

Peoples' Perception on Environment in Urban Areas: A Case Study on Dhaka City

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Abstract

Dhaka, the capital city in Bangladesh has been going through a hasty process of urbanization and population growth since the last few decades. Some factors like rapid growth of population, unplanned urbanization and unwise industrialization have created a tremendous pressure on the changes in its land using pattern. The aim of this paper is to understand and evaluate the environmental condition from citizens' perception and various factual data. Perceptual data on series of urban environmental issues have been collected through a detail perception study for questionnaire survey, and factual data have been collected from various secondary sources. Environmental facilities in this city are under tremendous pressure due to increasing population, insufficient supply of urban facilities and the reluctance of taking proper development initiatives by the city authorities. However, in all measures to keep the city atmosphere healthy and friendly, it is significantly important to ensure and evaluate peoples' participation.

Key words: Urban environment, environmental degradation, perception, satisfaction index, Dhaka city.

1. Introduction

Dhaka, the capital and the most populated city of Bangladesh, is now considered one of the mega cities in the world. It is the center of all political, administrative and economic activities. High growth rate of population is the primary cause of all sorts of environmental fall down. In 2001 the population density in Dhaka has been recorded to be 7918 person per sq. km and the percent increase over preceding year is 56 [1]. The recent picture of development in the study area appears to become an alarming threat for the remaining land use change. It is important to study the loss of agricultural land, vegetation, water bodies and wet/lowlands and to see how and what changes occurred through. Most of the economic development activities are focused in and around Dhaka city. These changes have rapidly transformed Bangladesh from a subsistence agrarian economy into rapidly industrialized country. The growing urbanization in the outer periphery of Dhaka Metropolitan city has created an extra pressure on its land using pattern.

Considering with other developing countries urbanization takes place at an exceptionally rapid rate in Bangladesh. It is mainly due to rural-urban migration, as well as natural increase of native urban population [6], [8]. Increasing the landless people in villages, riverbank erosion, urban pull and socio-economic conditions are the main causes of this migration. For such reasons urban areas are naturally absorbing the poor, which is a severe challenge. The implications of such urbanization are manifested in mass poverty, gross inequality, high unemployment, under employment, over crowded housing and proliferation of slums and squatters, deteriorating environmental condition, highly inadequate supply of clean water, high incidence of diseases, overloaded public transports and increasing frequency of traffic

congestion, accidents, violence, crime and social tensions. These features are the main characteristics of nearly all urban centers in Bangladesh [10]. Serious problems of environmental degradation stemming from urbanization in Bangladesh may be evaluated in terms of land use alteration, inadequate shelter, water and sanitation facilities in slums and other urban areas, and degradation of community ambient environment [5], [7].

The major consequences of changes in land use and land cover are resource depletion, loss of rural land, land degradation, deforestation, desertification, soil loss, loss of wetlands, loss of biodiversity, and loss of cultural diversity. The key issue is the magnitude of the changes induced by the changes in land use over an extensive area. There is much concern today in Bangladesh about environmental stresses leading to environmental degradation, namely the increasing aridity being experienced in the western and northwestern zone, particularly in the districts of Rajshahi, Dinajpur, Bogra, and some areas of Kushtia and Jessore.

In recent time, importance has been given on the study of environmental perception to focus the environmental issues [7]. The study of environmental perception seeks to focus on specific aspects of the environment, which are related to human welfare [4]. In modern urban planning, urban development decisions are made from local level community participation and in that case, citizens' perception in every aspect of urban life is important.

The quality of urban environment depends greatly on the quality of essential infrastructures and their appropriateness of the management. Utility services like sanitation, sewerage, drainage, drinking water supply, garbage disposal system, electricity, and gas and fuel supply for cooking are important physical infrastructures for maintaining healthy urban environmental quality [7],[8]. Environmental fibers are being continually strained due to population explosion. As the population grows, the demand for different types of urban services and facilities also increase. In Dhaka City, various authorities have made some efforts to increase social/urban neighborhood facilities. However, the tremendous population pressure has far exceeded these facilities, which are deteriorating the quality of such services. For this reason, the study of degradation of urban environmental quality is a great concern.

Geographical location of the study area

The study area is a part of Dhaka city and Savar area which is located in the central part of Bangladesh. Geographically, this area is in the southern part of Madhupur region. Based on flood control infrastructures, the study area is divided into two parts: Turag river East and Turag river west (Fig. 1). The major land transformation in the city is mostly pre urban/suburban and low laying flood plain areas, with wide range of land use types. The city land types of activities changes, which have led the city environment more susceptible to increasing population pressure.

