

## Optimal Site Selection of Green Spaces in Rural Settlements (Case study: Villages of Khaf County)

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### Extended Abstract

#### Introduction

The distribution and dispersion of parks and green spaces is of paramount importance in urban and rural areas. As an indicator in development of nations, green space has environmental, social, cultural, economic and physical dimensions. To be able to perform its roles and functions successfully, green space needs to be properly positioned. This requires spatial suitability analysis. By analyzing the factors affecting the location and position of green space as well as presenting a proper model, this study seeks to examine the distribution of green space in the sample rural areas of Khaf using Geographical Information System (GIS).

The main objectives of urban and rural planning are health and beauty. The correct localization of green space as one of the most important elements of the environment is essential for management of utility space and amenities. Therefore, the ultimate goal of this research is to perform a spatial analysis, using GIS technology and analytic hierarchy model to determine the factors affecting the location of parks and green spaces, parks and countryside, and also to find a model for locating of the study area in a rural landscape.

According to the previous studies on the literature, we can say that no research has, so far, been done about the location of green space in rural settlements. At the conclusion, the factors that influence the location of urban green spaces, such as slope, accessibility, consistency, texture components, users and etc. are mentioned. Therefore, in this study we have tried to look for the past research in urban areas, factors that have been studied and found thanks to GIS capabilities in the information layer in rural environments. Finally, with the help of hierarchical analysis in a GIS environment to choose the suitable zones should be taken into account for the construction of green space in rural areas. Another secondary objective of this study was to compare the results of the hierarchical analysis in GIS output on green spaces in rural areas and rural pilot projects.

#### Range Study

Khaf is the border area with geographic coordinates 59°, 28' to 60°, 55' east longitude and 34°, 1' to 34°, 59' north latitude, about 250 km in southeast Mashhad and Iran's eastern border with Afghanistan Country on a relatively broad plain. According to the 2011 census, Khaf County had a rural population of 65,494, in 86 rural settlements. Rural Guidance Plan has been implemented 21 villages in and our statistical population is consisted of 10 rural settlements of the County. Rural Guidance Plans have been completed and they took almost 10 years to complete, since its implementation.

#### Materials and Methods

This research has used as applied method based on descriptive - analytic nature. In this paper, status quo analysis and data modeling procedures have been used. To do this, spatial data (Neighborhood, area, availability, price, land use, etc.) of 10 Villages of Khaf City (with an approved pilot plan) and also descriptive data have been prepared to create database of GIS consisting of spatial data and descriptive data in form of algorithms. Then, a questionnaire has been designed and completed by 30 people including three groups of university professors, consultant engineers of rural pilot projects, and the experts of Housing Foundation of Islamic Revolution of Iran. Ultimately, through weighting the layers by AHP model, and GIS databases with overlapping operations of different maps, rural green spaces have been identified compared with the current and proposed location of (approved by Guidance Plan) rural waste disposal areas.

The main research question of the present study is that what factors influence the location of rural green spaces? And to what extent the current and proposed rural green spaces in the villages under study is in compliance with positioning in GIS environment?

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### Discussion

Parks and green space, as one of the most important centers and recreational services in addition to medical and psychological aspects are important for the sustainable development of rural areas. Thus, the importance of green space is undeniable in the physical and social impact and sustainability of rural systems. For this reason, use of green space in the rural areas, according to location is assigned based on the needs of the rural population as one of the basic issues in the planning and management practices.

Several factors make the land suitable for the construction of green space, but here five factors have been used as data layers. These are experimental measures, compatibility, availability, landuse, price and area.

The aim of the present study is to find the optimal location of green spaces in the sample villages of Khaf County. This was using the measurement of five layers, re-classification maps prepared for the model and the weight of each layer. In the final stage, the layers have been combined in the ArcGIS application the final map is classified in five categories of quite suitable, suitable, moderately suitable and unsuitable. The output of this model represents the optimal location for parks and green spaces in sample villages. In the evaluation, land prices by a factor of 0.351 have the greatest impact on localization of green spaces and rural area by a factor of 0.077 has had the least impact (Table 1).

