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Research Paper

Spatial and temporal Analysis of forest villages' population changes in Zagros (case study: Lendeh district in Kohgiluyeh & Boyrahmad province)

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Abstract: With regard to the rural population impact on the natural resources, understanding population changes of forest villages and reasons for these changes can be beneficial in determining development bottlenecks and planning development of forest villages. Severity number of haunted settlements and increase rural migration in Kohgiluyeh & Boyrahmad in recent years especially in the forested areas of this province can result from poverty, deprivation and lack of access to facilities. The purpose of this study is investigate the influence of spatial parameters such as villages elevation, slope and distance from urban centers on the demographic changes in the forest villages in Lendeh district in east of kohgiloyeh & Boyrahmad.86 villages were identified in the forested areas of Lendeh county. Then, digital elevation model, elevation and slope map containing 5 classes was prepared in Arc GIS software. To calculate impact of rural areas distance from the city on population changes of forest villages, distance of all rural areas from the county center (Dehdasht) were calculated. By overlaying the maps, number of villages in each zone was identified. The population of the village in 1966, 1976, 1986, 1996 and 2006 was interred into descriptive information table of village points in GIS environment, and then population for each course and each class has been calculated and analyzed. Using by multiple regression method, the statistical analysis of relationship between rural populations changes with spatial parameters of villages was done and coefficients related to the correlation and significant levels of parameters were determined. in order to spatial and temporal analysis of population changes utilizing a descriptive method, annual population growth rate in each class of prepared maps was investigated**.** According to result of this study, temporal and spatial analysis of demographic changes in this rural regions are expressing a similar pattern to villages across the country, with the difference that depending on geographical factors, class, temporal term, partially increasing or decreasing fluctuations occurred in the trend. The temporal analysis showed that studied 40-year period, often in the times that occur some historical political, economic and legal changes, rural population in a particular geographic area or have had more influenced**.** Annual growth rate of population in relation to geographical factors, slope, elevation, and village's distance from the city center has statistically significant correlation.

Keywords: Forest villages, population, elevation, slope, descriptive method, Lendeh district, Zagros

Introduction

Zagros vegetative region include 25 percent of Iran area. this region has 83 county and more than 19200 villages With residents that almost 30% of the total population of the country is in its place and more than 70 percent of all the nomads are in this area too (Management and Planning Organization, 2006). Forests in the region have so far remained stable because of species nature and tolerance to adverse environmental conditions (drought, poor distribution of rainfall, disasters etc.), but the lack of management and the impact of social problems have lost their ecological ability (Yusefi et al, 2002).In relation to forest conservation we need to comprehensive and detailed planning and this planning requires more knowledge of forest level changes and its reason (Pirbavaghar, et al, 2005). Livelihood dependence of rural communities on forest resources in many parts of the Zagros is one of major causes of forest degradation and loss of forest types. To reduce forest destruction pressure in rural communities is essential to clearly be identified the socio – economic, geographic structure and development ways of villages. Difference in the rate of exploitation of natural resources in different regions can be caused by environmental conditions and the quality of Location of local communities. In areas such as Zagros that impact of socioeconomic factors on the rate of utilization of forests is obvious, socio - economic issues can be directly related to the rural environment, spatial and geographical situation of rural settlements and should be considered in planning (Haghsetan, 2010).Rrural geography is a branch of science that is closely related to human nature and the countryside surrounding it, has produced tissue (Mostofi Almamalki, 2006). Based on rural geography, forests for their benefits is an important factor in people residence and build settlements in forest areas. Understanding the relationship between rural settlement patterns with forest changes without investigation human aspects such as rural socio-economic issues is impossible. With regard to the rural population impact on the natural resources, understanding population changes of forest villages and reasons for these changes can be beneficial in determining development bottlenecks and planning development of forest villages. Much research has been done.in field of natural and geographical factors influencing the stabilization of rural population or migration and the contribution impacts of the components in different regions. Mohammadi Yeganeh et al (2004) in investigation topographic factors (altitude and slope), climatic factors (temperature and precipitation), soil and water resources and analysis of the villages situation, relieve that the impact of environmental factors on migration and evacuated villages is most important than other known factors, and Even have been established low economic income due to poor

natural structures of villages. The results showed that the slope has positive relationship with the villages' evacuation and the elevation is not too impressive.