2. Objectives of the study

The main objective of this paper is to assess and review the past and present situation of urban environment as perceived by the living in Dhaka City. The specific objectives are as follows:

- To determine the level of satisfaction of citizens' perception on the prevailing urban environment in Dhaka City;
- To investigate the spatial variations of the perceived urban environmental problems in the city.

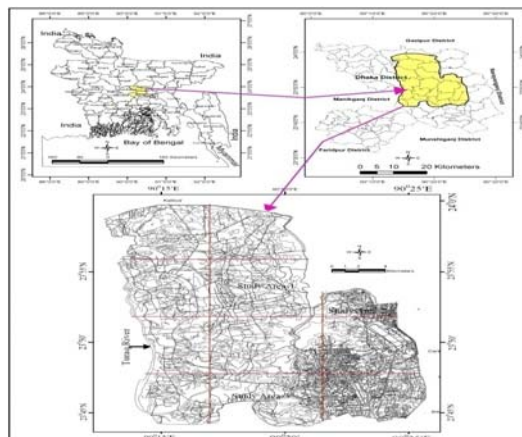


Fig. 1. Geographical Location of Study Area
(Source: Prepared by author based on Banglapedia [3].)

3. Methodology

Investigation of spatial distribution of urban environmental problems in Dhaka City is based on the perceptual data as well as factual data. The factual data have been collected from various secondary sources whereas perceptual data were collected through a questionnaire survey. Major environmental problems have been identified from the perception of study population, which have further been assessed for the evaluation of environmental quality.

It is observed from the study area that land use change map were divided into 11th Gradient (for example Grid, A, B, C, D, E, F, G, H, I, J and K) respectively (Fig. 2). For this major land use change areas were selected through Location Quotient (LQ) formula [9] (*The term first used in European Union and later by Mack and Jacobson 1996*).

The formula for computing Location Quotient is: $LQ = \frac{e_i/e}{E_i/E}$

Where, e_i = Local area in Grid-A; e = Total local area;

E_i = Reference area of the study area; E = Total reference area of the study area

The location quotient is most frequently used in economic geography and location analysis, but it has much wider applicability. The location quotient (LQ) is an index for comparing an area's share of a particular activity with the area's share of some basic or aggregate phenomenon. Following data were taken from a larger data set, which details the land use categories in the study area were divided into eleven parts (Table 1).

Table 1 Average location quotient value in the study area grid A to K

Grids	Land use categories								Total	Average
	BU	BL	AL	VG	WB	WL	TC	OT		
A	1.08	0.85	0.15	7.28	0.56	0.38	0.60	-	10.90	1.56
B	0.68	-	0.73	4.39	0.53	1.44	0.75	2.63	11.15	1.59
C	0.97	2.06	0.46	4.66	0.29	0.80	0.42	0.74	11.14	1.39
D	0.64	0.75	0.52	6.88	0.75	0.45	0.61	3.13	13.73	1.71
E	0.91	1.10	0.96	1.07	0.55	1.17	2.45	1.38	9.59	1.99
F	1.16	0.25	0.90	3.29	0.49	0.11	1.50	1.23	8.93	1.12
G	0.16	1.11	1.16	2.16	0.37	3.20	1.35	-	9.50	1.35
H	0.81	1.10	1.12	0.15	0.37	1.25	4.01	-	8.81	1.10
I	0.75	0.92	0.54	3.85	0.62	1.96	1.12	0.77	10.53	1.32
J	0.37	0.93	0.65	0.78	0.93	3.70	1.13	4.65	13.14	1.64
K	0.92	1.78	0.62	0.37	1.56	1.21	3.78	-	10.24	1.28

Note: BU = Built up, BL = Bare soil/landfill, AL = Agricultural land, VG = Vegetation, WB = Water bodies, WL = Wet/lowland, TC = Transport & communication, and OT = Others

Finally, Grid D, E and J were selected after analyzing the location quotient formula and observing the rapid change areas. Then the household numbers of these areas were found out with the consultation of BBS Community Series [2]. For this reason the whole study area was divided into eleven parts and selected only three survey area (Table 2).

Table 2 Sampled Study Areas

Names of the area	Ward number/Union Parishad (Shown in Figure 2)
Area- 01	Ashulia Union; A part of Yearpur and Birulia Union
Area-02	Uttara (a part of DCC ward-01) and Harirampur Union
Area- 03	Ward- 09, 10; and a part of ward- 08, 11, 12, 43, 46, and Aminbazar Union, and a part of Kaundia, Banagram, Bhakurta, and Tetuljhora Union.

