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Measuring the accessibility of urban park by using GIS Techniques: A case study of Bahawalpur City, Pakistan

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Abstract: Neighborhood parks give perfect open spaces to relaxation time physical movement and essential venues to advance populace level physical action. The point of the study is to quantify the availability of the urban stops through GIS methods taking into account an arranged street system served region and spatial nearness to stop guests. Two Urban Parks were chosen to attain to the points of the study. The name of park A is Jinnah Park Bahawalpur and the name of park B is Women Park Bahawalpur. The specimens of 200 polls were filled from both the recreation center guests to gauge the openness of parks. The gathered information is examined through SPSS programming by utilizing chi-square and connection strategies. The geometrically amended zone of the both parks was digitized and figured the separation. Digitized and ordered the street system information base on the separation the recreation center for system examination. System investigation method is utilized to compute the recreation center administration territory, guests and spatial closeness to stops. The study uncovers that the constrained administration range and availability of the recreation center inside the study region. The significant administration territory of both parks is 2 Km and the minor administration zone is 3 to 4 Km which is lacking for a reasonable City. Present study constitutes the capacity of GIS in evaluating the current neighborhood park offices in Bahawalpur City. The system administration zone examination gave exact results to inspect the availability levels. The legislature ought to make a move in light of rising to expand the urban parks for maintainability.

Keywords: Parks, Accessibility, Served Area, Proximity, Sustainability City

1. INTRODUCTION

Availability is thus an essential element which affects all parts of open space in both immediate and aberrant ways (Erkip, 1997; Lotfi *et al.*, 2009). Availability can be characterized in diverse routes, in which eventually more goal and subjective measurements are essential (Lotfi and Koohsari, 2009). Target openness and physical separation are still key figures creating nations (Massam, 2002). The utilization of open offices can be connected to availability, and hence private vicinity to offices and administrations can be guessed as adding to wellbeing in various ways (Doi, Kii, *et al.*, 2002). Urban stops and green spaces have a key significance for the personal satisfaction in progressively urbanized society (Anwar, 2012; Chiesura, 2004). Quantitative valuation of biological community administrations of recreational prospects of urban green spaces is required as a segment in urban (Anwar, 2012; Blanco *et al.*, 2009; Haase, *et al.*, 2014; Haase, *et al.*, 2014). Stops and open spaces are a standout amongst the hugest segments of urban environment that is of extraordinary significance for the individuals who live in urban zones (Andersson *et al.*, 2014). On the off chance that Parks and open spaces are more available to the encompassing society, they can enhance social attachment and communication as more individuals disparage them (Blanco *et al.*, 2009). Better openness to offices additionally guarantees financial proficiency in the utilization of such offices in light of the fact that when they benefit more individuals, they would be more savvy (Andersson *et al.*, 2014; Lin, Morais, and Hou, 2003). Open green spaces, play areas, stops in the city demonstrations like its lungs other than being utilized as dynamic diversion and recreation territories for its nationals (Freeman, 1995; McLafferty, 1982). Openness is gotten from the transportation framework (separation, cost or time) and the allure of the movement Center. Comprehensive access to amazing open spaces is along these lines a foundation of majority rule government and social value and a focal issue to make a space responsive (Galfán, Páez, and Morency, 2012; Hass, 2009; Tabassum and Sharmin, 2013). Neighborhood parks are discriminating segments of the area fabricated environment setting, particularly in urbanized regions (Anwar, 2012; Chiesura, 2004). Neighborhood parks give perfect open spaces to relaxation time physical action and imperative venues to advance populace level physical movement (Anwar, 2012; Chiesura, 2004; Witten, Hiscock, Pearce, and Blakely, 2008). Absence of, or restricted, park access can compel the physical movement open doors for neighborhood inhabitants, which may expand the predominance of corpulence (Hillsdon, *et al.*, 2006; Witten *et al.*, 2008). Having great access to green space, particularly stops, in urban ranges is connected with expanded physical action (Hillsdon *et al.*, 2006). The

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Task Force on Community Preventive Services prescribed making or improving access to places for physical movement as one of eight distinguished methodologies to increment physical action and parks are the most well-known spots for neighborhood populaces for open air physical exercises (Zhang, *et al.,* 2011). Parks are one of eight societal segments to advance physical movement prescribed by the U.S. National Physical Activity Plan (Zhang *et al.,* 2011).