**Table 1. The importance of criteria and sub criteria in the location of green spaces**

Factors	Weight of the layer	Classification	Description of layer	Relative weight of each category	Absolute weight of each category
Compatibility	0.155	Quite suitable, suitable, relatively suitable unsuitable	Education - Cultural	0.502	0.0788
			Residential - River	0.257	0.0398
			Health - Therapy - Religious	0.166	0.0257
			Administrative - industrial - installations - commercial and other	0.075	0.0116
Availability	0.260	quite suitable suitable, relatively suitable unsuitable	One degree Main	0.565	0.1469
			One degree Subsidiary	0.262	0.0681
			Two degree Subsidiary	0.118	0.0307
			Access	0.055	0.0143
Landuse	0.157	quite suitable suitable, relatively suitable unsuitable	Bayer	0.496	0.0779
			Agriculture	0.294	0.0462
			Dilapidated of residential	0.152	0.0239
			Cemetery	0.058	0.0091
Price	0.351	quite suitable suitable, relatively suitable unsuitable	Cheap	0.565	0.1983
			Relatively cheap	0.262	0.0920
			Median	0.118	0.0414
			Expensive	0.055	0.0193
Area	0.077	quite suitable suitable, relatively suitable unsuitable	More than 2500	0.547	0.0421
			1000-2500	0.270	0.0208
			500-1000	0.124	0.0095
			Less than 500	0.059	0.0045

Selection and location of the main issues should be considered by the Geographic Information System to investigate and to determine the extent to which areas are consistent with the facts. For this purpose, field studies and library reviews have been conducted to select the accurate location. In order to implement the results of the model presented for rural green space location with the existing realities of the study area, the map of the proposed land uses in rural guidance plan and rural land uses has been prepared and the results obtained from the model are reflected in the final evaluation plan. The comparison between the existing green spaces in rural

locations with optimum positioning of the model indicate that the location of parks and green spaces in Chamanabad-Valiabad, Sedeh, Tizab and Zuzan aqua are perfectly suitable for the rest of the villages. The area is relatively suitable and unsuitable (Table 2).

**Table 2. Comparative study between the proposed and existing green space in the village with results**

Row	Village name	Present location of green space ☆	Proposed location of green space ★
1	Chamanabad-Valiabad	Quite suitable area	Quite suitable area
2	Sijavand	Suitable area	Suitable area
3	Sedeh	Quite suitable area	Quite suitable area
4	Razdab	-	Suitable area
5	Khargerd	-	Relatively suitable and appropriate area
6	Tizab	Quite suitable and appropriate area	Quite suitable and appropriate area
7	Mehrabad	Suitable area	Suitable area
8	Barabad	Suitable area	Suitable area
9	Zoozan	Quite suitable area	Suitable area
10	Chahzool	-	Quite suitable area

### Conclusion and Suggestion

This research results indicate that using this method multi-options and a large number of criteria the final option can accurately be selected. Logical and accurate weighting should be done for criteria and options to select the ultimate site and make a prioritization of green space. The results can be used in regional planning to minimize damages in urban and rural settlements. The results of this research can be used with environmental and socio-economic perspectives and considerations to achieve the sustainable development.

According to the studies and the results obtained during the research process, the following suggestions can be offered:

- To identify suitable green spaces in the rural areas, one of the best models is AHP. This model along with other models (ANP) and using ArcGIS play an important role in making decisions and guiding future development in rural areas;
- The spatial characteristics are location, social (demographic) and ecological suitability analysis in site selection for rural parks;
- The location of parks and analysis of the appropriateness of various villagers in rural areas (based on the circumstances of the village), and the general classification for the different conditions and analysis methods are quite different.

**Keywords:** accessibility, adaptation, AHP, GIS, land use, price.