Source: Field Survey, 2010

Determination of the level of satisfaction of population and perception is based on the questionnaire survey. A questionnaire framed with 8 neighborhood environmental variables and statement (Table 3) on 5 points scale (Highly Satisfaction, Satisfied, Acceptable, Dissatisfied, and Highly Dissatisfied).

Table 3 Major urban environmental variables

Major Environmental Variables	
1. Water Supply	5. Drainage Condition
2. Sanitation Facilities	6. Cleaning and Maintenance
3. Garbage disposal	7. Recreation Facilities
4. Sewerage System	8. Traffic Management

Source: Field Survey, 2010

For this study, the primary data has been collected by observation and field survey with questionnaire. For the questionnaire survey of three selected areas were Ashulia (study area-1), Uttara (study area-2) and Amin Bazar (study area-3) from the major land use changed areas (Fig. 2). From the three areas total

397 questionnaires have been administered. A random sampling technique has been adopted in the survey. To determine citizen's level of satisfaction, a Satisfaction Index [11] was selected. In this respect negative index of satisfaction was taken to select a degrading environmental variable.

Satisfaction Index, $Is = f_s - f_d / N$

Here, f_s = Number of Satisfied Respondents; f_d = Number of Dissatisfied Respondents

N = Total Number of Respondents

Table 4 Index for spatial variation of urban environmental degradation in Dhaka city

Index Value (Is)	Meaning
$Is = +1$	Highly Satisfied
$Is = -1$	Highly dissatisfied
$-1 - -0.50$	Highly Degraded Area (HAD)
$-0.50 - -0.25$	Moderately Degraded Area (MDA)
$-0.25 - -0.001$	Lower Degraded Area (LDA)
+ Value	Not Degraded Area (NDA)

The assessment of spatial variation of degraded urban environmental perception has done on the basis of satisfaction Index (Table 4). Each degraded variable from negative index of satisfaction was taken to assess the area variation and their grand total was taken for final presentation of area variation of the city.

4. Results and Discussion

Major Problems of Urban Environment

The quality of environment depends to a great deal on the quality of the essential infrastructural and utility services, like sanitation, sewerage system, drainage, supply of safe drinking water, garbage disposal system, electricity and gas or fuel for cooking. Urban environmental problems relate to the deterioration of the ambient environment and the inability of the public infrastructure and services to meet the demands imposed by rapidly growing population. Respondents were asked to identify the problems regarding environmental pollution and degradation. The result from the respondents appear as 67% of them report the problems of flash flood and drainage congestion, 68% water pollution, 79% air pollution, 63% water and sanitation, 73% garbage disposal system, 79% traffic congestion and 36% open space/recreation facilities. Table 5 shows the summarized opinions about the problems generated for land use change and environmental degradation.

Table 5 Identified major environmental problems in Dhaka City

Problems	No. of Respondents	Percentage
Flash flood and drainage congestion	267	67.25
Traffic congestion	312	78.59
Water pollution	268	67.51
Air pollution	314	79.09
Water and sanitation	251	63.21
Garbage disposal system	289	72.80
Open space/ Recreation facilities	142	35.77

Source: Field survey, 2010

Perceptions on Urban Environmental Conditions

In case of the degree of satisfaction, a wide range of variations has been found across the level of perceptions, such as 'highly satisfied'. On the other hand, a little variation has been identified in case of 'satisfied' and 'dissatisfied'. However, about 10% respondents were highly satisfied with the quality of cleaning and maintenance system. On the contrary, about 20% respondents were highly dissatisfied with the quality of sanitation facilities, sewerage system and drainage condition and recreation facilities of the city. More than 47% respondents were dissatisfied with the quality of water supply, sanitation facilities, garbage disposal, and drainage condition and traffic management system in neighborhood environment which is counted as the highest degree of negative satisfaction (Table 6). About 12% respondents were satisfied with the quality of sewerage system, cleaning and maintenance and recreation facilities. High level of dissatisfaction (65-70%) was determined for water supply and traffic management in the study area. Only for 15% respondents have accepted the qualities of water supply, sewerage system, cleaning

and maintenance and recreation facilities. Thus, it is obvious that from the eight urban environmental variables, people of Dhaka city are dissatisfied with half of the total variables.