From a land viewpoint, the spatial arrangement of neighborhood stops, the quantity of parks and their spatial dissemination crosswise over neighborhood zones or nearby districts, speaks to the fundamental park access potential for nearby private populaces (Witten *et al.,* 2008; Wurster and Artmann, 2014; Zhang *et al.,* 2011). Amid the previous decades, the issue of availability to urban green spaces or parks has pulled in significant consideration. A typical normal for a considerable lot of these studies has been the utilization of spot based openness measures that consider the spatial and/or physical qualities of urban areas, yet have been more constrained regarding representing varieties in portability between diverse clients, because of age, sex, wage level, and other financial and demographic properties (Galfán *et al.,* 2012). Administration territory of these parks is by and large considered as 10 minutes strolling time or half Km range. Neighborhood Parks assumes lively part in standardizing the people groups and giving them recreational zones to assembling and other solid exercises (Javed, *et al.,* 2013). The utilization of geographic data frameworks (GIS) openly arranging and administration has multiplied over the previous decade, yet its reception inside the field of recreation administrations seems to have been moderately constrained (Altman, 1994; Luo and Wang, 2003; Morrill and Symons, 1977; Oh and Jeong, 2007; Van Herzele and Wiedemann, 2003). Offered an examination of the potential uses of GIS for park showcasing, administration and arranging, however the rarity of consequent articles committed to GIS in the relaxation administration writing proposes that the potential they recognized has not been acknowledged (Altman, 1994; Morrill and Symons, 1977; Nicholls, 2001; Oh and Jeong, 2007; Van Herzele and Wiedemann, 2003). **(Fig.1).**

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This exploration paper is centered on spatial dissemination of urban park and openness investigation through GIS procedures. The points of this exploration are as per the following

1. To set up a geometrically rectified and ordered street system dataset that can speak to the constant system associations.
2. Calculation of Served Area and Population
3. Spatial closeness to stops, which measures travel costs in overcoming spatial division between the areas of populace and parks.

STUDY AREA

Bahawalpur City is 2,372 square Km. Bahawalpur is located in south of Punjab province at 29°23′44″N latitude and 71°41′1″E longitude in Pakistan. Lodhran district is situated in the north and Hasilpur Tehsil is in the east, while Bahawalpur is bounded by Ahmad pur Tehsil in the west and Yazman Tehsil in the South. The climate is extremely hot and dry in summer with cold and dry winter. The summer season starts from May and ends in September. The winter season starts from October and ends in March. The mean maximum temperature of the area is 44℃ with mean minimum temperature 28℃. Dust storms are frequent during the summer season. Bahawalpur City processes less number of green spaces, parks and forest area. Due to the dry climate of Bahawalpur City, there is a great need of the high number of green spaces, parks and forest for a sustained growth of the city.

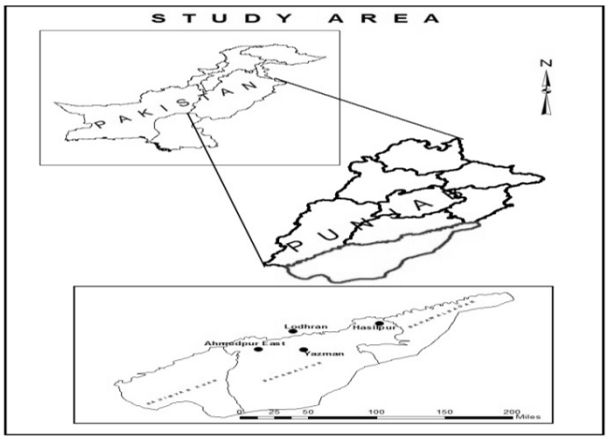

Fig.1: Study Area
Source: Anwar, 2014

2. MATERIAL AND METHODS

Bahawalpur is the city of southern Punjab in Pakistan. Two urban parks were selected to achieve the aims of the study. The name of park A is Jinnah Park Bahawalpur and the name of park B is Women Park Bahawalpur. Almost 200 questionnaires were filled with both parks visitors, to measure the accessibility of parks. The data are collected through random sampling. After the data collection, data are analyzed through SPSS software by using chi-square and correlation techniques. Then the corrected area of the both parks calculated and digitized by using the ARC GIS 10.1. The road network data base around the park was digitized and calculated by network analysis technique. This technique is also used to calculate the park served area, population and spatial proximity to parks.

3. RESULT AND DISCUSSION

The study examines the accessibility of the residents to the parks of Bahawalpur City. The study likewise uncovers the lacks in the arranging and dministration of the neighborhood Govt. of the Bahawalpur city.

