

## Localization of City Park Using AHP in GIS, Case Study: District 8 Area of Isfahan, Isfahan Province, Iran.

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### Abstract

Nowadays, daily life intensively depends on public services. Increasing population and urbanization take humans away from environment which may lead to chaos in usage of city lands. Consequently, human is in trouble using public services and facilities including green spaces. Isfahan, one of the metropolitans, has 18 m<sup>2</sup> green spaces per person while City Park of district 8 is of inappropriate distribution with regard to population density. To create a localization map of civil park, Isfahan district 8 has been selected. The selected district delimits to Baharestan in north and to Kaveh street in west and to Shahid Forouqi in south and to Emam Komeini street in west-south. Finally, GIS has been used to create given layers and calculate weights based on AHP. According to overlap between layers, the most appropriate places have been identified.

**Keywords:** City Park, geographical information system (GIS), AHP, localization, district 8 of Isfahan

*Accepted on March 29, 2018*

### Introduction

Among the most important problems of Isfahan District 8, we can point to inappropriate distribution, unavailability and few number of city parks with regard to area of the district and population density. Spatial organization, optimized distribution and balanced green spaces are of significance for meeting welfare of the population. Industry development and expansion of urbanization may lead to harmful outcomes affecting city and urbanization. Public sectors are the most significant components of cities and urbanization. Accordingly, humans are submerged in frequent interactions. One of the most notable elements can be green spaces and city parks which play active roles in community health.

Saberi et al. [1] studies different uses of the given region. They concluded that AHP is the ideal method to obtain positive results. Hosseini et al. [2] conducted a study on the importance of resource management in different aspects of development plan. They found the usefulness of GIS in forestry plans. Ahmadi et al. [3] evaluated green spaces per capita for Mashhad. They proposed a good model for Mashhad green spaces. Ahmad et al. [4] focused on the usefulness of Icons pictures and aerial images in obtaining information about green spaces and in calculating green spaces per capita for west-north of Tehran. Finally, they prioritized places for green spaces. There are various publications related to green spaces such as green spaces and their positive effects on mental health by reducing air pollution and producing oxygen as well as controlling winds [5]. The most attractive point about green spaces is that it leads to mental safety. Additionally, it is the most active factor in reducing air

pollution. Green spaces can link isolated human to environment. Also, it meets aesthetic needs of city population. As for hygiene, environmental and social-mental needs, green spaces can be taken as useful resources. To this end, according to social justice, every social class must be provided with equality in access to green spaces and city parks for their free times. It is not fair that high social class and rich population choose residential places with dense green spaces and spectacular views [6]. GIS is of use in city plans for appropriate use distribution. To this end, AHP is used to fins the most realistic results.

### Studies region

To create a localization map of civil park, Isfahan district 8 has been selected. The selected district delimits to Baharestan in north and to Kaveh street in west and to Shahid Forouqi in south and to Imam Komeini street in west-south (Figures 1-4). The given district is of the area of 2039 acres (230 acres are old textures) out of the Isfahan total area of 18370 acres [7]. Additionally, if each vehicle is designated a space of 25 m, the least pace required for parking lot will be of 8050 m<sup>2</sup>. Also, districts 8 and 16 had a population of 248782 in 2011.

The current study is aimed to localize a suitable place for City Park which focuses on such criteria as:

- To be close to street.
- To be close to residential centers.
- To be far away from the existing parks.
- To be close to cultural and educational centers.

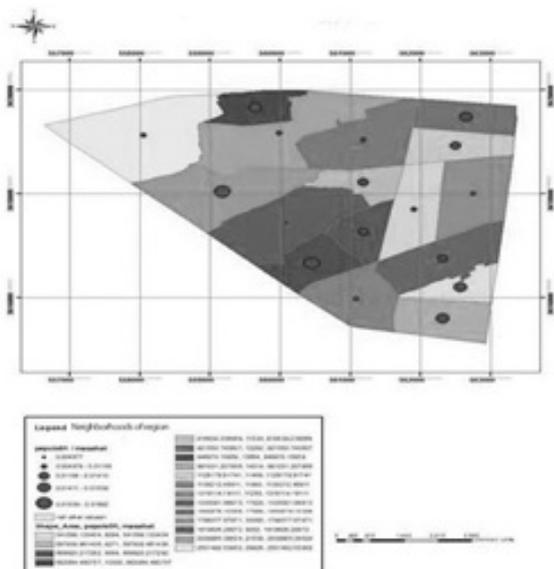


Figure 1. Distribution and density of population.

