

# Prospects of public green spaces in the context of Mymensingh city: A perspective from space syntax

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**Abstract**— *Green and public spaces offer inventive approaches to increase the quality of urban settings, enhance local resilience and promote sustainable lifestyles, improving both the health and the well-being of urban residents. Lack of proper accessibility and connection to other natural resources like water body creates unpleasant situation sometimes decreases frequent use of the space. In urbanizing countries green spaces are decreasing at an alarming rate and becoming less accessible day by day. In Mymensingh it is found that a few numbers of large and medium scale green spaces are located in the riverside of the city. Some of the green spaces are intensely connected with both of the city and river and some are not. This paper aims to the study of the green spaces in the context of Mymensingh city, their potentialities and in some cases the reason of failure to work as a potential green space using space syntax.*

**Index Terms**—Public green space, Accessibility, Connectivity, Space syntax, Mymensingh City.

## 1 INTRODUCTION

City as a collective project exists because its public spaces exist as well (Rubén, 2012). These public spaces have an important role regarding the environmental, economic and social context in the city as well as sources or providers of life, quality and sustainability (Chiesura, 2004). Urban public green space is defined as all urban land covered by vegetation of any kind. This covers vegetation on private and public grounds, irrespective of size and function, and can also include small water bodies such as ponds, lakes or streams. In cities of developing countries green open spaces are needed for environmental and ecological balance (khan 2014). The role of public green spaces, both at community and city level, is important to improve the social ties and social control for future generations. Such areas are often found to be misused by anti-social occurrences, thereby resulting into dehumanized areas (Nilufar 1999). There are lots of determinants that have impact on the potential use of these open spaces and also on the failure of some. It is therefore necessary to ensure that public green spaces are easily accessible for all population groups and distributed equitably within the city.

A public green space in a city, in difference to a private space, is a place of mutual involvement beyond the immediate family circle.

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The scale and type of public green spaces is guided by the socio-cultural and climatic conditions of the city concerned. In Mymensingh City, the urban dwellers popularly use both the streets and open spaces for different activities. Thus, the linear open space of streets, other than their main objective of circulation, also serve many urban activities in our cultures. On the other hand, open spaces are mainly for the purpose of public assembly, like open market, park, plaza, play field, fairground etc. However, this present research only focuses on the green spaces of Mymensingh City, other than its streets and roads. Such green spaces appear to be either at community level for local people or at the metropolitan level for the total urban population of the city itself. In addition to the intended formal and informal public function, public open spaces have great impact on human interaction and social control by citizens' sensory involvement and their participation.

Mymensingh is one of historic towns of Bangladesh that sits on the river bank of Brahmaputra. The river Brahmaputra has a great impact on the evolution of the city from time to time. It is found that a number of large and medium scale green spaces are scattered in Mymensingh city which can set as the "Breathing Zone" of the city. In rapidly urbanizing countries, public green spaces are

shrinking at an alarming rate. So it is high time to analyze how to create a well-connected city layout where all the public gathering spaces like open spaces, zoo, stadium, children's park etc will be connected ensuring pedestrian accessibility and should be highly integrated within the whole city grid so that people can have an easy access to these places which can create a strong social, cultural and environmental impact on the city-dwellers. Urban strategies should be taken to improve accessibility to the public green spaces to integrate these areas within the Master Plan. The extent to which an environment allows people a choice of access through it from place to place is a quality as termed as accessibility. Accessibility is an important tool of sustainability. It improves the economic, social and environmental condition of the area. With the increase of number of access routes, the choice increases and the environment becomes more responsive. Accessibility is important at two scales - at the city as a whole and to its immediate local. The relative ability of all the existing links to connect the site both to the city as a whole and to the immediate surroundings is considered to decide the relative importance of extending each link into and through the site, to achieve an appropriate balance between permeability at the city wide and local scales. Within the limited scope of a paper this research only deals with the location and physical access to the public green spaces.

