in areas with farmlands and gardens.

Finding: The findings showed that rural sprawl has resulted in unplanned proximity and intermingling of rural-urban functions in rural settlements, physical changes in surrounding rural settlements, changes in diversity and composition of rural land uses, changes in physical structure of rural areas, and increased number of single-family residential units and villas.

Research limitations/implications: Difficulty in gathering data about the rural areas' physical changes and access to data and documentation of some organizations and interviews with some groups were among the challenges of the study.

Practical implications: Management based on settlement systems of suburban towns and villages in the form of rural-urban ties and metropolitan area of Hamadan (in macro level), integrated management based on legal limits of the villages and their immediate areas, regulatory and more planned intervention through compliance of the uses with the structures and functions of the villages were some of the recommendations in the managerial and planning level.

Originality/value: There have been a limited number of studies on emerging concepts and phenomena in the villages surrounding the metropolises and big cities. Therefore, it was necessary to conduct a study and discuss the consequences of rural sprawl as a phenomenon in villages round cities.

Key words: Rural sprawl, physical changes, rural settlements around cities, Hamedan

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1. Introduction

As one of the main centers of human residence, villages develop the major geographical basis of an area with special relationships, and recognize the economic and socio-spatial features of their surrounding environment particularly cities. Nevertheless, the villages near urban centers, especially villages located in immediate spheres of influence of large cities and metropolitan areas have suffered the highest level of physical and functional changes (Saidi, 2010). One of the changes in such constantly changing areas was the phenomenon of rural sprawl and change in land use in rural settlements round cities. Meanwhile, a new area has come into existence which is neither urban nor rural. Although it has some differences with both, it has some of the characteristics and often negative features of both areas. It is clear that assiduous attention should be directed to this new area which is called the suburb, rural-urban outskirts, etc. in regional studies (Saidi, 2011). Changes related to land use and vegetation have interested many researchers in various fields of study including those who are modeling spatial-temporal models of land use changes and those who seek to understand the causes and consequences of changes in land use (Burgi, 2004). Changes in land-use and land-coverage, considering their effective dynamic forces, are still very complicated (Lambin et al, 2003). The sprawl of human settlements in urban and rural areas is the main driving force in land use and land cover changes across the world. What reinforces these trends is an action-reaction cycle in a dialectic format that gives rise on the one hand to some phenomena such as sprawl, gobbling (up), annexation; and on the other hand such phenomena have a complementary role and make way for the metropolises to extend into surrounding lands which are mainly valuable rural and agricultural lands (Saidi, Taleshi, Moosa Kazemi, Zianoushin,

2016). In the suburbs of metropolises and big cities, recently, the phenomenon of rural sprawl has become more evident. While urban sprawl and the suburbs have been a serious threat over the past decade, rural sprawl has recently created a thorny problem (Daniels, 1999). While the term rural sprawl has no fixed definition, it is physically characterized with scattered development which ruins the natural perspectives and agricultural lands and horticultural uses, and it is considered as a kind of extension of physical environment to adjacent lands. In the present study, we sought to determine the amount of rural sprawl in the villages around cities and specify the characteristics and physical consequences arising from rural sprawl. The rural settlements round Hamedan enjoy socio-cultural, economic, and natural diversity. In this area, there are populous villages in mountain, hilly and plain areas. In terms of the range of activities and functions, these settlements include a variety of economic activities from horticulture and agriculture to tourism, leisure, service activities, and even workshops. Accordingly, the main objective of this study was to explain the occurrence of rural sprawl in rural settlements around the city of Hamedan and investigate the evolution and physical consequences of sprawl in these villages.

2. Research Theoretical Literature

Today, modern geography as a systematic interdisciplinary science, surveys human societies as "space systems". All human communities, large and small, either as individual settlements or as homelands or nations, form spatial systems which constitute the structural systems; such systems including environmental-ecological structures, legal structures, their relations and activities, nature and capabilities, are discussed by modern geography either individually or simultaneously (Saidi, 2013). In recent decades, because of dependencies between rural and urban environments, a kind of

fragile connection between these two areas has emerged. This connection acts systematically and what happens in one of these two areas, inevitably affects the other area (Saidi, 2011). On such a basis, in rural-urban chains, the highest dynamism could be found in surrounding areas of cities, which are usually known as transitional areas with a combination of urban and rural activities and land uses.

This transitional area is also defined as a spectrum of rural-to-urban change, which is tumultuous and multidimensional and has resulted from deep social processes. In the transitional, suburban environments and rural settlements adjacent to metropolises and large cities, the phenomenon of rural sprawl has recently emerged. Since 1970's, rural sprawl has entered the literature of land use (Engle, 2003). One of the confusing aspects of sprawl is the disagreement over its definition (Johnson, 2001). Although Johnson presents several alternative definitions for the consideration and coverage of all aspects of sprawl, there is no consensus and agreement on the definitions. While the term "rural sprawl" has no fixed definition, its physical characteristics in general can be attributed to low-density development which is characterized by open spaces and agricultural lands with single-family housing units, and remote and isolated buildings with long distances. Suburban sprawl is often described as unplanned and poorly planned development, and as irresponsible expansion which destroys green space and environments and increases pollution and traffic. Sprawl may be described as the dispersion of urban settlements up to the rural landscape (Clark, 1971). Therefore, sprawl should be on the scale of time and space, and it is not simply increased construction. Rather, it is increased construction relative to population growth. In other words, the sprawl around urban and rural areas occurs when the conversion rate of land to non-agricultural or abnormal uses is higher than population growth rate. The most

common quantitative definition of rural and urban sprawl applies when the population density decreases over time (Theobald, 2003). In general, rural sprawl occurs in two types. The first type is the development of a low-density residential area into outskirts of the villages, suburbs and small towns. The second type of rural sprawl is the strip development near the highways and communication paths connected to the suburbs and villages. Daniels(1999) defines rural sprawl as a scattered residential development with low densities outside suburbs and cities. In fact, rural sprawl is defined by the development of residential units in rural environments and around urban and rural areas (Theobald, 2003). In the United States, after World War II, we witnessed the beginning of a revolution on 'land'. Only in 1945-1960, about 10 million single-family units were constructed in the suburbs and rural areas (Andersson, 2010). Rural residential land refers to the constructed areas of rural settlements including buildings, roads, cottages, gardens and grasslands, dykes, livestock fences, and bare grounds associated with villages and townships of small villages. In China, rural residential land was 16.5 million hectares, which is 5.61 times that of urban land in 1999 (Feng Ming, 2012). In 2000, in general, 67.3% of the total construction in China belonged to rural housing. Although several studies have been conducted on the demolition of agricultural land by expansion of urban centers; there are few studies investigating land use changes in rural housing. Recently, rural areas expand far from urban areas. Tourism harbor, non-local industrial and commercial infrastructure, dense road networks combined with the conversion of agricultural lands to separate buildings limited to residential uses are the most visible signs of a village transition to suburban lands. For example, in Greece, the spread of sprawl is more than normal along the beaches (Polyzos, 2008). The report made by the European Environment Agency in

1990's indicated the loss of agricultural land due to sprawl in the Mediterranean coastal zone, most of which was high quality soil for agriculture. The prediction made for land use in Europe shows that agricultural land has a profound impact on the quality of the landscape and the environment, and thus, it is essential to help measure the change of vision for policymakers within the boundaries of the suburbs. One of the consequences of rural sprawl is its physical changes. One of the consequences of rural sprawl with regard to physical aspect is the dispersion of housing in rural areas, which leads to a high level of low-density housing and the segmentation of residential units (Radeloff, 2005). In Transki and to a lesser extent in the Cape Town, the villages became larger over time. One of the consequences of rural expansion is that neighboring villages become one and result in a rural area with a large sprawl (Ronald, 2010). An increase in population in rural areas creates the demand for development within rural areas. In 1994-1997, about 80 percent of the new housing estates in the United States were outside the urban areas. Similarly, in rural parts of England, a significant expansion of new houses occurred, especially in small towns (Woods, 2005). Generally, structural and physical characteristics and issues of rural areas are very diverse and heterogeneous, and understanding and defining the type of rural settlements at the local and regional levels are the subject of many studies and research (Vasilevska, 2010). In the villages situated in suburban areas, as the most important residential area for immigrants who are also affected by physical expansion of cities, the agricultural lands have become commercially valuable, and there is a profitable market for farmlands and changing them into residential areas or workshops. Meanwhile, as the physical appearance of rural areas changes, gradually, a class of wealthy people (in rural scale) appear who cause a booming land

market in rural areas. Higher demands for housing are among the factors which make way for irregular construction which plays an essential role in the disorder observed in rural construction and physical appearance.