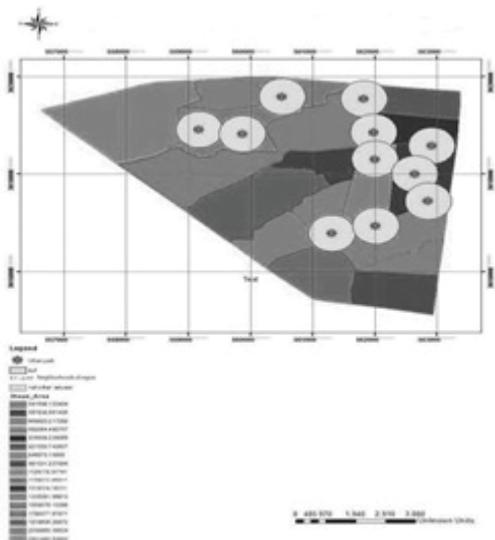


Figure 2. Distribution and access to city parks of district 8.

- To be close to parking lot.

Finally, GIS has been used to create given layers and calculate weights based on AHP. According to overlap between layers, the most appropriate places have been identified:

- In Marchin district which is of the area of 16 m<sup>2</sup>.
- In Bariman district which is of the area of 29 m<sup>2</sup>.
- In Imam Komeini street which is of the area of 17 m<sup>2</sup>.
- In Jaber Ansari street which is of the area of 23 m<sup>2</sup>.

### Methodology

The current study is of analytical-descriptive nature conducted to localize city park of Isfahan district 8. Descriptive studies have been conducted based on documents, library resources and referring to related organizations. Analysis has been done using GIS and AHP [8]. Those layers which are more suitable for City Park are advocated higher weights while those layers which are not suitable for City Park are designated fewer weights. Required layers are translated into RASTER in GIS

|                          | Residential | Cultural and Educational | Access to the Street | Available Park | Proper Use |
|--------------------------|-------------|--------------------------|----------------------|----------------|------------|
| Residential              | 1           | 5                        | 7                    | 1.7            | 1.9        |
| Cultural and Educational |             | 1                        | 1.3                  | 1.8            | 1.9        |
| Access to the Street     |             |                          | 1                    | 1.2            | 1.7        |
| Available Park           |             |                          |                      | 1              | 71.5       |
| Proper Use               |             |                          |                      |                | 1          |

Figure 3. Matrix of evaluated measures.

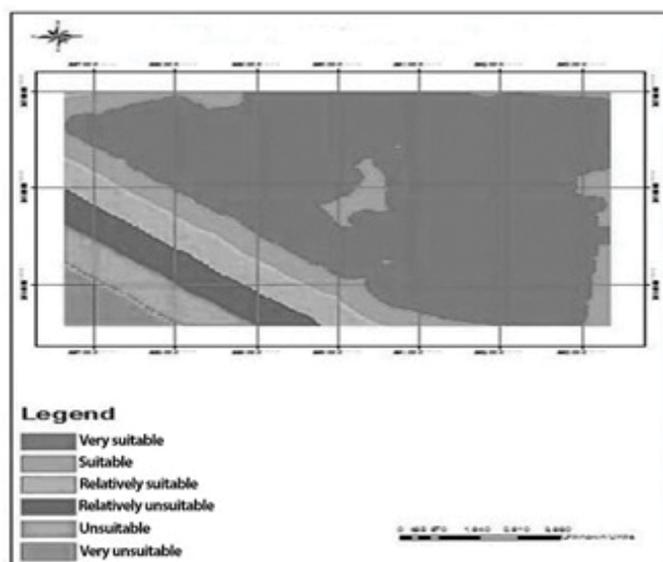


Figure 4. Closeness to residential centers.

environment based on valued measures. They are reclosed for categorization based on RECLASS. SUM WEIGHT was used to compare results and enforce finalized weights in AHP [9-12]. The resultant layer was categorized into 6 classes to identify preferred locations for City Park.

### Closeness to residential centers

Parks are good places for all age-groups for spending free times there. They should be close to residential centers in order to save time and money. Parks are aesthetic component of city face which can play role in reducing air pollution.

According to positive effects of green paces and parks and their role in reducing acoustic and air pollution, it is required to have these kinds of places all over the cities [13-18]. According to the fact that parks are appropriate places for free times and for establishment of cultural and educational centers, they are designated high weights (Figure 5).

### Access to communication network

For parks to be at easy access, communication networks are required. To meet safety and availability of parks, it is preferred to have all-side communication network [19,20]. Accordingly, communication network is taken as fitted layer which is assigned high weight (Figure 5).

### Appropriate Uses

An appropriate land for establishment of park is a place where no previous construction has been done. Additionally, it should be a place with spectacular view laden with green spaces, waterfalls and rivers [21-24]. The studies place has no river but it is full of green spaces. The old inexpensive lands available in the given region make the place a good one for City Park which consequently acquires a high weight (Figure 6).