Dehghani (2004) to identify and determine influence rate of effectiveness factors in evacuation and rural population stabilize process, investigated 150 sample villages of Isfahan with statistical descriptive and analytical tests.The results show that the relationship between village population stabilize and temperate climate, plains location, and plains - mountain variables is positive, and this relation with of hot and cold climate, mountainous situation and distance to the center of the province was negative.Taherkhani (2002) showed that the distance to the nearest town and a proper service are most important influencing spatial parameters on difference in trends types of migration in rural regions of Qazvin County. Results of Jalalian and Mohammad Yeganeh (2007) by examining four affective economical- environmental factors on rural migration in Zanjan county in a 20 year period showed that three factors including land and water scarcity, deprivation and poor services and low-income play an important role in rural migration this county and distance from urban centers is not affect parameter. mentioned Research mainly have been done in a specific geographical area considering all villages While so far an extensive research has not been done about forest villages on a large scale area, and studies related to forest villages have been limited to one or a few villages. Severity number of haunted settlements and increase rural migration in Kohgiluyeh & Boyrahmad in recent years especially in the forested areas of this province can result from poverty, deprivation and lack of access to facilities. The province's rural communities have heavy reliance on wood, forest byproducts and herbaceous cover for livestock grazing.Considering the fact that about 80 percent of kohgiloyeh & Boyrahmad area is composed of mountains and high hills (Kazemi et al, 2002), location of villages in forest areas is different. Villages located in the higher elevations of the province have a more difficult access to communication ways and villages located on steep slopes, land suitable for agriculture was not available, so question is that whether this spatial pattern of rural settlement can effect on population changes? The purpose of this study is investigate the influence of spatial parameters such as altitude, slope and distance from urban centers on the demographic changes in the forest villages in Lendeh district in east of kohgiloyeh & Boyrahmad.

Martial mad Methods

Lendeh district in Kohgiloye county has 129 villages (management and planning organization of Kohgiluyeh & Boyrahmad, 2006). The district is located between 50.16 and 50.53 east longitude and 30.83 to 31.13 north latitude and it is about 58520 hectares. Using existing library information (Iran Statistical Center, 2006) villages in Lendeh district whether haunted or with resident settlements were identified. Forest villages were identified by overlaying rural areas map on the color composite image Landsat TM 2006 and using library data related to villages' natural situation (Statistical Center of Iran, 1996). 86 villages are located in the forested areas of Lendeh county. Then, using digital topographic maps 1/25000 digital elevation model was created in Arc GIS software and elevation and slope map was prepared, each containing 5 classes. To calculate impact of rural areas distance from the city on population changes of forest villages, distance of all rural areas from the city center (Dehdasht) calculated in GIS environment using spatial interpolation, the distance map was prepared. In continue, map of forest village points was overlaid on the maps of elevation, slope, and distance from the city center and number of villages in each zone were identified. In this study, demographic information of villages that was populated in one or two courses and then are been evacuated, also new settlements caused by the intra-regional migration or separation of other villages in the studied period have been calculated. The population of the village in 1966, 1976, 1986 and 1996 was interred into descriptive information table of village points in GIS environment, and then population for each course and each class has been calculated and analyzed.

Using by stepwise analysis and multiple regression functions of SAS software, the statistical analysis of relationship between rural population changes with spatial parameters of villages was done and coefficients related to the correlation and significant levels of parameters was determined. in order to spatial and temporal analysis of population changes utilizing a descriptive method, annual population growth rate in each class of prepared maps was investigated**.**

Results

Spatial pattern of rural settlements

The lowest and highest elevation points of Lendeh county are 460 meters and 3120 meters above sea level respectively and with increasing distance from Lendeh city higher elevation classes are located (Figure 1).