This paper deals with the potential urban open space of Mymensingh City which is identified as large scale public green spaces and the analysis of physical location and accessibility of these spaces will be carried out by using 'Space Syntax'. In order to analyze all these questions about spatial characteristics; integration and visibility of the study area in Mymensingh is going to be assessed. This paper intends to identify the public gathering spaces at the central area of Mymensingh City and to analyze these open spaces in terms of accessibility as many of these are not potentially used because of inadequate accessibility. In order to assess how these areas are connected within the city, this paper will consider the followings:

- To identify the Integration Core of the Mymensingh city.
- To identify the areas of public open spaces, parks, play grounds and other recreational uses like green spaces.
- To analyze the integration of some selected public green spaces and to assess the accessibility of these spaces using "Space Syntax".

## 2 SPACE SYNTAX: METHODOLOGY

Space Syntax is a method for describing and analyzing the relationships between social structure and spatial structure. The analysis of the urban grids is based on the axial map.

Every island or urban block is surrounded by axial lines and every street intersection within the urban grid is recorded as an intersection of axial lines. Thus the axial structure might be considered as an objective transcription of the structure of the urban grid. There are four first orders and these four may in turn be correlated to form second order measures (Figure. 1).

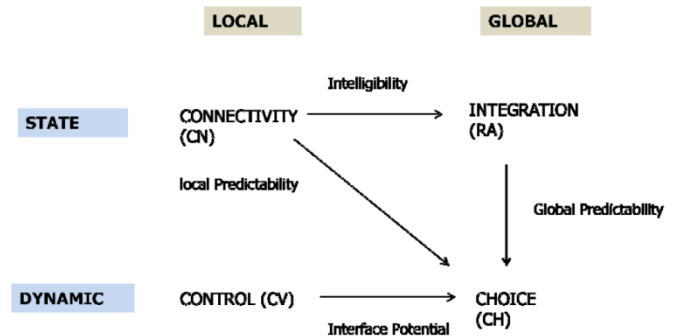


Figure 1: A model of relationship between syntactic measures (Hossain 2001).

The most important measure is Integration which is the relative depth or shallowness of any spatial system seen from any particular point within it. The integration value sare the rank ordered from most integrated to the most segregated line. The set of most integrated streets are collectively known as 'integration core' whose nature, shape, size, coverage etc depends basically on the shape, connectedness and geometry of the urban system and its mode of growth. The method is also used to understand the structure locally of integrated lines (R=3), by computing a more immediate measure giving a value for integration among the spaces up to three or four steps away from the root. The second measure is Choice (CH), which expresses the extent to which a particular space (axial line) figures as a choice on all shortest routes from all spaces to all other spaces in the system. Connectivity (CN) is literally the number of immediate neighbors that are connected to a space. It is a local syntactic measure. The Control (CV) represents the amount of choice a space represents to its immediate neighbors as somewhere to go. The Global choice is a dynamic global measure of the 'flow' through a space. The second order measures even have sociological potential. The correlation between global integration and connectivity is considered to index the Intelligibility of the system which means the degree to which what we can see from the spaces that make up the system. It leads to a strong sense of reliability of the grid from local scale towards a larger context. Integration has now been found empirically to correlate well with observed patterns of

space occupancy, use and movement in towns and cities in different parts of the world (Nilufar 1998)

The pedestrian accessibility to public spaces is usually analyzed in terms of time or distance of trips along the pedestrian network. This network and its configuration is a key factor to collect the pedestrian flows at different scales in the city; neighborhood, quarter, district or city. Therefore, a planning process that analyzes these structural implications on the city could plan public spaces with better criteria (Rubén, 2012). This paper is developed on two key ideas: accessibility and spatial configuration. In application of these ideas or its measures it is going to link other concept, integration. Accessibility refers to the ease to arrive to facilities, activities or goals, which could be appointed in general as opportunities. In addition accessibility could be defined as "the intensity of the possibility of interaction" (Hansen, 1959) and interchange (Engwicht, 1993). The spatial configuration plays a primitive or principal role for the pedestrian mobility (Hillier et al, 1993).

