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Study of Rasht Urban Parks by Using GIS (Case Study: Region 1)

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ABSTRACT: Global tries to protect environment are for almost original ecosystems and have biodiversity and has paid less attention to nature near to workplace and humans living place, Small green urban place and their benefits for people .Urban parks and green and open spaces have strategic importance in our urban community life quality. Natural areas in addition to important bioenvironmental services such as air and water purification, sound and wind insulation and creating microclimate, prepare social and physiological services that are important to make cities livable and improve residents status. One of the urban critical problems is urban green space scarcity that effects on human life in different dimensions. Comparing to urbanization standards, in addition to low green space in different Iran cities, its undesirable dispersion also has created some problems that could refer to injustice green space distribution on the city and citizens accessibility difficulties. This paper aims to introduce urban green space importance to improve citizens' status and urban development where live. Also current parks place in Rasht region one analyzed by using criteria closeness to residential areas , training centers, cultural and religious centers, commercial centers, official centers, river, access to main ways and far away current parks in GIS and AHP hierarchical analysis method.

Keywords: Park, Green Space, Rasht, AHP, GIS

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INTRODUCTION

Increasing the towns in all the world, including in Iran, the inevitable consequence is the era of science and technology.Urbanization grow and development has direct relationship to cities structural development and causes nature avoidance and not relation between human and environment (Moharramnejad and Bahmanpoor, 2009). Increasing population and urbanization development causes urban green spaces turning to impermeable concrete surfaces. This process especially in developing and third world countries has more serious appearance (Shi, 2002).

Urban open and landscape not only are regarded due to their recreational importance but also are important due to their role to protect and balance urban environment and air pollution decreasing, citizens spiritual and physical breeding are important. Green space as a part of city face, as a real phenomenon is an issue that human has faced and will face it. This subject has environmental, social, cultural, and economical dimension (Bunnes and others, 1999). Due to urbanparks high importance in today human life for most productivity of such spaces toward suitable efficiency and effectiveness, their orientation obtains especial importance.

If urban parks orientate correctly face people welcome and presence that follow by social interactions increasing , crimes decreasing , supplying personality, psychological, physiological needs, game need, recreation, family relations enforcing and finally will cause role making and forming life good memories and again urban spaces referring necessity (Yaghoobi and Zamani, 2011).

MATERIAL AND METHODS

Present study research method is descriptive analytical and on the basis of records, library studies and collecting reports, records, publications, books, Internal and external papers, refer to universities and official centers and organizations and using software programs such as GIS, Auto Cad, Super Decision.

Theoretical principles

Urban green spaces

Urban green spaces means a type of urban land use surfaces with human made vegetation that include social and ecological returns.Ecological return includes: urban parts beautiful making, temperature decreasing, oxygen production. Urban green spaces in urbanization view include a part of city face consist of different vegetation and as alive and critical factor along with city dead body is city morphologic construction determinant.

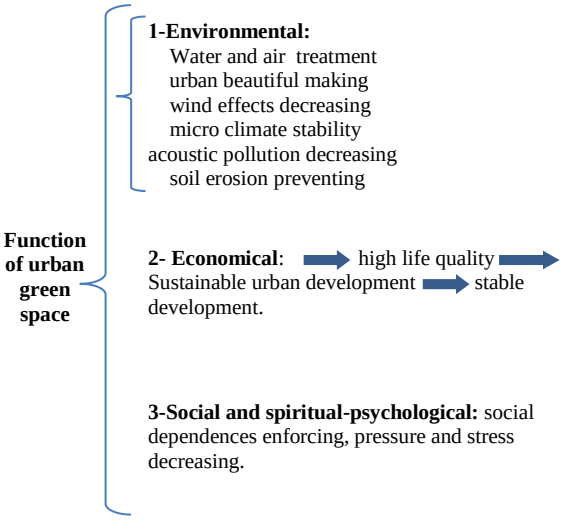
Green spaces classify into two classes (urban green spaces) and (nonurban green spaces). In addition to it urban green spaces classify into three classes public green spaces, semi-public green spaces, street green spaces (Saeednia, 2004).