Few studies have been conducted on rural sprawl, especially in Iran. Generally, serious studies in the field of rural sprawl in the world began in the late 1980's. One of the most important studies related to rural sprawl and its physical consequences is Hualou Long et al.'s (2007) article titled "Socio-economic development and land-use change: Analysis of rural housing land transition in the Transect of the Yangtse River, China" which investigated the land use changes in rural housing. The authors showed that construction of rural housing in every region has its own special procedures and with the development of the local economy, the share of total rural housing constructions in the country had gradually reduced. Burgess and Bier (1998), in a report titled "public policy and rural sprawl" discussed the issue of management and numerous decision makers in various urban subjects, associated forces, the policy framework related to development of these villages and the loss of agricultural lands. The authors emphasized that while residential development used to happen in specified areas of towns and villages, recently construction of single-family homes in the paths leading to the villages had greatly enhanced. Liberty (2013) in "cessation of sprawl in low-density rural settlements" stated that over the last 50 years, millions of hectares of rural land in the US has become low density ones because of residential development. Within the last five decades, state and local governments have adopted different ways for protecting rural lands against low density residential development. Salvati (2013) in an article titled "Rural sprawl, Mykonian style: a scaling paradox" examined the rural sprawl in an unspoiled rural area in Greece in the form of second

homes and low-density tourism sprawl. In this paper, the author has examined the rural sprawl indices in different physical and housing dimensions and land uses, and has argued that the most evident symptoms of rural sprawl are the expansion of tourist resorts, disorganized commercial facilities, non-localized industrial infrastructure, dense road networks, and the use of isolated buildings (far from farmlands) for residential purposes.

Mann (2009) in an article titled "Institutional Causes of Urban and Rural Sprawl in Switzerland" discussed the role of decision-making bodies in the regulation and protection of agricultural land in the face of severe shortage of open space in the country. The author acknowledged that in Switzerland, 22% of the total land is now used for housing and roads. An important part of the constructions and roads is in rural areas which reveals rural sprawl. Fengming (2012) has discussed sprawl and loss of agricultural lands in China, growth in rural residential lands, and affirmed that an important part of rural and physical development of the villages has been the result of land use change and conversion of farms and plantations. Radeloff et al. (2005) in an article titled "rural sprawl and suburban areas of the Middle West of the United States from 1940 to 2000", investigated rural-urban suburban sprawl and 146 percent raise in housing. The authors discussed the quantification of the spatial and temporal patterns of increased construction in the area, the ecosystems that housing has severely affected and the relationship between construction and the fragmentation of the forests. Afrakhteh et al., in an article titled "the role of spatial flows in rural sprawl" discussed two important indices of population and capital flow and their impact on the formation and development process of rural sprawl and scattered physical changes in rural areas. Saidi et al. (2014) investigated the annexation of urban settlements of Sayan and Gavazang and demographic consequences,

land use changes and physical changes. This study is one of the few studies that discusses rural sprawl in rural settlements of a big city in Iran. Generally, in the literature, the role of urbanization and urban factors effective in rural sprawl has been discussed. In this article, attempts have been made to take into account the forces and factors affecting the rural sprawl in the rural community.

3. Research Methodology

3.1 Geographical Scope of the Research

The study area included 24 populous rural settlements in the suburbs of Hamedan. These settlements have a high socio-economic, cultural and natural diversity. In this area, there are various villages ranging from villages with agriculture and horticulture functions to villages with the service and leisure functions and villages which closely interact with Hamadan. These settlements enjoy a high cultural diversity. Some villages, including Yoknabad, Qasem Abad, Dah Piyaz, Garachqa, Abshineh, Yekaneh and Konjineh are Turkish speaking ones. The villages of Tafri Jon, Ansar al-Imam, Heidareh Balashahr, Solan and Silvar are Persian speaking. The villages of Cheshin (also known as Keshin) are Kurdish and Laki speaking villages; the village of Abrou is a Bakhtiari Turkish-Lori speaking village, the village of Cheshmeh Malek, and Khakou are Lori speaking ones. In the villages of Mehdi Abad, Qasem Abad, Ali Abad, Poshtshahr and Hassan Abad Shorin due to migration from different regions inside and outside the province, there are simultaneously different variety of Kurdish, Lori, Turkish and Persian speaking people. Such a variety has brought about physical, socio- economic and political developments. Accordingly, for selection of rural settlements, we took into account 1- direct sphere of influence (daily commuting to Hamedan), 2- villages 10 and less than 10 kilometers away from Hamadan, 3- the economic activities and employment of some

heads of rural households in Hamedan County (Fig. 1).

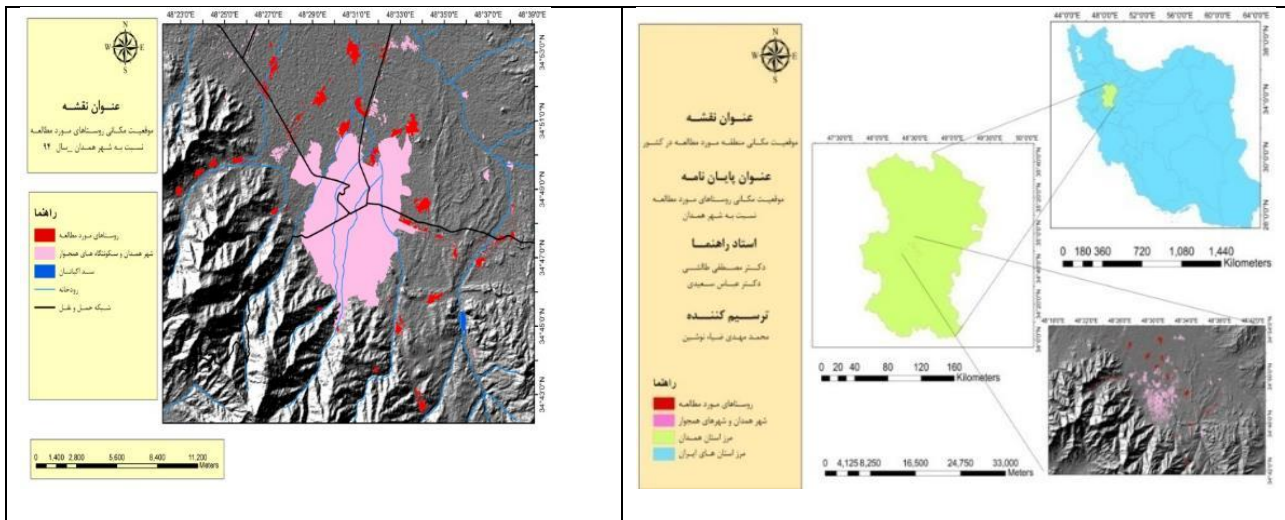


Figure 1. Geographical location of rural settlements in suburban Hamadan (1995-2016)

Source: Research Findings, 2016

2.2 Methodology

The data were collected by library research and field works. We used library research to get a theoretical understanding of rural sprawl and its effective forces and factors. Another part of the research was conducted by surveying the applied maps. The layers used in this study included administrative divisions, land use, vegetation, main roads, rivers and seasonal rivers, altitude, slopes, etc. Considering the 20-year period covered in this study (1995-2016) and to monitor the physical changes, the aerial photos related to

1995 with the scale of 1: 40,000 were converted into topographic maps of 1: 25,000. Then topographic maps of 1:25,000 were converted to DWG format and then layers were merged and coordinated. With the help of CAD maps of the rural areas, we converted them into GIS maps for the years 1995-2016, and compared them with one another, and identified the extent and type of rural sprawl in each rural settlement (in hectares) and the impact of rural sprawl on changes in land use and physical development of these rural settlements.