**Distance from the existing parks**

To precisely localize city parks, it is necessary to keep their interval. Accordingly, those places with acceptable interval are given high weights (Figure 7).

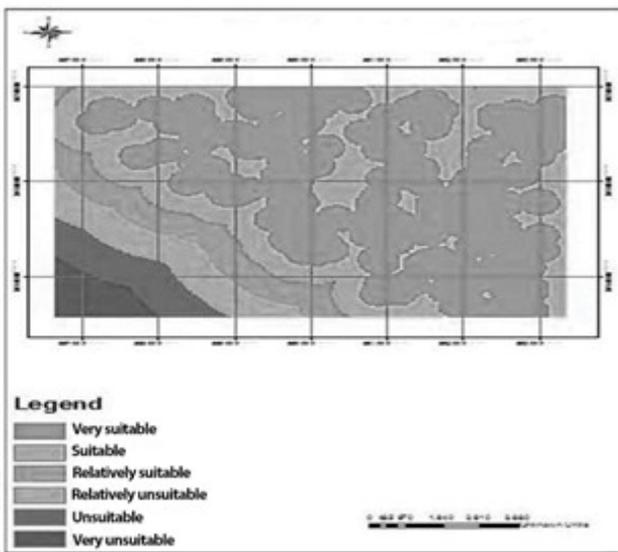


Figure 5. Closeness to educational and cultural centers.

**Results and Recommendations**

According to binary comparative weighing method, measures are compared to identify the most important pair. Then, a matrix is formed inputs of which are predefined weights and outputs are relative weights. After given layers have been weighed in AHP, weight of each layer is dedicated according to the following table. Layers are translated into RASTER and then categorized by RECLASS using SUM WEIGHT in order to enforce the calculated weights based on AHP. Layers are summed and the optimized place for City Park is identified (Figure 8).

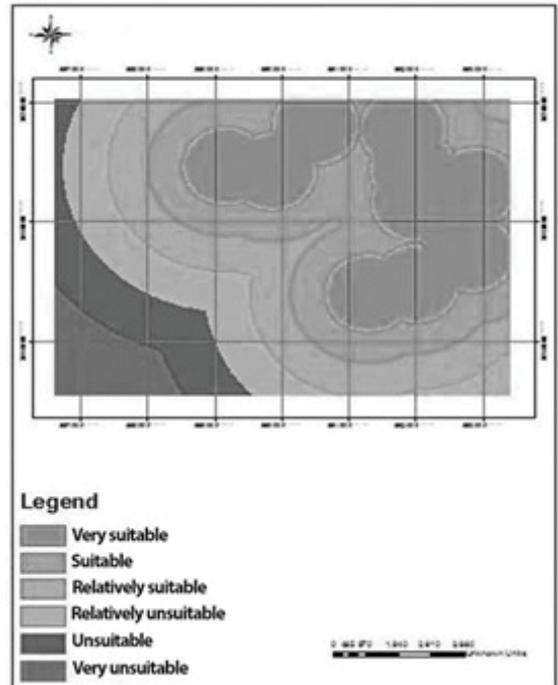


Figure 7. Distance from the existing parks.

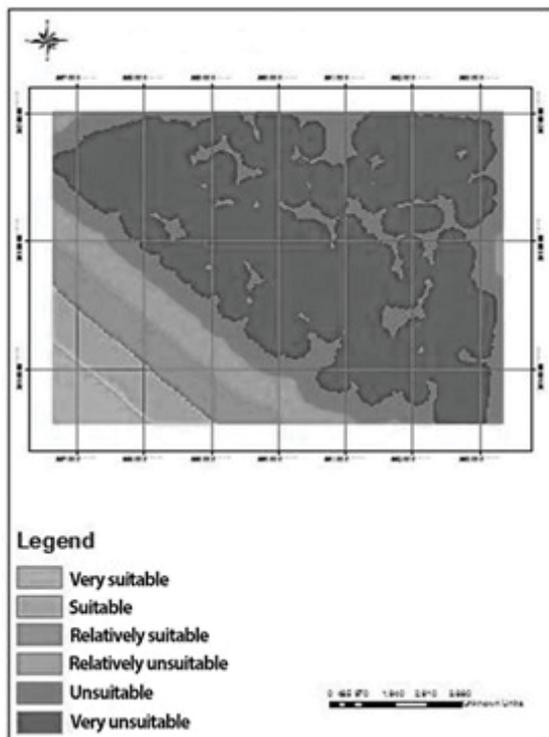


Figure 6. Appropriate uses.