Urban parks

Urban parks are a part of public green spaces that in addition to recreational and cultural and environmental dimensions have service dimension providing different city parts. Nature and such spaces identity is as all people could use it. In public parks tries to supply all recreational and welfare equipment almost for each style and think and age (Ghorbani and Teimoori, 2010).

Urban green space role

Graph 1 concern on urban green spaces role in urban stability that urban green spaces improved and suitable distribution is a factor for citizens' ecological, environmental, economical, social and spiritual-psychological return and could prepare cities ecological stability context.



Graph1.green space and its role in urban stabilities. (Mohammadi and Mohammadi dah cheshmeh, 2007)

The study area

Rasht is one of the metropolitan cities of Iran north and the provincial capital of Gilan . Rasht is located at 49 degrees 36 minutes east longitude and 37 degrees 16 minutes northern latitude and its distance is 325 km from Tehran. Rasht also with an area of 136 square kilometers located in a flat and smooth land with the height of 5 meters from the sea level. According to the official census in 2011, its population was 639.951 people. The study area is presented in Figure 1.

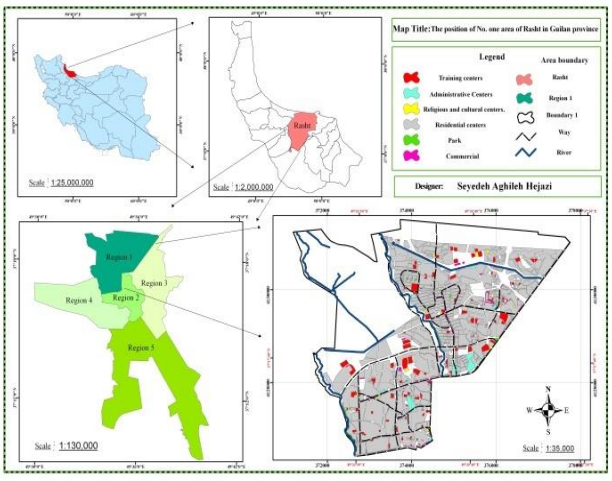


Figure 1. Study area

Rasht green space per capita

TOTAL Rasht green space area in current status considering urban areas planting is 1.453.298 m^2 as Table 1. Regarding to total Rasht green space area considering urban planting and street green space Rasht green space per capita is according to 2006 census (550000 person) is 2.64 m^2.

Table 1. Total Rasht green space area.

Row	subject	area in m^2
1	urban and local parks	603.361
2	boulevards space and squares, etc.	429.103
3	urban areas planting	420.834
	total green space area	1.453.298

(The green spaces and parks organization, Rasht, 2011).

Rasht urban park (Region 1)

Total Rasht parks area is 603.361 m^2 that Rasht park spaces per capita is according to 2006 population is 1.1 m2 and total Rasht region one parks area is 86866 m^2 that have brought Rasht region one parks type and name and its area in Table 2. Rasht green space per capita considering urban areas planting and also on the basis of 2006 population census is 2.64 m^2 that has much distance from at least determined standard green space per capita (7 m^2) (The green spaces and parks organization, Rasht, 2011).

Table 2. Rasht parks (region 1)

Rasht statistics (region 1)		
Park type	**name**	**are (m2)**
Urban park	Tohid park	24000
	Simorque park	45000
Local park	Germany square 1	990
	Germany square 2	999
	Germany square 3	990
	Meysam park	2528
	Golpark golsar	3344
	Namaz golbagh	5221
	Kasmaei boostan	1785
	Nikmaram park	2009
10 parks		86866

(The green spaces and parks organization, Rasht, 2011).