Table 1. Demographic developments and physical changes in rural settlements in suburban Hamadan

Source: Statistic Center of Iran, 1996-2016

Rural Settlement	distance from the city (km)	1996	2006	2011	2016	Number of households	annual growth rate (%)	Rural sprawl type
Garachqa	1.5	2233	2252	2354	2700	680	+1.02	Linear - Longitudinal
Dah Piyaz	4	3881	4078	4614	4700	1251	+1.05	Continuous
Ali Abad Poshtshahr	Joining	2598	4453	6540	7500	1987	+9.4	Continuous
Qasem Abad	Joining	2933	5661	8382	10000	2394	+12.04	Continuous
Hassan Abad Sheverin	Joining	386	1600	4428	5500	864	+66.2	Scattered and irregular

Table 1.

Rural Settlement	distance from the city (km)	1996	2006	2011	2016	Number of households	annual growth rate (%)	Rural sprawl type
Yeknabad	5.5	2573	2824	3267	3600	620		Longitudinal and continuous
Mahdi Abad	4	400	1303	1908	2400	526	+25	Scattered
Soulan	6.5	3025	3118	3281	3450	1030	+0.7	Linear - Longitudinal
Sangestan	2.5	1227	1127	1193	1450	381	+0.92	Scattered and irregular
Sheverin	1	3800	4021	4445	4700	1255	+1.2	Continuous
Tuigin	8.5	1437	1496	1617	1700	465	+0.93	Linear - Longitudinal
Moigin	7.5	1646	1759	1802	1930	503	+0.88	Linear - Longitudinal
Barfgin (& Vafargin)	10.5	1410	1445	1622	1750	436	+1.2	Scattered
Abshineh	6	1537	1506	1425	1300	417	-0.7	Scattered and irregular
Konjineh	8	845	760	750	770	238	-0.4	Scattered - Longitudinal
Heidareh Balashahr	2	1551	1232	1145	1150	355	-1.29	Continuous
Cheshin	3	1366	1447	1662	1950	502	+2.1	Scattered and irregular
Yekaneh	10	584	427	342	450	108	-1.1	Linear - Longitudinal
Ansar al-Imam	3.5	2753	2742	2799	3100	846	+0.65	Continuous - Longitudinal
Khakou	5	698	448	415	450	118	-1.7	Continuous
Silvar	Annexation	467	373	367	400	117	-0.7	Scattered and irregular
Cheshmeh Malek	1.5	242	252	268	270	78	+0.5	Continuous
Abarou	8	3479	3486	3783	4000	1034	+0.74	Linear - Longitudinal
Tafrijan	5.5	2404	2134	2149	2146	691	-0.5	Continuous
Total		43475	49944	60558	67616	16896		

3.3 Indices of Rural Sprawl

In the literature, sprawl includes various types of development including low, strip, scatter density, nodal moves, etc. (Ewing, 2002). Generally, concerning the indices measuring the sprawl, the cities are taken as measure of the study, and these indices are based on urban spaces. However, in some studies, a few indices are considered with regard to rural sprawl. With a review of the literature you may come across some applied

indices relevant to rural areas. These indices include a variety of sprawl, from sever sprawl to limited ones in urban areas, suburbs and rural areas. In the following table, some indices of rural sprawl are given. It is clear that the use of these indices depends on the conditions of the society, economy, and the characteristics of each geographical area, as the intensity and pattern of rural sprawl can be different.

Table 2. Bibliography of the criteria and indices of rural sprawl
Source: Research Findings, 2016

Dimensions of rural sprawl	Criteria	Reference
Physical	Physical expansion	(Daniels, 1999; Engle, 2010; Ewing, 1999; Forman, 2008; Ewing et al. 2008; Radeloff, 2005; Salvati, 2013; Polyzos et al. 2008; Fina, Stefan & Siedentop, 2008; Gordon, 2001; Ewing, 2002)
	Physical structure	(Fengming Xi et al. 2012; Fina et al. 2008; Anderson, 2010; Rodewald, 2007; Gordon, 2001; Ewing, 2002)
	Housing patterns	(Radeloff, 2005; Fina, et al. 2008)
	variety in uses	(Engle, 2010; Mann, 2009; Anderson, 2010; Statistics, 2008; Fina et al. 2008)

Table 3. Indices and criteria of rural sprawl
Source: Research Findings, 2016

Dimensions	Indices of Rural sprawl
Physical	the amount of increase in size of the rural settlements in rural conservation zone
	the amount of increase in the rural settlements in farming zone
	the amount of increase in the rural settlements in rural activity zone
	the amount of increase in the rural settlements in rural living zone
	idleness of the uses and residential units
	The number of single-family houses
	The number of 'Second homes' or 'Holiday homes'
	The changes in the physical patterns and structure
	The ratio of primary core of settlements to residential spaces built in different periods
	The integration of the new residential area with existing residential area (open space and openness)
	The construction of the main and secondary roads in rural settlements
	The number of constructions in proportion to total number of buildings in the village
	The percentage of newly built houses in dense areas of the villages
	The percentage of newly built houses in detached and isolated areas of the villages
	The percentage of adjacent construction
	The ratio of the houses being built to number of available rural houses
	Percent of construction in a village compared to mean in the villages of the County
	Number of urban uses in rural areas
The average number of floors in rural residential buildings	
The ratio of newly built houses to old ones	

4. Research Findings

The physical effects of rural sprawl in the study area were categorized in several sections: 1- proximity of urban-rural uses in rural settlements 2. Physical changes outside the residential area 3. Adding variety to rural-

use combinations 4. Changes in the physical structure of rural areas, and 5. Increased number of single-family houses and villas

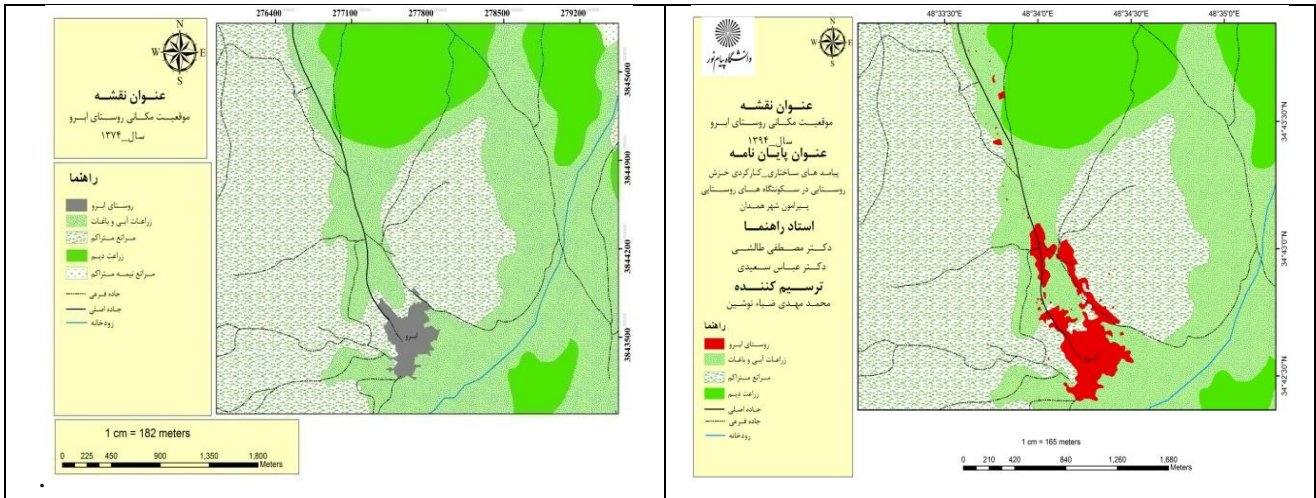


Figure 2. Physical changes caused by sprawl in Abrou village in 1995-2016.
Source: Research findings, 2016