Table 6 Perceptions (level of satisfaction) on urban environmental conditions

Variables	Highly Satisfied		Satisfied		Acceptable		Dissatisfied		Highly Dissatisfied		Not Respondent	
	F	P	F	P	F	P	F	P	F	P	F	P
Water Supply	9	2.27	44	11.08	61	15.37	266	67.0	10	2.52	7	1.76
Sanitation Facilities	8	2.02	32	8.06	52	13.10	175	44.08	92	23.17	38	9.57
Garbage disposal	2	0.50	34	8.56	45	11.34	189	47.61	64	16.12	63	15.87
Sewerage System	4	1.00	60	15.11	69	17.38	136	34.26	91	22.92	37	9.32
Drainage Condition	5	1.26	41	10.33	49	12.34	203	51.13	81	20.40	18	4.53
Cleaning & Mainten..	37	9.31	62	15.62	65	16.37	137	34.51	77	19.39	19	4.79
Recreation Facilities	11	2.77	72	18.14	92	23.17	125	31.49	84	21.16	13	3.27
Traffic Management	1	0.25	37	9.32	49	12.34	261	65.74	38	9.57	11	2.77

Source: Field Survey, 2010. Note: F= Frequency, P=Percentage (N=397 for the three sampled area)

Ranking urban environmental degradation

The Satisfaction Index has accessed degradation of urban environment. For the Satisfaction Index, eight variables have been considered, which found to be negative responses from the respondents (Table 7). Among these variables of urban environment, traffic management system (-0.564) has shown the highest negative value of satisfaction index. Citizens showed their strong reaction against mismanagement of the urban authority.

Table 7 Ranks of urban environmental degradation

Neighborhood /Social Environmental Variables	Number of Satisfied Respondents (fs)	Number of Dissatisfied Respondents (fd)	Satisfaction Index (Is)	Rank
Traffic management	37	261	-0.564	1
Supply of water	44	266	-0.559	2
Drainage condition	41	203	-0.408	3
Garbage disposal system	34	189	-0.390	4
Sanitation facilities	32	175	-0.360	5
Cleaning& maintenance	58	189	-0.329	6
Sewerage system	60	136	-0.191	7
Recreational facilities	62	137	-0.188	8

Source: Field Survey, 2010. Note: Rank indicates severity of the problem

In addition, in the case of traffic management, low-income residents are inadequately served. Supply of water (-0.559) takes the second position, while drainage condition (-0.408) is placed in the third position according to negative index of satisfaction. The residents feel problems of water supply hardly in the summer than winter season. Besides there is a huge gap between demand and supply of piped-water in the city. Drainage congestion (-0.408) is also one of the most important neighborhood problems. Most of the drainage channels are filled up by waste, used polythene bags and others garbage. For these reasons, water logging and drainage congestion are the common miserable conditions during the rainy season. The other variables, shown in the Table 7, are found to be negatively ranked, for which the residents are suffering a lot.

Spatial variations of urban environmental perception

The environmental variables of the three selected areas in Dhaka city have been shown in Table 8. Most of the citizens are not satisfied with quality of traffic management system in this city. Among the three areas, area-03 has the highest value of negative index and identified as a highly degraded area. Other two areas (area-01 and area-02) have shown moderately degraded environment (Table 8 and Fig. 2). The residential neighborhoods and urban poor areas are worst affected by the mismanagement of traffic management system. In all three areas, facilities of supply water have shown the negative index of satisfaction.

Table 8, shows that area-03 (-0.587) has shown the highest value relating to supply of water, and identified as a highly degraded area. In this respect, area-01 and area-02 have been found as the moderately lower degraded areas in the city.

Table 8 Spatial variations of Urban Environmental Degradation

Variables	Area-01 (Is)	Area-02 (Is)	Area-03 (Is)
Traffic Management	-0.533	-0.488	-0.590
Rank	2	3	1
Supply of Water	-0.511	-0.488	-0.587
Rank	2	3	1
Drainage Condition	-0.311	-0.302	-0.458
Rank	2	3	1
Garbage Disposal System	-0.422	-0.279	-0.397
Rank	1	3	2
Sanitation Facilities	-0.344	-0.348	-0.367
Rank	3	2	1
Cleaning & Maintenance	-0.311	-0.139	-0.367
Rank	2	3	1
Sewerage System	-0.166	-0.139	-0.208
Rank	2	3	1
Recreational Facilities	-0.166	-0.162	-0.200
Rank	2	3	1
Grand Total	-0.35	-0.29	-0.40
Rank	2	3	1