RESULTS AND DISCUSSION

Identification of effective criteria in site selection of green space

Identification and selection of factors which on site selection is one of the important study steps. The more compliant of identified factors with land realities, the more satisfying results of site selection would be (Faraj zadeh Asl , 2005). According to opinion of a group of green space experts of Rasht and by using the opinion of Geography and Urban Planning professors who were aware of the circumstance and situation of Rasht, the following criteria were identified to locate the green space in the Rasht (region 1).

The main criteria for the site selection of urban green space in Rasht (region 1) include: Proximity to educational centers, residential centers, cultural and religious centers, business centers, administrative center, river, access to main roads, And distance from the existing parks.

Determine main criteria priority Base on goal

To determine criteria importance coefficient, there are different methods that the most common one is pair comparing. In this method compare criteria in pair and consider each importance grade (Brown, 1990). In this study used standard method Analytic hierarchy process

(AHP). In this method provides a rate between 1 to 9. For example if C1 criterion would have two fold C2 priority, C2 has half of C1 prior. Each criterion comparing to itself will result in 1.

So, one serves in main matrix diamond (Poorghayomi, 2010). Finally, obtains relative weight. Table 3 shows quantitative proportionality for paired comparison of criteria.

Table 3. quantitative proportionality for paired comparation of criteria

Value	Priorities	Explanation
1	Equal importance	Two criteria have equally importance in achieving the goal.
3	Slightly more importance	Experience shows that to achieve the goal, the importance of i is greater than j.
5	More importance	Experience shows that the importance of i is much more than j.
7	Much more importance	Experience shows that the importance of i is so much more than j.
9	Absolute importance	Much more importance of i compared to j has been definitively proven.
2, 4, 6, 8	Intermediate	When there are intermediate states.

Source: (Tawfiq,1994 quoted by Thomas L. Saaty)

To Analytic hierarchy process main criteria have compared in pair. In this study has used experts Opinion to ensure results. After combine and experts Opinion decreasing obtained final pair compare matrix. Criteria weighting conducted in Super Decision software.

By using Geometric mean techniques and rates normalization has calculated Eigenvectors. Numbers importance coefficient of each main criterion Conducted calculations has provided in Table 4 and special vector has shown as W_1.

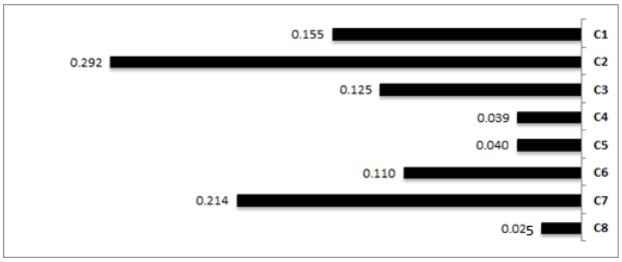
Table 4. The main criteria for determining the location of urban green spaces

Eigenvectors	Geometric mean	C8	C7	C6	C5	C4	C3	C2	C1	
0.155	1.645	7.417	0.424	0.845	5.790	6.333	1.218	0.450	1	C1
0.292	3.107	6.724	1.149	4.058	4.606	7.262	3.727	1	2.221	C2
0.125	1.326	3.4	0.728	2.294	6.054	4.296	1	0.268	0.821	C3
0.039	0.419	3.340	0.282	0.271	0.732	1	0.233	0.138	0.158	C4
0.040	0.423	3.009	0.174	0.305	1	1.365	0.165	0.165	0.173	C5
0.110	1.172	4.635	0.501	1	3.280	3.689	0.436	0.246	1.183	C6
0.214	2.273	6.221	1	1.997	5.745	3.542	1.374	0.871	2.357	C7
0.025	0.260	1	0.161	0.216	0.332	0.299	0.299	0.149	0.135	C8

Explanation:proximity to educational centersC1,residential centersC2,religious and cultural centersC3 ،commercial centers C4,office centers C5, riverC6,access to the main roadsC7,the distance from available parkC8.