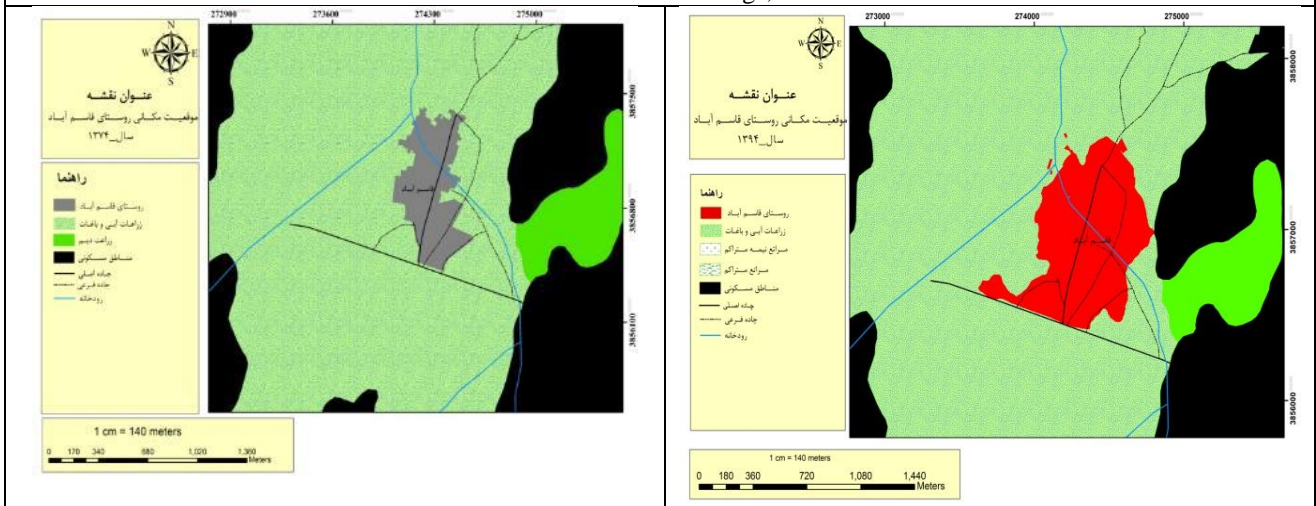


Figure 3. Physical changes caused by sprawl in Qasem Abad village in 1995-2016.
Source: Research findings, 2016

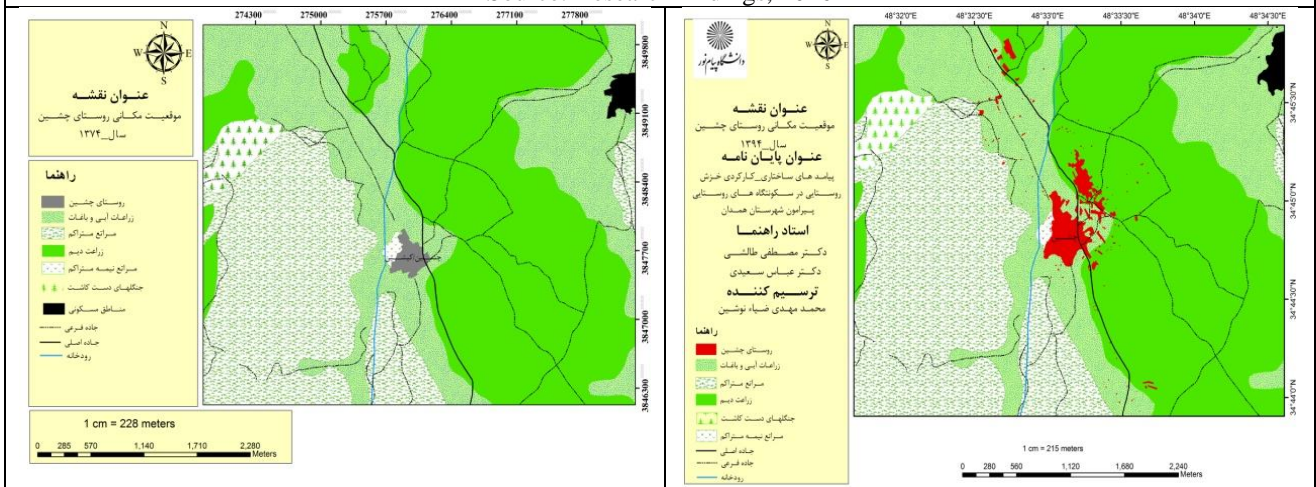


Figure 4. Physical changes caused by sprawl in Cheshin village in 1995-2016.
Source: Research findings, 2016

One of the physical consequences of rural-urban sprawl is the intermingling of urban-rural functions. As a result of the sprawl in the villages around the city of Hamedan, rural-urban activities and functions have greatly expanded. A survey of maps, images, observations and research findings showed that an important part of the newly developed functions are in the immediate area of the villages which has led to an inconsistent and contradictory neighborhood of urban and rural functions. In fact, parts of urban functions have extended to villages in suburban Hamadan due to the lack of space in the city of Hamedan, the lower price of land in these areas compared to the urban area of Hamedan, and bare lands in the suburbs. Among the most disturbing and conflicting urban uses in the vicinity of these settlements, one can list the following: 1- Shops and workshops of waste materials in Merianage to Ansar al-Imam road. 2. The emergence of an area

known as Masoum Khani with about 140 authorized or unauthorized garden houses near Heidareh road to Solan and the western and southwestern parts of the Alvand settlement and on Heidareh land, as well as several restaurants and two halls and several shops on the way from Heidareh village to the leather industries and the town of Modarres, and a company for cutting the precious stones; 3- Presence of Shahid Mofateh technical university in the vicinity of Shorin village; 4. Public and private companies and factories adjacent to farmlands of Garachqa village. 5- In the vicinity of Abshineh, Sangestan and Konjineh rural areas, urban uses are mainly contrasting with the rural structures and functions located in the vicinity of the agricultural lands and gardens of the village. In addition, in the villages of Qasem Abad, Ali Abad and Hassan Abad Shorin, which are somehow annexed to the urban area, urban activities are found in great numbers.