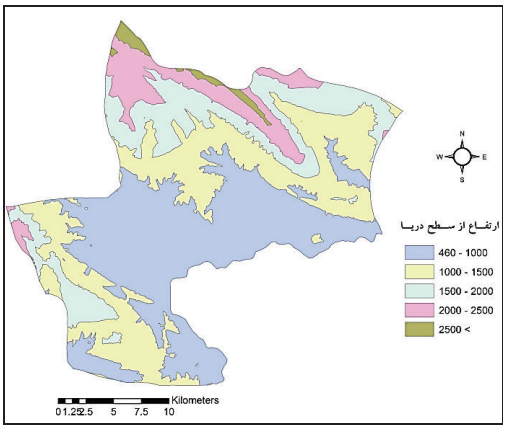


Figure 1. Map of elevation classes.

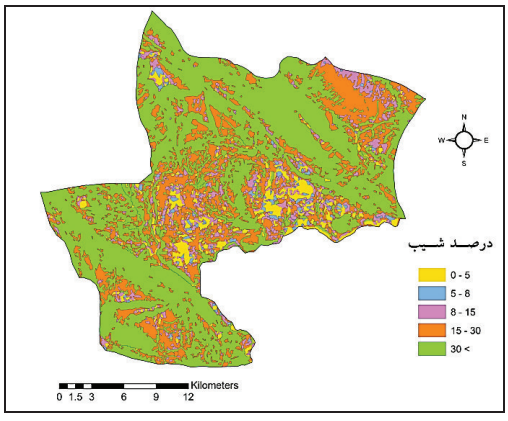


Figure 2. Map of slope classes.

Slope classes were determined based on Iranian model for agricultural use (Makhdoom, 2007) (Figure 2).

Distance classes were determined based on villages distance from Dehdasht as county center in Arc Gis software. according to maximum and minimum distance values, 5 classes were determined to evaluating this parameter (figure 3).

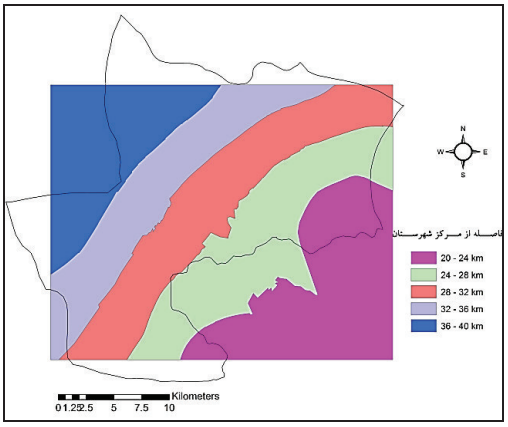


Figure 3. Map of distance form city center classes

Demographic pattern results

Evaluation of obtained information shows that the maximum population amount is related to altitude 1,000 to 1,500 meters above sea level and 1966 year. Population values and Annual population growth percentage for each elevation zone relative to the prior period showed in table 1.

Table 1. Population and annual population growth rate of elevation classes

2006		1996		1986		1976		1966	
Annual growth percent	pop	Annual growth percent	pop	Annual growth percent	pop	Annual Growth percent	pop	pop	Class
-5.6	659	-2.4	1506	2.3	1982	3.4	1606	1193	1
-2.5	2977	-1.4	4004	2.1	4680	7.1	3671	2144	2
-0.4	508	-5.1	532	6.4	1093	4.4	663	460	3

Population changes in four 10 years course compared with rural population growth of country shows that in course of 1966 to 1976 in all classes, the annual population growth percentage rate is higher than the percentage of rural population growth in the country. Population growth rate in elevation classes 1 and 2 in the period 1976 to 1986 is equal to population growth rate of country, but the population growth in zone of 1,500 to 2,000 meters has increasing rate (figure 4).