Table 1 Respondents According to Their Distance from Destination to Parks

Distance	Jinnah Park (A)	Woman Park (B)
1 Km	67%	35%
2 Km	21%	55.5%
3 Km	8%	6%
4 Km	4%	3.5%

Source: Author 2014

Table 2 Distance from Destination to Park A and B

Distance	1 Km	2 Km	3 Km	4 Km	Total
1 Km	70	64	0	0	134
2 Km	0	42	0	0	42
3 Km	0	5	11	0	16
4 Km	0	0	1	7	8
Total	70	111	12	7	200

Source: Author 2014

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.776	.036	17.286	.000[c]
Ordinal by Ordinal	Spearman Correlation	.651	.038	12.070	.000[c]
N of Valid Cases		200			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

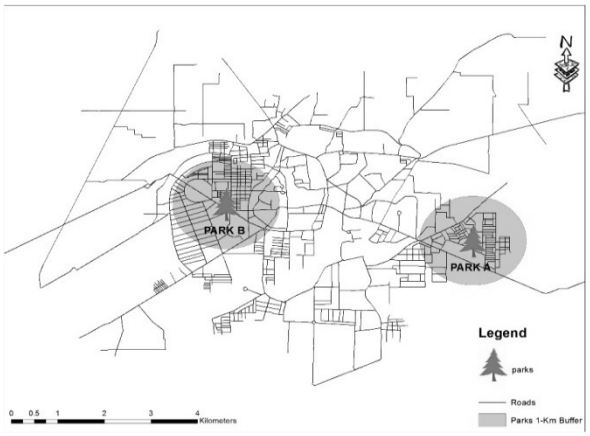

Fig. 1 a, Maximum Accessible Areas of Parks
Source: Anwar 2014

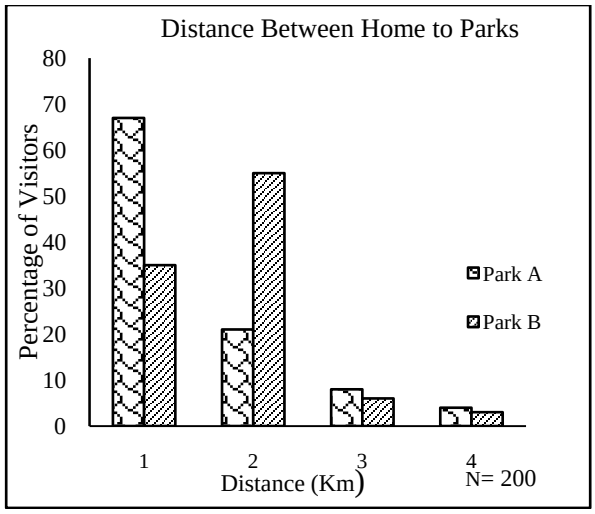

Fig.2b,. Accessibility of the parks
Source: Author 2014

(Fig. 2) Shows the percentage of respondents with different distance from home to park for measuring the accessibility of the park. Overall major served area of the parks is 2 Km. In park A 67% visitor's visit the park from the 1 Km, 21% visitors visit the park from the 2 Km, 8% visitors visit the park within 3 Km and 4% visitors visit the park within 4 Km. In park B 35% visitors visit the park from the 1 Km, 55% visitors visit the park from the 2 Km, 6% visitors visit the park within 3 Km and 3% visitors visit the park within 4 Km. **(Fig.2and 3)** the road network of the Bahawalpur city is digitized to calculate the accessibility of the parks.

The following map shows the road Network of Bahawalpur City. The roads are divided into 4 categories that are primary, secondary, tertiary and unclassified roads.

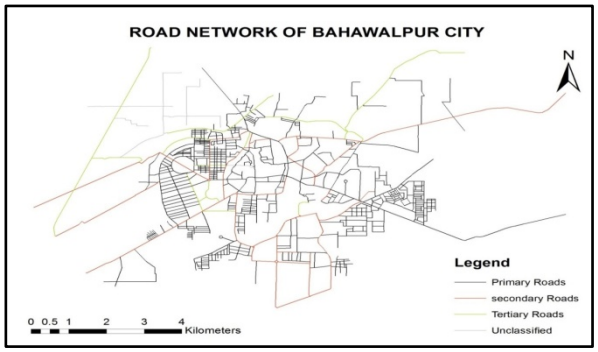

Fig. 3: Road Network of Bahawalpur City
Source: Anwar 2014

Following the map **(Fig.3)** shows the one-Km buffer around 2 parks and also showing the pedestrian access to the parks of the peoples living within one Km. This map does not show the modes of travel

The Euclidean Distance tool is used to calculate the Euclidean distance to roads. This Euclidean distance shows that nearest 500 feet roads required the cheapest cost for accessibility to parks and cost increases with the increasing distance see **(Fig 4. Fig. 5):**