Figure 5. proximity of urban uses and the physical structure in villages of Abshineh and Konjineh.
Source: Research findings, 2016



Figure 6 . proximity of urban uses and the physical structure of Sheverin village.
Source: Research findings, 2016



Figure 7. proximity of urban uses and the physical structure in Sangestan village.
Source: Research findings, 2016



Figure 8. proximity of urban uses and the physical structure in Garachqa village.
Source: Research findings, 2016

One of the most concrete and significant changes caused by sprawl in the villages around Hamedan was the physical changes in rural settlements and their immediate spaces. The findings of this study indicated that in general, on Hamedan-Kermanshah, Hamedan-Malayer and Hamedan-Tehran roads, physical changes caused by sprawl are evident. According to the research findings and recent statistics from the Ministry of Industry and Mines, in 10 km radius of Hamedan which comprises the study area, there are approximately 800 small and large workshops ranging from 20 square meters to several thousand square meters in the form of aviculture units, warehouses, service stations, stone and ceramics workshops, etc. Most of these workshops and small production and industrial units are in the vicinity of rural settlements and agricultural lands and gardens of these villages. Near Hamadan-Kermanshah road, there are three villages of Ansar al-Imam, Mahdi Abad and Yoknabad. In the surrounding area of Ansar al-Imam village, and in the agricultural fields of this village on the western side (in the sub-route and the village's old access road), there are waste material workshops that have led to sprawl outside the rural area. In the vicinity of the villages of Mahdi Abad and Yoknabad, there are mostly restaurants, delicatessens and service stations. There are also a number of factories, cold storage rooms for Agricultural Jihad Ministry, aviculture units and poultry feed shops, plastic and disposables items, Children Refinement Association, some storage depots, and a number of buildings all of which are located outside the rural area of this villages which has created physical disorder and disorganized rural areas. Along Hamedan-Tehran road, only in Garachqa village, there are 120 active wood workshops with 5 to 10 workers in each unit which have created an industrial area and workshop sprawl. In addition, along this road, on the eastern side of the road and in the farmlands of Qasem-Abad, Hasan Abad and Shorin villages, state companies and factories of Hamedan are established, for example Iranian Gas Company, Keyvan, Customs Office, and the warehouse of Ministry of Jihad-e-Agriculture, etc. are located in this area. On the western side of the Hamadan-Tehran road and in farmlands and gardens of Garachqa, there are drug selling companies, Iranian Red Crescent warehouse,

carpet washing workshops, vegetable farms, recreational and service complexes, etc., which have connected rural areas of Garachqa village to such uses. In Hamadan-Malayer road, Sangestan, Abshineh, Yekaneh and Konjineh settlements have been established. The main workshops and production and industrial units along this road are plastic, stone, and ceramics workshops, aviculture units, numerous warehouses, carpet washing workshops, concrete block and mosaic making workshops, service stations, stone industries, etc. With a review of pictures taken from these villages, especially those of Abshineh, Yekaneh and Konjineh, we found that although the buildings in these settlements have a short distance from one another, it is the improper site selection for workshops and micro-industrial units which have actually made them too close to one another. The villages of Abshineh and Konjineh on both sides of the Hamedan-Malayer road are connected to each other as a result of this dispersed and disjoint sprawl. In addition to the industrial and workshop sprawl in the vicinity of the villages of Sangestan and Abshineh, there are several hundred garden houses and villas mainly owned by the affluent and middle classes of Hamedan and partly by residents of the villages or villagers living in the cities. These villas have been built as a result of changes in land use. As a result, the appearance and landscape of the area has been altered in a disorganized way, and there have been scattered physical and spatial changes in the rural landscape.

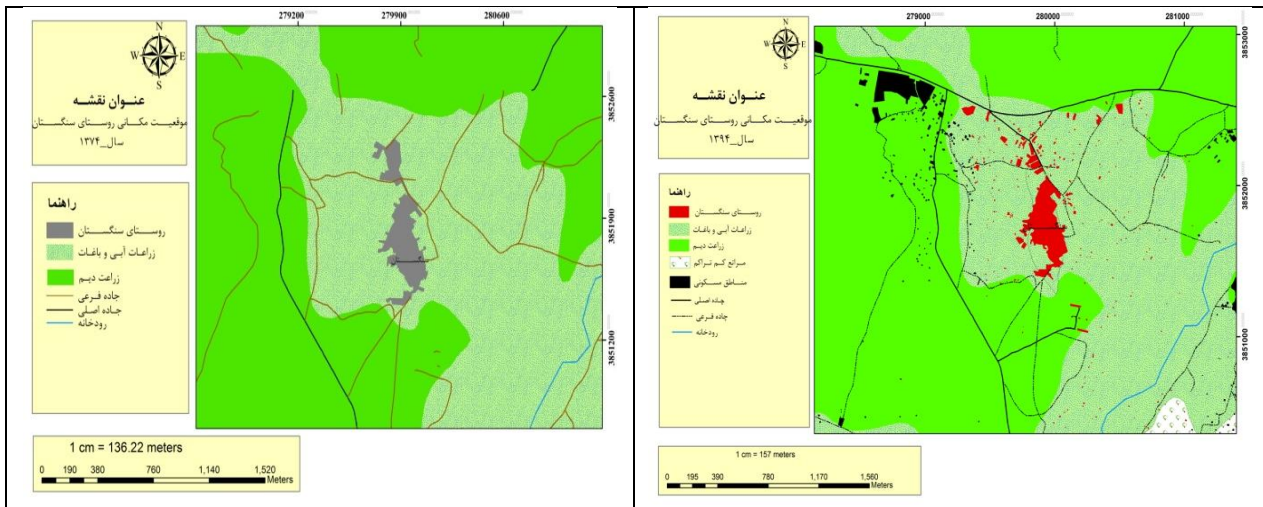


Figure 9. Physical changes caused by rural sprawl in Sangestan village in 1995-2016.
Source: Research findings, 2016.

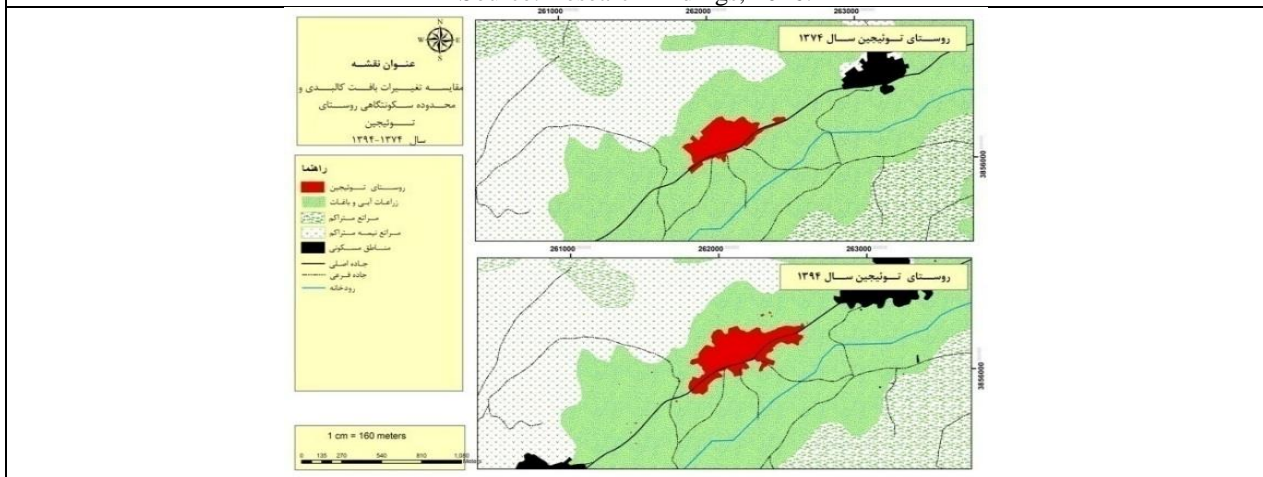


Figure 10. Rural sprawl in Tuigin village in 1995-2016
Source: Research findings, 2016.