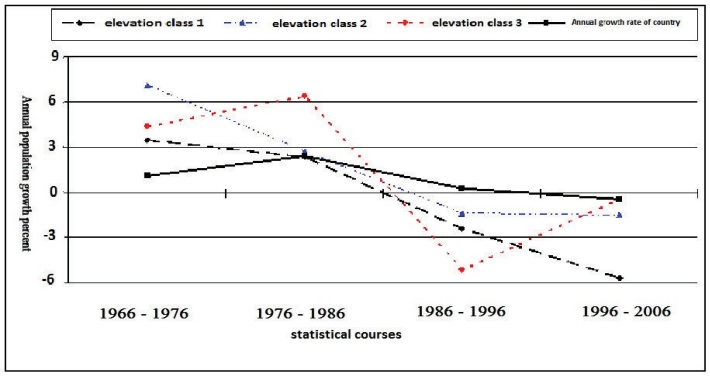


Figure 4. Graph of population changes in studied period

Population growth rate in mentioned zone during the next does not show regular mode. residing a part of the nomadic population located in the higher elevations of in villages of class 3 of elevation map in the course 1976 to 1986, intra-regional migration from the adjacent district boundary changes and failure to improve the ways of communicating (Statistical Center of Iran 1996) in next courses are reasons for this lack of population growth uniformity in this category.

The lowest per capita income of rural areas among the provinces in 1996 was related to Kohgiluyeh & Boyrahmad (Statistical Center of Iran, 1996), so earn money more can be incentive for rural migration to urban areas and reason of rural population decline between the years 1986 to 2006 in Lendeh.

The general trend of population changes in slope classes follows of the total rural population pattern approximately, so that a reduction of population annual growth in all courses is viewed. The only areas that are located on the first slope class in the step 1976 to 1986 have been growth relative to the beginning of period (table 2, figure 5).

Table 2. Population and annual population growth rate of slope classes

2006		1996		1986		1976		1966	
Annual growth percent	pop	Annual growth percent	pop	Annual growth percent	pop	Annual growth percent	pop	pop	Class
-4.7	71	-2.1	134	5.6	171	3.6	109	80	**1**
-	-	-	-	-	-	-	-	-	**2**
-3.3	640	-1.2	957	4.3	1090	8.4	759	433	**3**
-6.6	930	-2.9	2423	3.3	3131	4.4	2343	1616	**4**
-8.8	299	-3.3	2528	2.3	3363	6.3	2729	1668	**5**

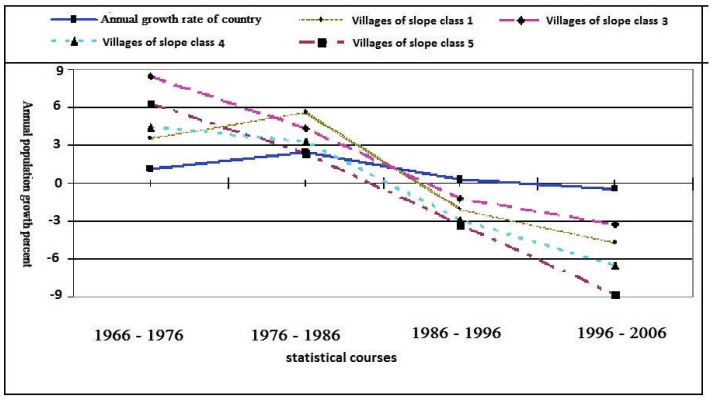


Figure 5. Graph of population changes in studied period

Concurrency this period with political changes in country (the Islamic Revolution in Iran, 1979), land use change of almost flat areas from forest to agriculture and increasing revenue due to the change, resulted in integration and migration of rural villages in this region.

Comparing results related to classes of distance from the city center with total rural population growth shows that in statistical period 1966 to 1976 in all zones, the annual population growth rate is higher than the percentage of rural population growth in the country (table 3).

Table 3. Population and annual population growth rate of distance from city center classes

2006		1996		1986		1976		1966	
Annual growth percent	pop	Annual growth percent	pop	Annual growth percent	pop	Annual growth percent	pop	pop	Class
11.7	364	-5.3	159	-2.2	340	3.4	438	326	**1**
0.6	1774	0.3	1668	1.8	1614	6.4	1359	824	**2**
-4.3	1032	-2.8	1830	2.1	2574	7.5	2116	1206	**3**
-7	521	-1.3	1748	4.3	2023	5	1413	942	**4**
-2.9	450	-4.7	637	9.6	1204	2.3	614	499	**5**

Statistical review of this process in the next period show exception two classes 1 and 5, a lower population growth rate than the total population in rural villages, and reduce more intensity (figure 6).