The axial map was subject to syntactical analysis and defined by Hillier and Hanson (1984). Under the theory of Space Syntax, the proposed integration measures the degree in which a node is integrated or segregated with respect to a part of total (local integration) or the whole (global integration). This paper is based on the pedestrian network and the public space of the Mymensingh City. To undertake spatial configuration analysis based on street network, different measures of axial map have been used here as provided by the spatial configuration software DepthMap, developed by Alasdair Turner. Local-global integration and intelligibility are some of the most interesting measures that could be used to analyze spatial configuration in the Mymensingh city. These measures of spatial configuration in the axial map are put in together with the diversity of public space and their capacity to offer accessibility. The space syntax measures were calculated as defined by Hillier and Hanson (1984). The distribution of global integration values is  $n$  and the local integration is  $R=3$ . The axial map was subject to syntactical analysis and the space syntax measures were calculated as

- The Green spaces beside riverbank have been marked in map. Two green spaces are seen named Jaynul Abedin Park and Botanical Garden of Mymensingh Agriculture University.
- From these all the streets, surrounding streets of the green spaces have been chosen for analysis, Streets are Park Road, Govt. Laboratory School Road and Police line Road etc.

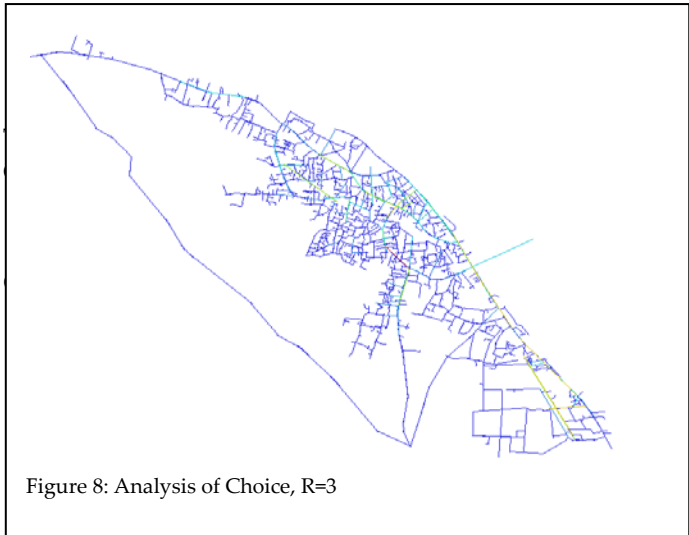
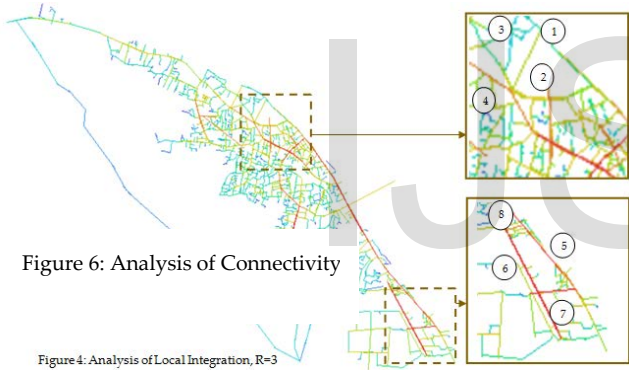
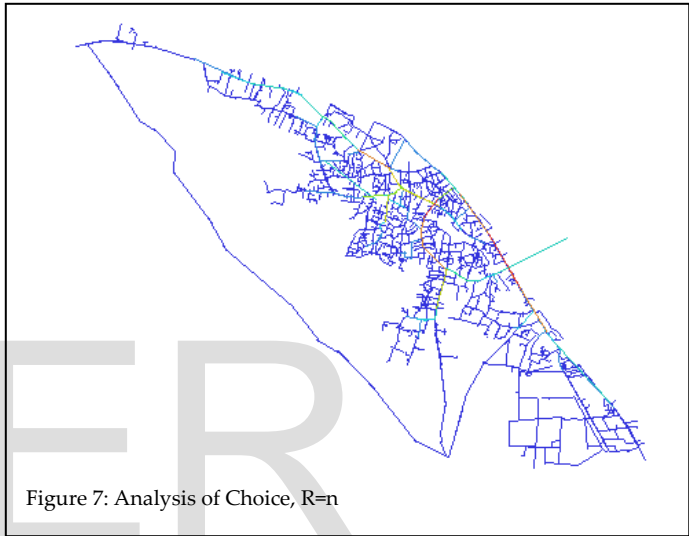
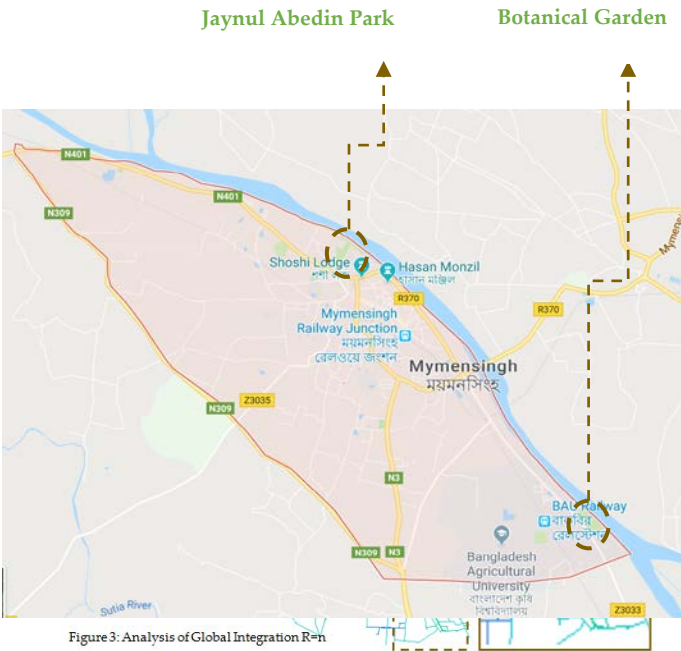