Consistency Rate or CR of conducted comparisons was obtained 0.052 which is smaller than 0.1 and therefore the comparisons can be trusted.

As a result, the proximity to residential centers with the normalized weight of 0.292 has the highest priority. Access to main roads with the weight of 0.214 is in the second priority. Proximity to educational centers with a normal weight of 0.155 has the third priority. Proximity to the cultural and religious centers with a normal weight of 0/125 is in the fourth priority. Proximity to the river with normal weight of 0/110 is of the next priority. Proximity to commercial centers C4 and administrative centers C5 with almost similar weight of 0/039 and 0/040, respectively, have relatively low priority. The distance from existing parks with the normal weight of 0/024 is in the lowest priority. Graph 2 shows graphical presentation of the main criteria priority. Figure 2 shows Super Decision software to determine main criteria is presented in Figure 2.



Graph 2. Graphical presentation of the main criteria priority.

Figure 2. Super Decision software and determiningmain criteria.

Preparing layers

After considering effective criteria in green space and each weight should extract and prepare each criterion information layer from urban base map. In this research has used Auto CAD maps from Rasht municipality and Guilan plan assistant department to extract criteria and enter them into GIS data station for next steps.

Valuation of data layer

This step is one orientation main step by using geographical information system. In this step data in GIS reclassify and value layers. Reclassify Process is necessary for layers and evaluate under a common criterion. For any data layer prepares a distance map. Each

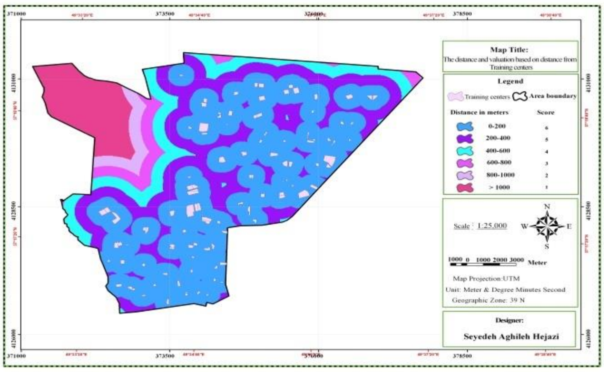
map classifies into 6 classes and valued classes according to experts view and AHP analysis.

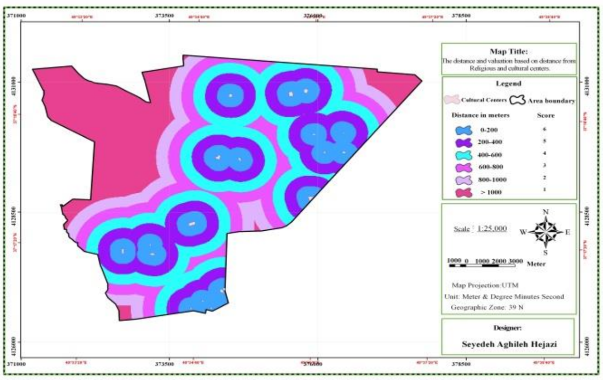
Distance and time are the most important items the location of land use. Accessibilities evaluate by distance and time. Two factors serve as welfare measuring (Ziari, 2002). To evaluate suitable closeness rate, serves distance in following classes for effective factors.

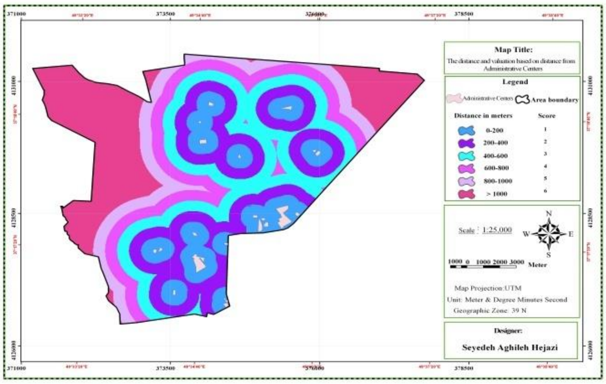
Table 5. Valuation of layers in meter.