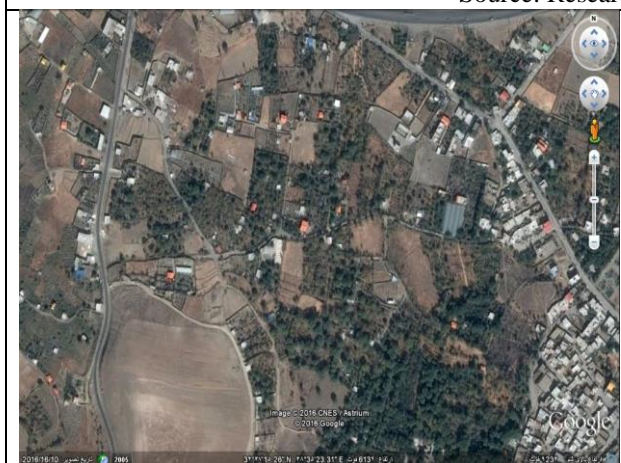


Figure 11. Villas and one family houses near Sangestan village
Source: Research findings, 2016



Figure 12. Villas and one family houses near Abshineh village.
Source: Research findings, 2016

Another change in the peri-urban settlements is the change in the composition of rural uses. On the one hand, the villages of this area, due to high population density that has increased over time, have been eligible to receive all types of grade-1 and grade-2 services in rural areas. Such a situation has helped to change the diversity of rural uses in this residential area. According to statistics, the population share of the surrounding villages in the central district of Hamedan county is about 77%, and the population share in Hamedan County is 68%. Besides, this residential area comprises about 9.3% of the rural population of Hamedan province, which is a large number. On the other hand, because of the rural sprawl and the proximity to Hamedan County and the environmental attractions of these villages, the uses of these settlements are very diverse. According to the statistics of the ‘[Statistical Center of Iran](#)’ and ‘the Profile of rural areas and

field surveys’, access to facilities and services in the villages of the study area was high compared to other villages of Hamedan province and Hamedan County. As a result, this ratio for the total of 24 rural settlements around Hamedan County was 3 to 1, and compared to the province it was 4 to 1. In other words, there are respectively 4 and 3 types of non-agricultural services and facilities in the villages for each type of services and non-residential uses in the villages of the province and the County, indicating the variety and composition of various uses in these villages. There are a large number of real estate agencies, various uses related to home businesses, small business units and workshops, sporting and recreational facilities, supermarkets and food products, and a variety of service stations, household appliances, etc., which comprise a part of the non-residential uses.



Figure 13. Variety of uses in suburban settlements.

Source: Research findings, 2016

Changes in the patterns of physical structure of the villages of the study area are another consequence of the rural sprawl. The survey of the images and maps over the course of the 20-year

period showed that the physical structure of all rural settlements has changed with different intensities which reveals different structural patterns. Villages of Dah Piyaz, Ali-Abad

Poshtshahr, Qasem-Abad and Shorin have experienced a continuous sprawl pattern. The settlements of Hassan Abad Shorin, Mahdi Abad, Sangestan, Abshineh, Konjineh, and Cheshin had a dispersed and irregular sprawl in 1995-2016. The villages of Garachqa, Yoknabad, Solan, Tuigin, Moigin, Yekaneh and Abrou have also encountered with a linear-longitudinal sprawl pattern. The villages of Solan, Tuigin, Moigin and Barfin alongside the mount Alvand have formed a residential axis. Villages with a linear-longitudinal sprawl pattern are mainly located on the paths adjacent to communication roads, as in

this type of villages, newly constructed buildings are found quite often on these roads. The difference between the primary core of the village and the newly developed buildings is the more regular network of roads and old second or third grade road networks. In fact, the difference in the type of newly built housing and the old buildings of the villages is the increased average number of floors in the new quarters; the expansion of the rural passages and proximity or attachment of rural buildings (villages of Yoknabad, Mahdi Abad, Moigin and Tuigin) are some of the physical changes in rural settlements of this area.

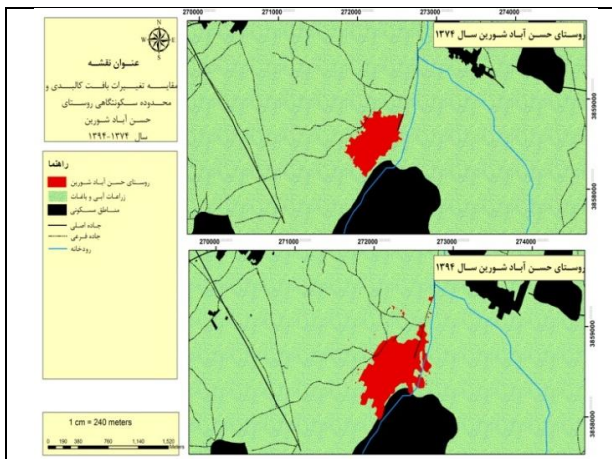


Figure 14. Continuous sprawl in Ali-Abad Poshtshahr in 1995-2016.
Source: Research findings, 2016

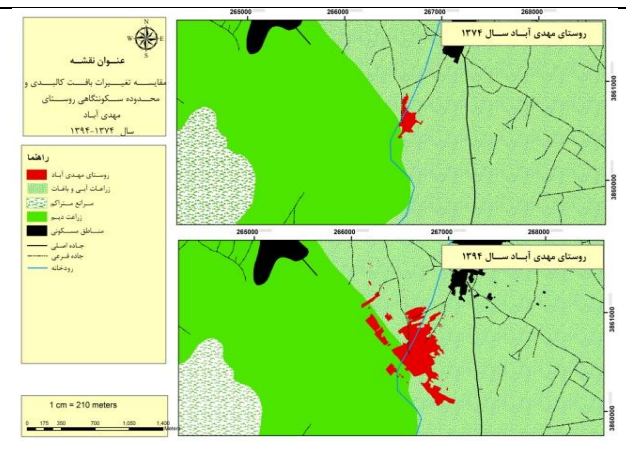


Figure 15. Scatted sprawl in Mahdi Abad in 1995-2016.
Source: Research findings, 2016

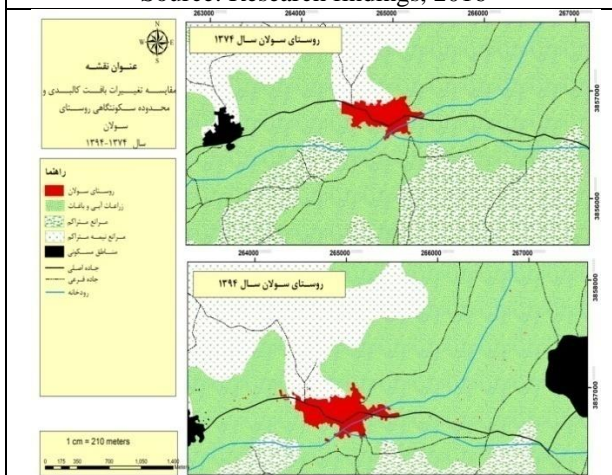


Figure 16. Longitudinal-linear sprawl in Soulan in 1995-2016.
Source: Research findings, 2016

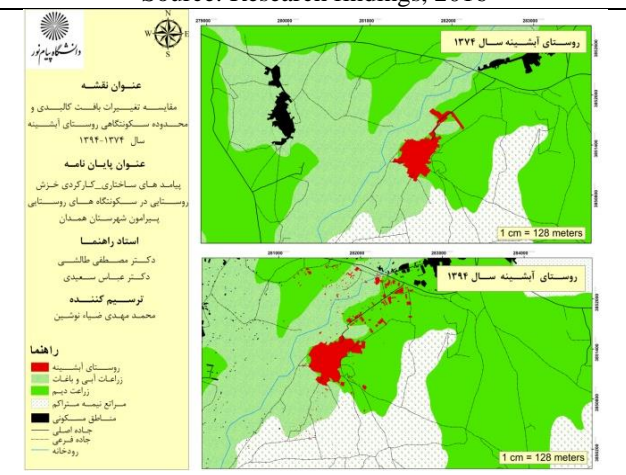


Figure 17. Scatted sprawl in Abshineh village in 1995-2016.
Source: Research findings, 2016

Among other physical changes caused by rural sprawl, we can mention the expansion of single-family units, villas and residential gardens inside and around the villages. Comparison of the images and maps showed that in the vicinity of the villages of Abshineh, Sangestan, Cheshin, Solan, Moigin, Tuigin, Silvar, there are numerous single-family units, second homes and villas that have created a special physical appearance for these settlements. Based on field surveys and interviews, there are about 200 second homes and

villas in farmlands and gardens of Sangestan, 100 residential gardens and villas in the vicinity of the physical structure of the Abshineh village, 70 residential gardens and villas in farmlands and gardens of Silvar; besides, there are respectively 120, 30, 60, 20 villas and second homes in the villages of Cheshin, Solan, Moigin, and Tuigin. However, the results indicated that 15% of these villas belong to villagers and 75% belong to urbanists in Hamedan, Tehran, and Khuzestan.