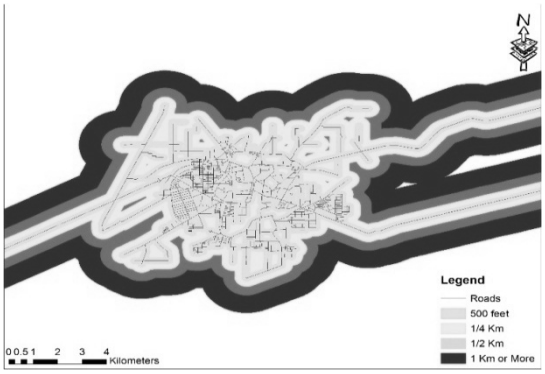

Fig.2: Road network analysis of accessibility of Parks in the Study Area

Source: Anwar 2014

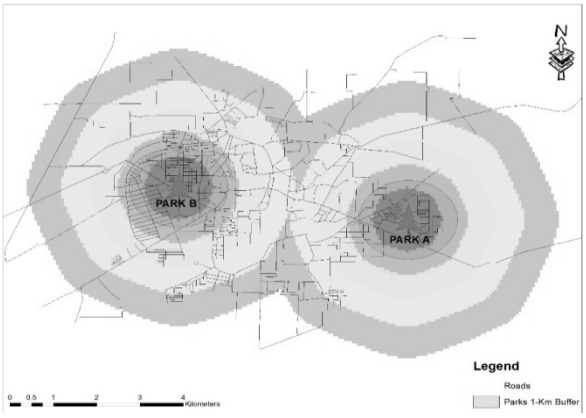

Fig. 3: Coast accessibility of the Parks
Source: Anwar 2014

The above cost map 5 categories of cost that are pedestrian distance, low cost, medium cost, high cost and very high cost. This cost map generated by using the cost distance tool. Cost map shows that how much money is served by getting access to the park. On above map shows that these areas are accessible to **p**arks in walking distance, shows serving low cost of access

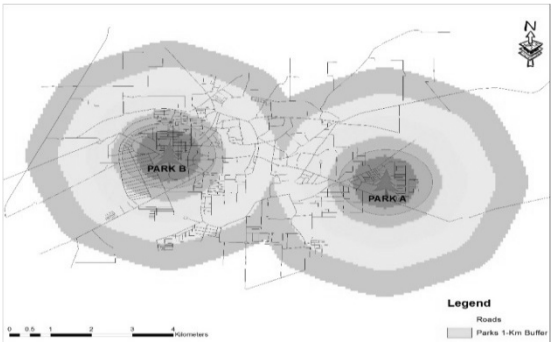

Fig.4: Distance accessibility of the parks
Source: Anwar 2014

to parks. And the other show the medium, high and very high increasing cost trends on access to parks by increase in distance. Parks accessibility map **(Fig 6,7)** shows that the area between 1 Km are best areas that are accessible to parks on walking distance low and medium travel cost. The 1 Km buffers that shows the buffer area have low travel cost, but areas except buffer have high travel cost and these areas are not easily accessible to parks.

4. CONCLUSION

The results reveal the limited served area and accessibility of the park in the study area. This study has attempted to present an analysis of the spatial patterning of local public space access (such as parks) in a previously unexplored location in cities of developing country like Pakistan. It first tried to create a novel methodology for quantifying the degree of objective accessibility to public spaces and second it compared the results with distance. The present methodology has the potential to be put on at the local level by utilizing GIS and other spatial data. Maps and statistical information which is created by this methodology are useful analytical tools for local agencies and planners. This technique holds the possibility to be utilized as a part of urban regions with diverse scales and could be an essential manual for urban powers, specialists and plans. The outcomes elucidated that numerous parameters must be considered for urban open space dispersion. Case in point, it can be shown that poor family units typically utilize the closest offices to abstain from transportation expenses, while high salary gatherings want to go more distant separations to proceed far from gathered parks and other open spots. Generally speaking, the contextual analysis of Bahawalpur City has showed that urban fashioners need to redress their seeing about urban occasions; however it doesn't essentially infer that they are banned from utilizing open spaces, similarly they are physically closer to these circumstances. The quantity of parks is inadequate for a supportability of a city like Bahawalpur. The present study gave an expressive appraisal through GIS methods of existing neighborhood park administration territory in Bahawalpur City. The system administration range investigation gave exact results to look at the availability levels. There is have to reach out an exhaustive study to present new neighborhood stops all through the study region so more individuals could be benefitted. The administration and arrangement producers form the strategies towards the powerful treatment of constrained park's assets and its character. The administration and NGO ought to dispatch a media crusade to bring issues to light on enhancing the life quality and wellbeing. The administration ought to call

for activity in view of rising to build the urban parks for maintainability.

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