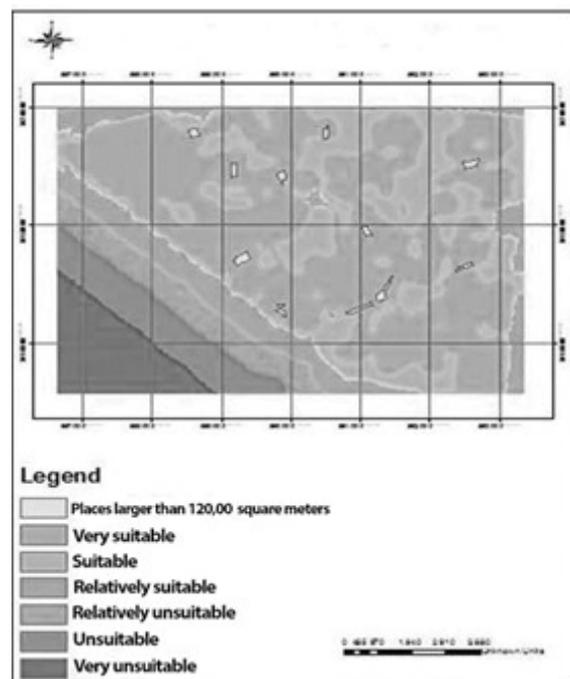


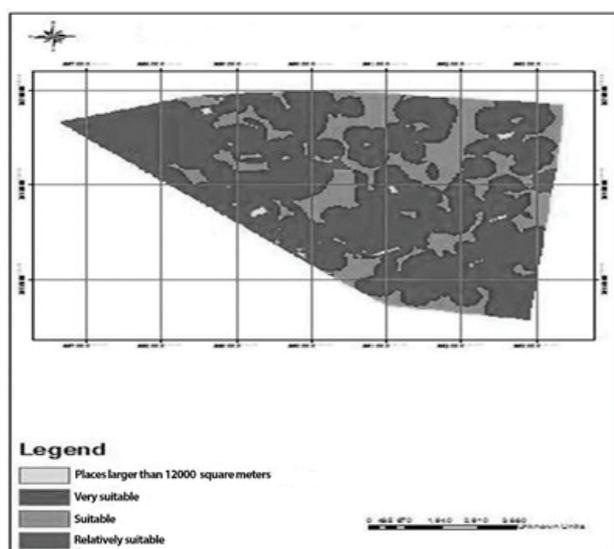
Figure 8. Appropriate places after overlapping.

## Conclusion

According to Figure 2, distribution of city parks in Isfahan District 8 is not acceptable. The main focus is on some places including Khane Isfahan, Mir Emad, Shahriyar, and Jaber Ansari. Other neighborhoods do not have any city park. According to the current study and the requirement of at least a land of 12000 km, some places are eligible:

1. Marchin district which is of the area of 16 m<sup>2</sup>
2. Bariman district which is of the area of 29 m<sup>2</sup>
3. Imam Komeini street which is of the area of 17 m<sup>2</sup>
4. Jaber Ansari street which is of the area of 23 m<sup>2</sup>

Urban general green places (UGGPs) are seldom identically divided among place. A branch of urban population is not commensurate with well available of UGGPs, while another inhabitant has extremely confined availability to UGGPs (Figure 9). Negotiating and inspecting the spatial dissimilarity in UGGPs approachability can control better land use strategy. This Article demonstrate accommodates elements from four girths containing wealth, occupation, education and housing is essential [25-28]. Three amplitudes of measures (redundancy, modality and approachability) are progressed to standard UGGPs. In the later, two concepts are needed for urban greening policies: (1) a general view in UGGPs approachability assessment; (2) site-distinct goal strategies. The available probe is managed using new methods of procedure among others, the analytical hierarchy process AHP, which will permit us to weight and incorporate all standard and to categorize their particular weights, in addition to the use of GIS which will donate to the assessment of these standard in order to distinguish whether the choice of the Volant site pursuant to the outcome of our study encounter the provision of a controlled green spaces respecting the place [29-33]. A procedure was expanded using the Analytic Hierarchy Process (AHP) and Geographical Information System (GIS). The park location choice is one of the most significant intentions for financiers and enterprisers.



**Figure 9.** suitable spaces meeting the requirement of the area of 12000 m<sup>2</sup>.

As well as, the spatial distribution of park place is not stable across the town. It is necessary to distinguish the preferences of each place depended on identified factors and standard. It is essential should to disclose the relations between sound/soundscape conceptions and public city park [34,35]. As well as industrial parks are considerable event in towns' progress procedure. It should have examined to analysis the relics of diverse perspective details on soundscape conception in city parks. Urban forest parks, prepare inhabitants with perspective facilities, recreational occasions, and interplay with nature. This potential of public parks as a subject of skill for city marking.

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