- After analyzing the choice, connectivity, control and global and local integration of whole area, two major green space and eight roads have been selected.
- Choice, control and connectivity value has been tabled and compared with average, maximum and minimum value.
- Local integration and global integration value have been calculated and compared.

### 3 CASE STUDY MYMENSINGH CITY

Mymensingh (Bengali, pronounced moy-mon-shing-haw) is a city of Bangladesh situated on the river Brahmaputra. Since the 1980s the city has expanded with fast urbanization. Mymensingh city is clearly marked by the old Brahmaputra River flowing along its north. Shambhuganj is situated on the other side of the Brahmaputra, connected by the Shambhuganj Bridge. The other ends of the city are marked respectively by the beginning of the Agricultural University campus, the Medical College, Army cantonment and, finally, Sultanabad, a township built for the followers of Aga Khan. A railway line connecting Dhaka with northern districts, built between 1885 and 1899, passes through the city and divides it into two sides. The entire area between Durgabari Road, and Maharaja Road comprises the core commercial area.

Though the city is blessed with several open spaces, it has only two public green spaces. Both of these spaces are located in riverside of Brahmaputra. The Jaynul Abedin park is located in the central area of the town, beside the river. Having immense relationship with the river this park is very important for its location. It has a great pedestrian connection from more or less every part of the city. So, this park has a wide range of usefulness through different times of day through all over every season. On the other hand, the Botanical garden is located at the end of the city inside the campus of Bangladesh Agriculture University.