Source: Field Survey, 2010

Note: Rank indicates severity of the problem

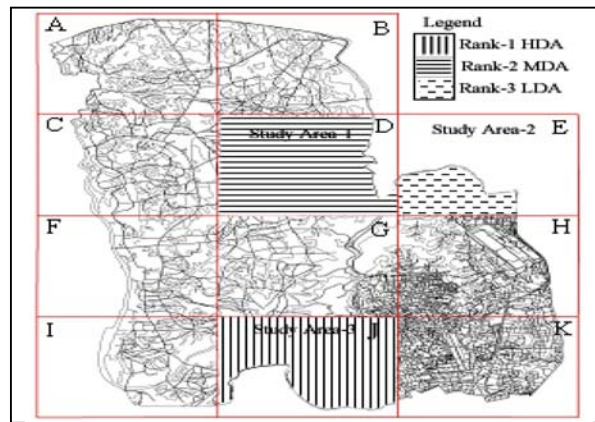


Fig. 2. Spatial variations of environmental perception in three study areas

(Source: Field Survey, 2010 Note: HDA-Highly Degraded Area, MDA-Moderately Degraded Area, LDA- Lower Degraded Area.)

This is found from the areal variations that all three areas have shown the negative index of satisfaction on drainage condition. Degraded drainage conditions are found only one area, area-03. Piedmont, low laying and congested areas is mainly affected by poor drainage congestion. Areal variations are also found in such feature, area-01 is situated on piedmont and low laying landform and area-02 is located on the congested newer part of the city (Table 8 Fig. 2). In case of sanitation facilities, cleaning & maintenance, sewerage system and recreational facilities, all these areas have shown the negative index and among them area-03 has found the highly degraded area. Other two areas (area-01 and area-02) have shown moderately degraded area. Maximum areas in Dhaka city, recreational facilities have not satisfied in the sustainable environment.

Most of the citizens are dissatisfied with quality of traffic management and garbage disposal management system in this city, which is reflected from the areal variation. For garbage disposal system all these areas have shown the negative index of satisfaction. The residential neighborhoods and urban poor areas are worst affected by the mismanagement of garbage disposal system.

In aggregate result, all these areas have shown the negative value of satisfaction index. So it is obvious that in all urban environmental conditions no area stands beyond the degradation boundary. But the magnitude of degradation may differ from one area to another area. Area-03 has shown the highest value (-0.40) and is identified as the highly degraded area. Except area-03 other two areas (area-01 and area-02) have been found as moderately and lower degraded areas (Fig. 2).

5. Conclusion

Within a short period, the survey of this study was conducted and resources were very limited. Income group did not take individual respondents and their duration of living in this city was not considered. Respondents of higher level of education were also very limited for getting accurate environmental perception of residential or neighborhood facilities. About 43 percent citizens mentioned that there is no environmental problem in this city. Among the perceptual environmental problems (from 45 percent citizens), 50 percent problems were neighborhood environmental related and 50 percent problems were physical environment related. Among the total neighborhood environment related problems, traffic jam and mismanagement of garbage disposal system placed the highest rank.

The aggregate result for the level of satisfaction, the satisfied citizens (12.03%) are slightly more than dissatisfied citizens (46.98%). On the other extreme point, the highly dissatisfied citizens (16.91%) are double than highly satisfied citizens (2.42%). In total 15.18 percent citizens have taken the urban environmental quality in Dhaka City at acceptance level.

Eight variables out of seventeen (about 50 percent) have been identified as degraded urban environmental variables. Most vulnerable variables are traffic management, water supply, drainage congestion and garbage disposal system.

In respect of spatial variation, all three areas have shown the degradation of urban neighborhood environment in Dhaka City. Area-3 is identified as the highly degraded area and other two areas (area-01 and area-02) have been found as moderate and lower degraded area respectively.

The effect of large population on the neighborhood environment is quite strong. The degradation of urban environment in this city is obvious from perceptual and factual data. In this case, the city authorities with government and non-government organizations should take proper development initiatives to save the degradation of urban environment. For these reasons, community people should extend their helping hand to such organizations for creating proper community action programs.

Dhaka can yet to be saved from environmental degradation provided suitable planning measures are taken. The physical and social environment of Dhaka city has already crossed well beyond its entrance limits and the city dwellers are susceptible to serious environmental concerns. The present study shows that the process of such degradation has already begun in Dhaka, the capital and the largest metropolitan city in Bangladesh. However, with the view to have a future sustainable city friendly for both environment and ecology there are still a lot of scopes to develop the city in a planned manner. That's why a systematic research is necessary.

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