One reason of this subject is forming Kohgiluyeh & Boyrahmad province in 1973 (Governor Kohgiluyeh, 2009) and the development of Dehdashti city as center of kohgiluyeh county. The highest annual population growth in four 10year periods is assign to 1996 to 2006, and the closest villages to the city center (class 1). Introducing Lendeh (district center) as the new city in 1996, being the first class villages around this urban point and rural migration to the suburbs can be reason of unexpected increase population in this period and class. Lowest annual population growth is for period 1986 to 1996 and same class that resulted from population steady decline and rural migration in prior statistical courses.

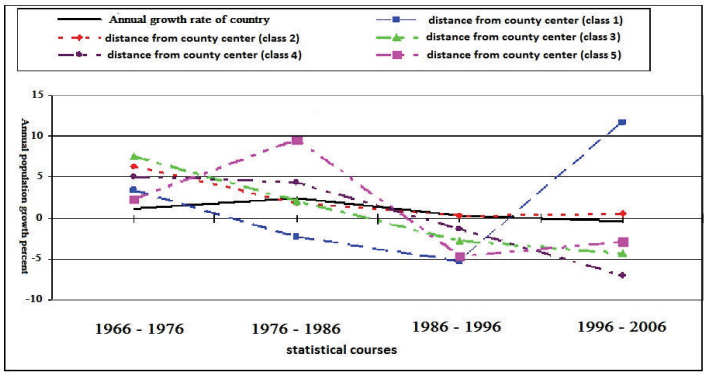


Figure 5. Graph of population changes in studied period

Results of parameters correlation

statistical analysis of relationship between rural population changes with spatial parameters of villages using by multiple regression method show that three studied parameter have significant relation to rural population changes (table 4).

Table 4. Correlation coefficients and significance levels of characteristics

Annual population growth rate		
Probability level of significance (p)	correlation coefficient (r)	**parameters**
**0.005	-0.373	Villages slope
*0.048	-0.330	Villages elevation
*0.023	0.484	Distance from Dehdasht (county center)

* * Significant at the 99% Probability level * Significant at the 99% level ns no significant

Conclusion

Rural migration increase mainly due to lack of welfare facilities in villages, economic and cultural attractions of urban points and also abuse policy in cases (Saeedi, 2004). The village is a geographical phenomenon that in terms of its spatial and geographical conditions led to the settlement of a small population that whose livelihoods are related directly to environmental factors such as water, soil, climate, slope and elevation (Mostofi Almamalki, 2006). Uusivuori et al (2002) believe that villagers migrants from poor areas to areas with optimal conditions. According to result of this study, temporal and spatial analysis of demographic changes in this rural regions are expressing a similar pattern to villages across the country, with the difference that depending on geographical factors, class, temporal term, partially increasing or decreasing fluctuations occurred in the trend. The Temporal analysis showed that studied 40-year period, often in the times that occur some historical political, economic and legal changes, rural population in a particular geographic area or have had more influenced. For example, the Islamic Revolution in Iran, the Iran-Iraq War, became Lendeh a urban point according to country divisions law and etc., led to the handling the population from an area to another area or urban points.

Demographic changes in this study shows a general trend of population decline in forest villages of Lendeh district. Annual growth rate of population in relation to geographical factors, slope, elevation, and village's distance from the city center has statistically significant correlation. Among the environmental factors, elevation and slope play a decisive role in the formation and development of rural and urban settlements. Because space of physical development, existence of adequate land and covered with fertile soil, access to groundwater and surface water resources and relationships with around are the major effects of altitude and slope in the village birth and development (Mostofi Almamalki, 1385). The spatial situation of villages can be considered as secondary effective factor on the forest area variation. In other words the effect of spatial parameters on the forest area change is throughout internal correlation of these parameters with structural facilities level and socio-economic factors (Haghsetan, 2010).

The results of this study can be efficient in predict future forested villages changes in this area. Also relying on the coefficients obtained and provided temporal data, taking into account the ecological and economic components, Models and decision support systems appropriate to protect this region of Zagros forests can be produced.

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