

Environmental Impacts of Urban Sprawl (Case Study: Gorgan)

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Abstract

One of the most important subjects in 21 century in relation to sustainable urban development is urban form. Urban form that is pattern of spatial distribution of human activities in a specific period can be divided into two kinds: Compact city and Urban sprawl. Because there is a close relation between urban form and urban sustainability, urban planners have to know about urban pattern and form to achieve more sustainability. For understanding urban form of the study area, the city of Gorgan, we used several methods: Population density, Map of the city in different periods and Holdern model. Attained results show that Gorgan sprawl was very high in 1996, and it increases in next period (2006). This city in addition to high population growth, has had a unplanned physical development that cause some undesirable outcomes in social, economical and environmental dimensions. These effects such as loss of agricultural lands and forests, contamination of waters, and air are considerable.

The most causes of Gorgan sprawl are high rate of immigration, ambiguity in the laws, superfluities of armed and military land use per capita, combination of villages, and etc. So, for attaining to more sustainability, the urban development pattern should be changed and some strategies must be used to decrease urban sprawl and undesirable outcomes.

Introduction

Urban sprawl is an important problem in 21th century. Beginning of the twenty-first century has been started with the development of a new city in the world. Urban form that is the pattern of spatial distribution of human activities over space in given period can be divided into two different types: Compact city and Urban sprawl. Because of the close relationship between urban form and urban sustainability it is required by urban planners to know about urban pattern and form to make well decisions for more sustainability. One of the critical issues associated with sustainability in the 21st century is how to form and shape the development of space. Spatial development of the city can be defined as a model of human activity in a certain period of time.

Materials and Methods

Methods of this study are a descriptive -analytic. We used data from library resources, field observation, statistical, and graphical information using software. To measure the vertical distribution of Gorgan, Holdern model are used as temporal variations in population density and size in different periods.

Discussion of Results and Conclusions

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The most common indicator used is the density distribution. It is a city that can reflect the low density urban distribution. The population density of the city of Gorgan in 1335 was 2.99 persons per hectare. It was, in 1345, 5.93 persons per hectare in and in 1365 about 6.91 persons per hectare. Apparently, the trend of this year after intense congestion starts in 1375 to 1.67 and in 1385 was 77.08 people per hectare. Changes in population and land area of Gorgan and its density from 1335 to 1385 are given in Table 1.

Table 1. Changes in population growth and city of Gorgan

Density (people per hectare)	Area (hectare)	population	Year
99.2	286	28380	1335
93.5	547	51181	1345
88.2	997	88033	1355
80.9	1722	139430	1365
67.1	2809	188710	1375
77.08	3560	274438	1385

Source: (Population and housing censuses from 1335 to 1385 and of the results of the authors).

In this study, the size of Gorgan in different directions, maps, and tables of physical development in the years from 1230 to 1386 are shown in table 1. The amount of land consumed per period of growth has been very high, and much of the city is 85-acre (85.0 square kilometer) in 1230 AD. It is no more than 3560 hectares (6.35 sq. km) in 1385. The results are given in Table 2.

Table 2. Changes in the land uses of Gorgan

Area (hectare)	Name
5.6	From forest to residential
4759.4	From agricultural to residential

Source: authors.

One of the basic methods for determining the standing of Holdern urban growth is sparse. Using this method, it can be specified that how much of the growth is for urban population and how much is for the shape. If the year of 1335 was beginning of the period of 1385 to the end of the course, we should look at the overall growth and physical size of the period, 74 percent of the city's population growth and 26 percent of the rest of the spread or dispersion is horizontal. Between 1385-1335, 74% of the physical growth of urban population and 26% of the horizontal dispersion are reducing congestion and increasing per capita gross margins of urban land and the spread horizontally immethodical city.

It appears that the horizontal distribution of Gorgan cause negative environmental impacts such as the loss of agricultural lands and forests around the city, or the land use change and urban air pollution, and water. One of the negative effects of horizontal dispersion is loss of agricultural and forest lands. So, the equation Holdern shows on average one-quarter (25%) of physical growth and increasing population growth but rather represent the effect of growth factors. Due to the proximity of the city of Gorgan to high quality agricultural land and forest land in the southern portion, horizontal expansion of agricultural land in each period have been under construction in the city. From 1365 to 1381, more than 4,000 hectares of land that was capable for farming has been eliminated. Overall, 4,765 acres of farm and forest land have been converted into urban uses. The share of agricultural land has changed and decreased more than others.

Results of the 1365 and 1381 satellite images indicate that destruction of the city was mainly in agricultural land and forest. Horizontal expansion increase air pollution through an increase in the number of vehicle trips and fuel consumption as well as increased consumption of other energy carriers. Pollution of water resources due to increased waste and inefficiency by the large number of wells, sewage system, and sewage disposal will be resulted from the increase in sprawl. Given that water wells are less deep in Gorgan, the risk of contamination of water resources is very high. The results of this research indicate that during the study about irregular horizontal distribution of Gorgan, unfortunately this trend is negatively continuing. The main reasons for the sharp horizontal distribution of Gorgan in 1385 are a lot of unnecessary applications, such as military and moorland and etc. some of the causes for the sprawl are including many people migrated to the city, land and housing policies after the revolution, increase in the rate of private car ownership or improvement in transportation, integrated townships, villages and cities, urban uncertainty and frequent changes in laws and regulations and city managers.

Keywords: environmental impacts, Gorgan, Holdern model, population density, urban sprawl.