**Figure 2:** Two public green spaces Jaynul Abedin Park & Botanical Garden of Mymensingh city



Road Name	Road No.
Park Road	1
Police line Road	2
Govt. Laboratory School Road	3
Kanchijhuli Road	4
University KhuyaGhat Road 1	5
Mymensingh Gaforgaon Highway	6
University Post office Road	7
University KhuyaGhat Road 2	8

Table 1 Global Integration Values, Local Integration Values, Connectivity, Control and Choice for Jaynul Abedin Park

Jaynul Abedin Park							
R o a d	Re f. No.	Global integra tion Value (R=n)	Local Integra tion Value (R=3)	Co nnectivity	Contro l	Choic e (R=n)	Choi ce (R=3)
1	1113	0.7263	1.472	4	1.41667	12147	18
2	1015	0.889835	2.31443	7	1.38492	130198	107
3	1290	0.815307	2.47007	7	1.4547	74477	169
4	1151	0.889141	3.016	13	2.62222	734552	665
Average		0.83015	2.31813	7.75	1.71963	237844	239.75
Maximum		0.88984	3.016	13	2.62222	734552	665
Minimum		0.7263	1.472	4	1.38492	12147	18

Correlation considering only the values of the access road of the Jaynul Abedin Park

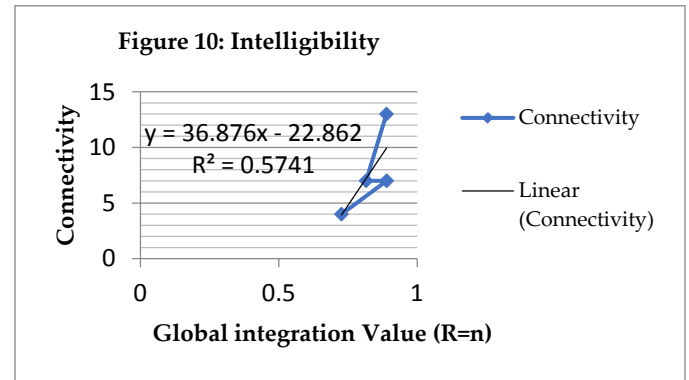
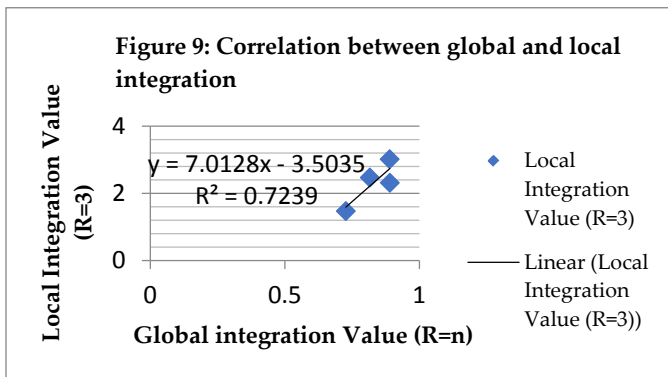
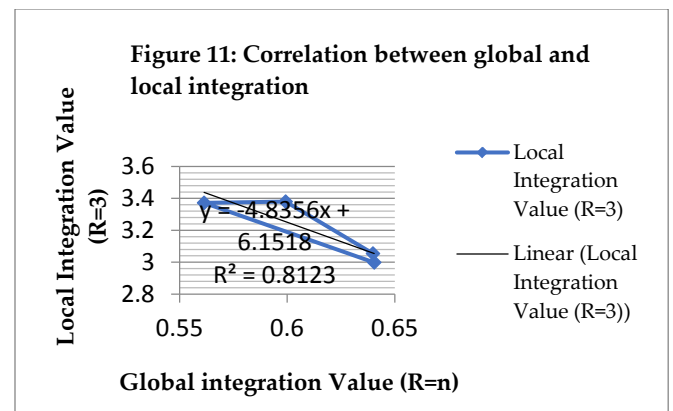
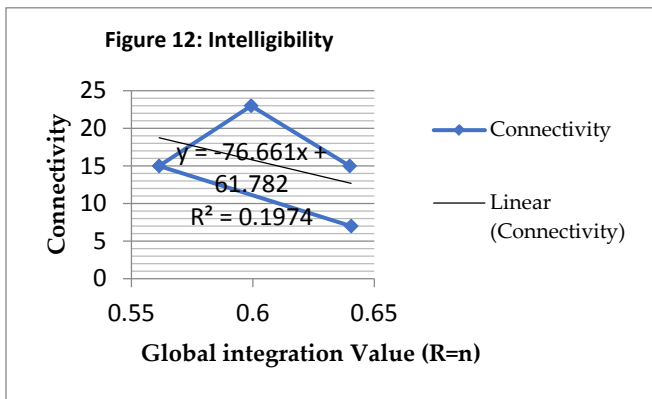


