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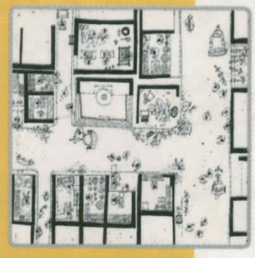

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Planning for School Safety: A Case Study of Earthquake Affected Bagh Town in Azad Jammun and Kashmir, Pakistan

Dr. S. Shabih-ul-Hassan Zaidi
Professor and Dean, Faculty of Architecture and Planning,
University of Engineering and Technology, Lahore
Email: shabih52@hotmail.com

Abstract
School children are the most valuable asset of a society. Schools play an ever increasingly important role in the life of communities throughout the world. Unfortunately, schools are also places of immense vulnerability when located in areas of high seismic activity. In national disaster risk management plans, however, schools have not been given adequate attention, and poor disaster management has too often left them isolated, inaccessible in times of disaster and away from relief and rescue efforts.

Previously, the planning guidelines only placed emphasis on environmental and traffic hazards in selecting locations for Schools. Now a days, safety of schools is even more desired, since they are expossed to natural disasters such as earthquakes, floods, fire, heavy rains etc. In Pakistan earthquake of October 08, 2005 had caused a large number of casualties of the school children in Azad Jammun and Kashmir (AJK). This was mainly because of poor construction and bad location of schools. In order to safeguard school children from the above mentioned hazards, we need to plan our schools in such a way that they become safe buildings for children and they do not fall prey to these hazards. In this connection, the location, standard of construction, space standards and accessibility to the schools are the important issues to be considered while planning for safe schools. This paper, by taking the example of earthquake affected Bagh town in AJK, Pakistan, portrays the lessons learnt and attempts to present some recommendations for ensuring safety of schools through proper Town Planning.

Key Words: Earthquake disaster, School Safety, Seismic Resistant Buildings, Building and Planning Codes.

1. Introduction

Earthquake is a common phenomenon in certain areas of Pakistan and the authorities are concerned about emergency disaster management as well as for long term solutions. In this process, after the severe earthquake of 2005 in Bagh town of Azad Jammun and Kashmir, Pakistan, the Earthquake Reconstruction and Rehabilitation Authority (ERRA) was established by the Government of Pakistan. The ERRA, took a wise step to prepare the Master Plan for the Bagh town before starting the rehabilitation of people and reconstruction of all the damaged constructions. In fact, preparation of Master Plan for all affected cities was considered as a former step of rehabilitation as suggested by the donors in order to ensure an effective utilization of their assistance. The Governor of Punjab involved the City and Regional Planning Department of the University of Engineering and Technology, Lahore, to prepare the Master Plan of the Bagh town on a voluntary basis. The experiences gathered as part of the project are presented here to formulate the guidelines for School Planning in earthquake prone areas.

2. Earthquake and its Vulnerability in Bagh Town of Pakistan

Earthquake is considered as a natural disaster by the general people. In technical terms, an earthquake is a sudden motion or trembling of the ground produced by the abrupt displacement of rock masses. The Earth's crust is actually made up of huge separate masses of rock called tectonic plates. These move very slowly and when they rub together, the movement forces waves of energy to come to the earth's surface, resulting in the tremors and shakes that we experience as an earthquake. It is the shaking motion which does the most damage, causing buildings and bridges to sway perilously or collapse. Every year, around half a million earthquakes affect some part of the planet's surface, but the majority of shakes are so small as to be detectable only by seismometer. Potentially headline-grabbing earthquakes occur, on average, twice a week and mega-earthquakes - with a magnitude of more than 8 on Richter scale - only once or twice a year [1].

On Saturday, the October 8, 2005, at 08:52 local time (03:52 GMT), a massive earthquake measuring 7.6 on the Richter scale - the most devastating to hit the region in a century - destroyed towns and villages in Azad Jammu and Kashmir (AJK) and the Northwest Frontier Province (NWFP) of Pakistan. The scale of the disaster was massive

covering over 30,000 square kilometers in the most rugged mountainous terrain - the Himalayas. The calamity struck heavily in Balakot, Mansehra, Muzaffarabad, Abbotabad, Shangla, Rawalakot, Bagh, Batgram, Neelam valley and Kohistan areas. The disaster caused death of more than 88,000 lives and made over 100,000 injured. Approximately, 23 percent of the total deaths were that of the school children. More than 10,000 cattle were destroyed. Nearly half a million houses were destroyed along with many hundreds of kilometers of roads and dozens of bridges.