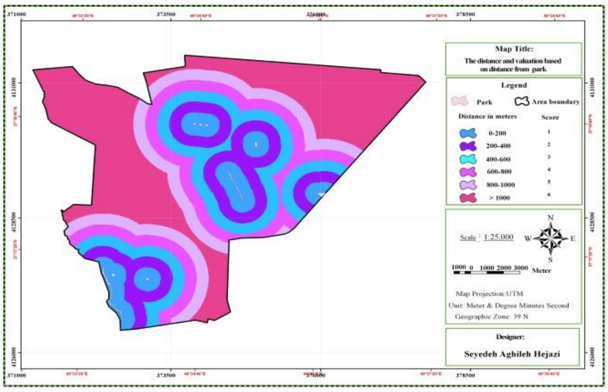
Distannce (m)	cultural centers	educational centers	office centers	Available park
0-200	6	6	1	1
200-400	5	5	2	2
400-600	4	4	3	3
600-800	3	3	4	4
800-1000	2	2	5	5
More than 1000	1	1	6	6
Distannce (m)	**residential centers**	**commercial centers**	**main roads**	**river**
0-100	6	1	6	6
100-200	5	2	5	5
200-300	4	3	4	4
300-400	3	4	3	3
400-500	2	5	2	2
More than 500	1	6	1	1

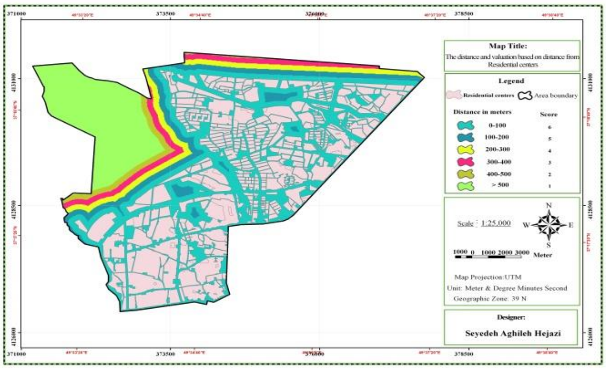
According to Table 5 distances served on the basis of 100 to 100 meters for residential centers, commercial centers, main ways and river layers, and 200 to 200 meters distances served for cultural and religious centers, official centers and green space and training centers layers. Layers accordance to parks and green space have more score 6 in less distance and reversely have score 1. These scores provided by green space experts. Figure 3 shows valuation of data layers (Table 5).

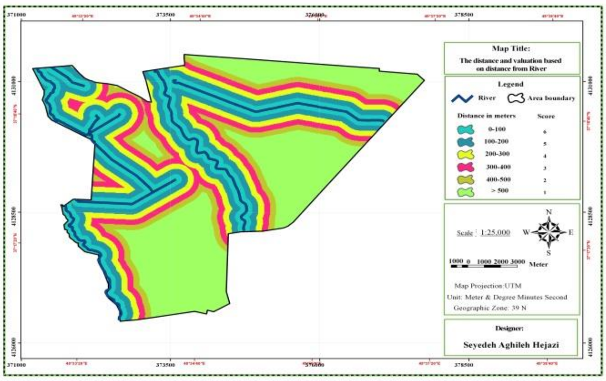












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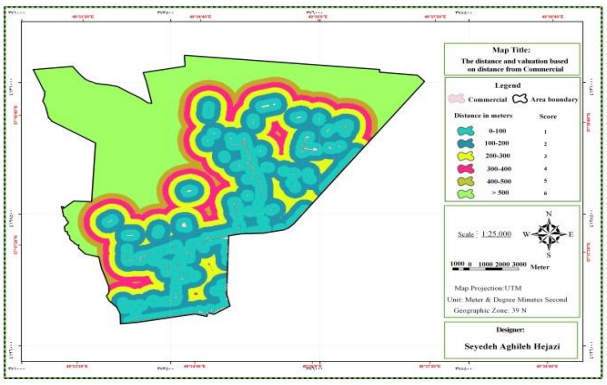

Figure 3. Valuation of data layers

Combinning of data layer

After determine effective criteria and weighting them according to their importance in AHP and preparing data layers map in GIS, by using Spatial Analyst tool---- Calculator Raster in GIS environment the weight overlay was performed and the final map was obtained for the area parks (Figure 4).