Figure 18. Second homes. Sangestan village.
Source: Research findings, 2016



Figure 19. Second homes in Soulan village.
Source: Research findings, 2016



Figure 20. Second homes in the Tuigin village.
Source: Research findings, 2016

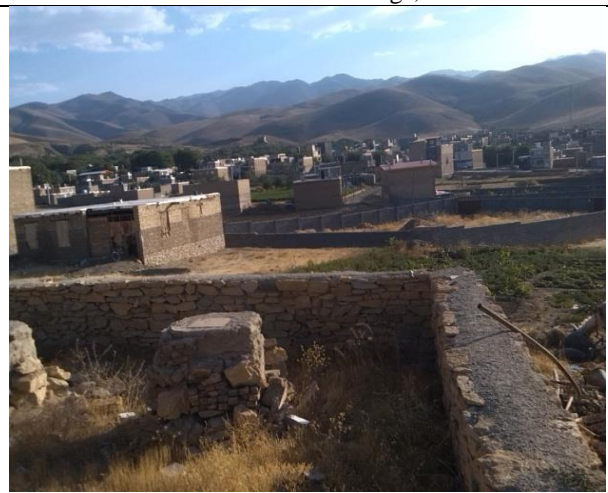


Figure 21. The progression of old buildings to the orchards. Cheshin village.
Source: Research findings, 2016

5. Discussion and Conclusion

The survey of physical-spatial changes from 1995 to 2016 indicated that sprawl in the suburban

settlements of Hamedan have happened in two levels: authorized area of villages (rural buildings or the area of Rural Conduct Plans) and outside the authorized area of the village (outside the area

of rural Conduct plans). Except for the villages of Qasem-Abad, Hassan-Abad Shorin and Ali-Abad Poshtshahr which have been annexed to the city of Hamedan, their authorized sprawl is also of both rural and urban types. In the rest of the settlements, the sprawl phenomenon is due to rural sprawl. Outside the rural areas, and in the areas between the rural settlements and their surroundings, the sprawl is mainly rural, urban and industrial-workshop which is the result of a variety of factors and forces, the most important of which is the high cost of land in Hamedan, various conflicting rules and regulations of the relevant organizations, and the lack of laws and supervision and policies for suburban lands. Such inefficient policies and planning for the private sector and economic activists and the affluent and middle-class in urban and rural areas have provided the motivation to intervene and change the land use and has caused sprawl in suburban Hamedan. All rural settlements around Hamedan have experienced sprawl over the past 20 years. The villages of Ali-Abad, Poshtshahr, Qasem-Abad and Yekaneh have experienced a double expansion of the physical structure of the villages. The village of Mehdi Abad, Hassan Abad Shorin and Cheshin (Keshin) have faced a three-fold increase in the size of the rural physical structure over the past 20 years. In the rest of the villages, during a 20-year period, from 1995 to 2016, 20% to 90% of the villages' physical structure have expanded. Outside the rural physical structure, there is a huge amount of diverse and conflicting uses that have created a disorganized and disrupted appearance in these settlements and lands. The mass of built-up areas alongside units

under construction at different intervals, which do not have a special order, permeate the suburb as a disorganized area, as if there is essentially no planning and logic in interception and expansion and changes of land use. The results of the few studies have mainly focused on urban forces affecting rural sprawl, and have noted the number of second homes, government investment, and return of refugees, while the results of this research were based on the intrinsic characteristics of the villages around the city of Hamedan and the occurrence of sprawl was influenced by economic, environmental, political and social factors of settlements. It seems that in areas adjacent to physical structure of the villages (rural areas), especially in suburban settlements, more spatial-physical planning should be taken into account. These spaces are mainly influenced by forces and impulses of the urban areas and the urbanization and reconstruction processes, such a region, spatially and structurally has the highest dynamics of growth and development, and is known as a transitional region with a combination of urban and rural activities and users. In this regard, activities and uses in suburban settlements should be in line with the structures and functions of each village, so we can expect positive and synergistic functions in human (urban-suburban-rural) settlements.

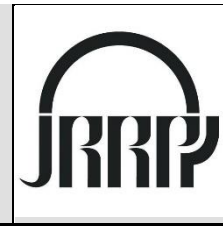
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تحولات کالبدی ناشی از خزش روستایی در سکونتگاه‌های روستایی پیرامون همدان

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چکیده مبسوط

۱. مقدمه

روستاهای واقع در حوزة اثربخشی مراکز شهری، به ویژه روستاهای واقع در حوزة نفوذ بلافصل شهرهای بزرگ و کلانشهرها با بیشترین میزان دگردیسی کالبدی و نیز عملکردی همراه بوده اند. یکی از این تحولات در چنین فضاهای دائما تغییرپذیر، پدیده خزش روستایی و تغییر کاربری اراضی و زمین در سکونتگاه‌های روستایی پیرامون شهری است. تغییرات کاربری اراضی و نیز تغییرات پوشش زمین با توجه به روند آن و نیروهای دینامیک و پویای تاثیرگذار در این مسئله، هنوز خیلی پیچیده می‌باشد. خزش سکونتگاه‌های انسانی در اطراف شهرها و مناطق روستایی یک نیروی محرکه اصلی در استفاده از زمین و تغییر پوشش زمین در سراسر جهان است. در محیط‌های گذار و پیرامون کلانشهرها و شهرهای بزرگ اخیرا پدیده خزش روستایی نمایانگر شده است. در حالی که خزش شهری و حومه یک تهدید جدی از دهه‌های گذشته بوده، خزش روستایی، اخیرا یک مشکل نگران کننده بوجود آورده است. سکونتگاه‌های روستایی پیرامون شهر همدان از تنوع و گوناگونی اجتماعی، اقتصادی، فرهنگی و طبیعی برخوردار هستند. بر این اساس مساله اصلی این تحقیق تبیین بروز خزش روستایی در ۲۴ سکونتگاه روستایی پیرامون شهر همدان و بررسی تحولات و پیامدهای کالبدی خزش در این روستاها است.