Table 2 Global Integration Values, Local Integration Values, Connectivity, Control and Choice for Botanical Garden

Botanical Garden, Bangladesh Agriculture University							
R o a d	R e f. No.	Global integra tion Value (R=n)	Local Integra tion Value (R=3)	Co nnectivity	Contro l	Choic e (R=n)	Choi ce (R=3)
5	26	0.639851	3.05398	15	2.27114	95356	494
6	72	0.59927	3.37942	23	5.10952	53041	976
7	46	0.561373	3.37184	15	2.66501	43613	982
8	101	0.64046	2.99828	7	0.93951	80238	269
Average		0.61.24	3.20088	15	2.7463	68062	680.25
Maximum		0.64046	2.99828	23	5.10952	95356	982
Minimum		0.56137	2.99828	7	0.93951	43613	269

Correlation considering only the values of the access road of the Botanical Garden





#### 4 FINDINGS

In the syntactic analysis of Mymensingh City explores that, the city integrated core has extended from north east to south west along Brahmaputra River (Figure. 3). The selected green spaces are situated away from the global integration core but surrounded by highly integrated lines.

**In the case of Jaynul abedin park, the correlation between global and local integration is reasonably good (0.723) (Figure 9). At the same time the intelligibility of the park is moderate (0.574) (Figure 10).** The integration values below 0.70 of the order indicate more segregation and while the value above 0.70 show strong integration. Analyzing table 1 it has found that **Jaynul abedin park is both globally and locally integrated.** From table 1 it has been found that the control value is greater than 1, so the park has strong control. The permeability of any system of public space depends on the number of alternative routes it offers from one point to another but these alternatives must be visible (Bentley, Alcock, Murrain, McGlynn, Smith, 1985:12). The entrance points are decided based on the choice value (global measure) and connectivity (local measure) of each link to achieve a balance between the accessibility at the city wide and local scale. In this respect Jaynul abedin park is moderately connected.

**In the case of Botanical garden, the correlation between global and local integration is reasonably very good (0.812) (Figure 11). At the same time the intelligibility of the park is very low (0.197) (Figure 12). It is globally integrated and locally moderately connected.** From table 1 it has been found that except road 8 the control value is greater than 1, so the park has strong control except road 8. In this respect Botanical garden is moderately connected.

#### 5 CONCLUSION

When the large scale open spaces are located at highly integrated areas, they are within people's daily movement

network and used frequently. In the case of Mymensingh Space Syntax identifies that two public green spaces are well integrated with the city grid. Some of these spaces are also well integrated at local level. From our daily experience we see that Jaynul Abedin Park and Botanical garden are used by people frequently for recreational purposes. The use of these parks can be made better by taking a few steps like increasing access points and proper location of those points. Space Syntax helps us to analyze the accessibility of these open spaces which helps for further research and developments.

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