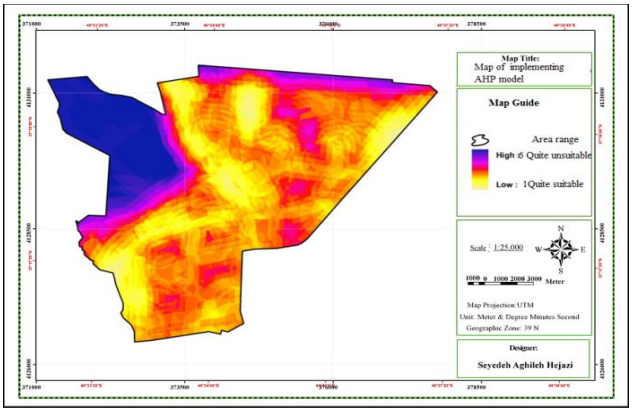

Figure 4.the final map obtained from the model implementation.

output was a raster model in which the pixels represent the value of lands for implement the green space plan describing from quite suitable to quite unsuitable.

By classifying pixels into four classes completely suitable, suitable, unsuitable and completely unsuitable according to criteria priority and weighting will obtain suitable places map to plan green space. Completely suitable and completely unsuitable fields distinction will be in places value map informational limit in (Figure 5).

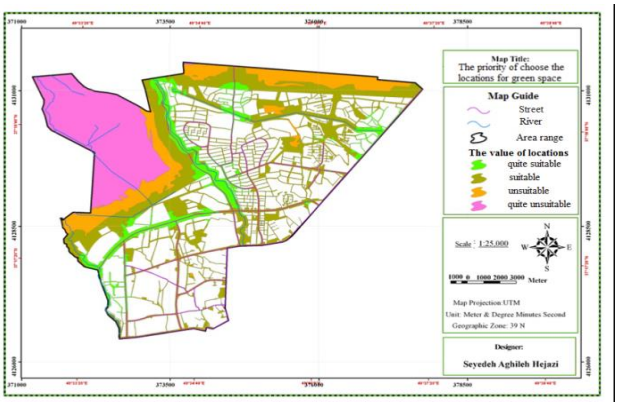

Figure 5. Location of the study area.

CONCLUSION

After implementation of the AHP model and mapping locations for implementation of green space in GIS, statistics from the proposed locations are in the following.

The quite suitable places which include 13/5% of selected ranges were mainly at the edge of the river and the street that according to the environmental condition the rivers within Rasht, green space design is necessary on both sides of the river.

Suitable locations were mainly located in the class of 2 distances from the residential units which mostly are located in the suburbs and the closest distance to the residential structure as well as neighboring rivers and roads that includes 43% of the total selected area. Unsuitable and quite unsuitable places have allocated 16/2% and 27/3 of the entire selected ranges, respectively, and this places are more located out of town and away from the residential context which more are located in classes of 3 to 6 distances away from the residential units.

The use of GIS in the areas is led to information integration and the information will be available precisely, quickly and safely for planners to fulfill their duties with spend the least amount of time, error, and cost.

In Rasht there are suitable chances to increase green spaces environmental and biodiversity value but such spaces face serious problem such as destroy and decrease due to unsuitable urban development, urban green lands use change and lack of planning to protect and develop them. Public awareness about spaces is very low. But such spaces protect and develop and knowing effective factors and increasing public awareness in this area result in citizens life quality increasing.

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