۲. مبانی نظری

طی دهه‌های اخیر، به خاطر وجود بستگی‌های موجود بین محیط‌های روستایی و شهری، نوعی پیوستگی شکننده بین این دو عرصه زیستی پدیدار شده است. این پیوستگی در قالبی نظام‌وار عمل می‌کند و بر این مبنا، آنچه در یکی از این دو عرصه اتفاق می‌افتد، لاجرم بر عرصه دیگر

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نیز اثرگذار خواهد بود. بر چنین مبنایی در زنجیره روستایی- شهری، بالاترین پویایی را می‌توان در منطقه پیرامون شهرها مشاهده کرد که اغلب به عنوان یک منطقه گذار با ترکیبی از فعالیت‌های شهری و روستایی و کاربری زمین شناخته می‌شود. آدل (۱۹۹۹) در محیط‌های گذار و پیرامون شهری و سکونتگاه‌های روستایی مجاور کلانشهرها و شهرهای بزرگ اخیرا پدیده خزش روستایی نمایانگر شده است. از دهه ۱۹۷۰ خزش روستایی وارد ادبیات کاربری زمین شده است. یکی از جنبه‌های نگران کننده خزش، عدم توافق بر سر تعریف آن است. اخیرا روند گسترش و خزش در میان نواحی روستایی دور از مناطق شهری اتفاق می‌افتد. اقامتگاه تفریحی گردشگری، زیرساخت‌های صنعتی و تجاری غیرمحملی، شبکه‌های متراکم جاده‌ای همراه با تبدیل کشاورزی به ساختمان‌های مجزا و محصور به استفاده‌های مسکونی قابل مشاهده‌ترین علامت گذار از روستا به سمت سرزمین‌های حومه است. یکی از پیامدهای خزش روستایی از بعد کالبدی گرایش پراکندگی مساکن در نواحی روستایی است که سطح بالایی از مساکن کم تراکم و قطعه قطعه شدن واحدهای مسکونی را بدنبال دارد.

۳. روش تحقیق

روش گردآوری اطلاعات با توجه به ماهیت پژوهش به دو صورت کتابخانه‌ای و میدانی است. برای کسب آگاهی و درک نظری در مورد پدیده خزش روستایی و نیروها و عوامل موثر بر آن، اطلاعات موردنیاز با مطالعه و بررسی منابع کتابخانه‌ای و ... به دست آمده است. بخش دیگری از این تحقیق از طریق پایش نقشه‌های کاربردی انجام گرفته است. لایه‌های مورد استفاده در این پژوهش شامل لایه‌های تقسیمات کشوری، کاربری اراضی، پوشش گیاهی، راه‌های اصلی و فرعی، رودها و رودخانه‌های فصلی، سطوح ارتفاعی و شیب و ... بوده است. باعنایت به قلمرو زمانی دوره ۲۰ ساله پژوهش (۱۳۷۴-۱۳۹۵) و بمنظور پایش

پیامدهای کالبدی خزش روستایی است. نتایج پایش در طی دوره ۲۰ ساله حاکی از آن است که بافت کالبدی در تمامی سکونتگاههای روستایی با شدت و ضعف تغییر داشته و الگوهای ساختاری مختلفی (خزش پراکنده، نامنظم، خطی، طولی و...) را نشان می‌دهد. از دیگر تحولات کالبدی ناشی از خزش روستایی می‌توان به گسترش واحدهای تک خانواری و ویلاها و باغ مسکونی در بافت کالبدی و پیرامون روستاها اشاره کرد. البته مقایسه تصاویر و نقشه‌ها نشان می‌دهند که در مجاورت روستاهای آبشینه، سنگستان، چشین، سولان، موئجین، توئجین، سیلوار تعداد بیشماری واحدهای تک خانواری و خانه‌های دوم و ویلا ساخته شده و چهره کالبدی ویژه‌ای را به این سکونتگاهها داده است.

۵. نتیجه گیری

نتایج پایش تحولات کالبدی- فضایی در دوره زمانی ۱۳۷۴ تا ۱۳۹۵ نشان می‌دهد پدیده خزش در سکونتگاههای پیرامون شهری همدان در دو سطح محدوده قانونی روستاها (بافت کالبدی روستا یا محدوده طرح هادی) و خارج محدوده قانونی و بافت کالبدی روستا (بیرون محدوده طرح هادی) اتفاق افتاده است. به جزء روستاهای قاسم‌آباد، حسن‌آباد شورین و علی‌آباد پشت شهر که به شهر همدان الحاق شده‌اند و خزش محدوده قانونی آنها هم از نوع خزش روستایی و هم خزش شهری است. در سایر سکونتگاهها پدیده خزش ناشی از خزش روستایی است. در خارج از محدوده روستاها و فواصل بین بافت کالبدی سکونتگاههای روستایی و پیرامون آنها خزش عمدتاً روستایی، شهری و صنعتی- کارگاهی است که خود زائیده مجموعه عوامل و نیروهای متنوعی است. **کلمات کلیدی:** خزش روستایی، تحولات کالبدی، سکونتگاههای روستایی پیراشهری، همدان.

تشکر و قدرانی

پژوهش حاضر برگرفته از رساله دکترای محمد مهدی ضیاء‌نوشین، گروه جغرافیا، دانشکده علوم انسانی، دانشگاه پیام نور، تهران است.

تحولات کالبدی ابتدا عکس‌های هوایی مربوط به سال ۱۳۷۴ دارای مقیاس ۱:۴۰۰۰۰ تبدیل به نقشه‌های ۱:۲۵۰۰۰ توپوگرافی شده است. در مرحله بعد نقشه توپوگرافی ۱:۲۵۰۰۰ تبدیل به فرمت DWG شده و سپس لایه‌ها روی هم ریخته و موازیک شده است. آن گاه با بهره‌گیری از نقشه‌های CAD بافت کالبدی روستاها و تبدیل آن به نقشه‌های GIS در دوره‌های ۱۳۷۴ و ۱۳۹۵ و مقایسه آنها با یکدیگر میزان و نوع خزش روستایی در هر یک از سکونتگاههای روستایی (به هکتار) و تاثیر و میزان خزش روستایی بر تغییرات کاربری اراضی و تحولات کالبدی در این سکونتگاههای روستایی مشخص شد.

۴. یافته‌های تحقیق

تبعات کالبدی خزش روستایی در محدوده مورد پژوهش در چند بخش تبیین و تحلیل گردید. ۱- همجواری کاربری‌های شهری- روستایی در سکونتگاههای روستایی؛ ۲- تغییرات کالبدی بیرون محدوده سکونتگاهها؛ ۳- تنوع بخشی ترکیب کاربری‌های روستایی ۴- تغییر در بافت و ساختار کالبدی روستایی و ۵- گسترش واحدهای تک خانواری و ویلایی. پایش نقشه‌ها، تصاویر و مشاهدات و یافته‌های پژوهش نشان می‌دهد بخش مهمی از کاربری‌های ایجاد شده در فضای بلافصل روستاها منجر به اختلاط و همجواری ناهماهنگ و متضاد عملکردهای شهری و روستایی شده است. یکی دیگر از ملموس‌ترین و مشخص‌ترین تحولات ناشی از خزش در روستاهای پیرامون شهر همدان تحولات کالبدی در سکونتگاههای روستایی و فضاهای بلافصل آنها است. یافته‌های پژوهش نشان می‌دهد که بطورکلی در سه محور ارتباطی همدان- کرمانشاه، همدان- ملایر و همدان- تهران شاهد تحولات کالبدی ناشی از خزش هستیم. براساس یافته‌های پژوهش و آمارهای موجود از سازمان صنایع و معادن در شعاع ۱۰ کیلومتری همدان که محدوده مورد پژوهش بود بالغ بر ۸۰۰ کارگاه کوچک و بزرگ از متراژ ۲۰ متر تا چند هزار متر در قالب مرغداری‌ها و ضایعاتی‌ها، سوله‌های متنوع، انبارها، آپاراتی‌ها، سنگبری، سنگ و سرامیک و... دیده می‌شود که بخش عمده‌ای از این کارگاهها و واحدهای کوچک تولیدی و صنعتی در مجاورت بافت سکونتگاههای روستایی و اراضی زراعی و باغی این روستاها می‌باشد. تغییر در الگوهای بافت و ساختار کالبدی روستاهای محدوده از دیگر

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