The earthquake of October 8, 2005 caused the destruction or damage beyond repair of 8000 schools out of 9000 in the earthquake affected region i.e. AJK and Northern Areas of Pakistan. Over 18,000 school children died in the collapsed schools and over 20,000 more students suffered from serious injury [2]. The Bagh District and Town suffered heavy loss of life and property due to the earthquake. About 24,000 people died in the Bagh district. Almost all public buildings have been damaged and most of the houses have been either collapsed or suffered from major and minor cracks in the walls. In Bagh town alone, 703 people died (most of these were school children) and thousands of people were injured due to earthquake. Most of the houses (3364) were completely damaged and the dwellers were forced to take shelter in the tents and sheds. All of the 50 schools (100%) were also completely destroyed or damaged beyond repair [3]. The Boys Degree College and the Girls College were also completely destroyed. This damage, in general, was devastating because of the location of type of construction of the existing public buildings particularly that of the school buildings. The earthquake was a reminder of the need for policy and public and private sector engagement and investment to make schools more resilient to earthquake and other hazards. It is believed by the experts that much can be done to guide future school planning and construction and to reduce school vulnerabilities through proactive mitigation programmes. Fortunately, there now exists ample information in the form of knowledge and technologies for making schools safer well within the affordability of governments and communities alike. There is a need to apply this information in the construction of new schools and retrofitting of existing school buildings.

Province	Total Population(1998)	Total School	Total Enrolment	Total Teacher
BALOCHISTAN	6565885	10908	727697	
NWFP	17743645	29329	1842419	55353
PUNJAB	73621290	54614	9265049	303834
SIND	30439893	41661	3440821	161448
Total	128370713	136512	15275986	520635

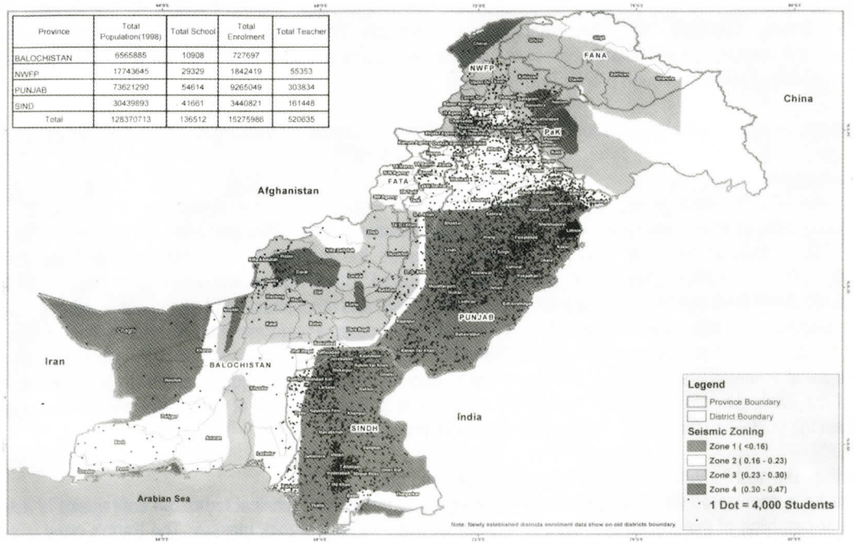

Figure 01: Map showing Seismic Zones and identifying number of the school children at risk (1 dot on Map represents 4000 students). Map courtesy : Agha Khan Planning and Building Service, Pakistan

3. The Context of Bagh Town and Its Master Plan

The Bagh district is bounded on the north by Muzaffarabad district, on the east by Indian held state of Jammu and Kashmir and on the south by Poonch district and Indian occupied state of Jammu and Kashmir and on the west by Rawalpindi and Abbottabad districts of Pakistan. Topographically, the entire Bagh district is mountainous area, generally sloping from north-east to south west. The area falls in the Lesser Himalayas zone. The main range in the district is Pir Panjal. The Haji Pir pass is situated at the height of 3421 meters above sea level. The general elevation is between 1500 and 2500 meters above sea level. Mountains are generally covered with coniferous forests [4].

Bagh is the fifth largest town in Azad Jammu and Kashmir. The Bagh Municipal area has been divided into 23 wards with varied areas and populations. The town comprises of mostly hilly area with steep ridges and a very little flat area is available for development. Mahl River (Nullah) flows along the south-western side of the main town. The Bagh town has grown from a small settlement of 1810 inhabitants in 1972 to 18,886 in the year 1998. At a growth rate of 8.73 percent per annum the current population (in 2008) is estimated to be around 38000. Bagh was given the status of District Headquarter in April, 1987. It is said that a Bagh (garden) was set up by the landowner, where now the premises of the Forest Department is located. As a result, the area was named as Bagh [5]. The Bagh town has a Municipal Committee and a Bagh Development Authority (BDA) which are responsible for providing housing and other utility services to the residents of the town.

After the devastation earthquake of 2005, the process of Master Planning was led by the Faculty of Architecture and Planning in which the role of the Project Manager was delegated to the Dean of the Faculty. The students and teachers of the City and Regional Planning Department conducted various field surveys, analyzed data, and developed a Master Plan for Bagh town using a Quick Bird Satellite imagery as a base map and the application of Geographic Information Systems (GIS) technology for analyzing data and developing proposals for a long term (25 years) Master Plan. The local community was fully involved in developing proposals at every stage of the Master Plan. A number of Public Hearings were held before the final approval and adoption of the Master Plan by ERRA.

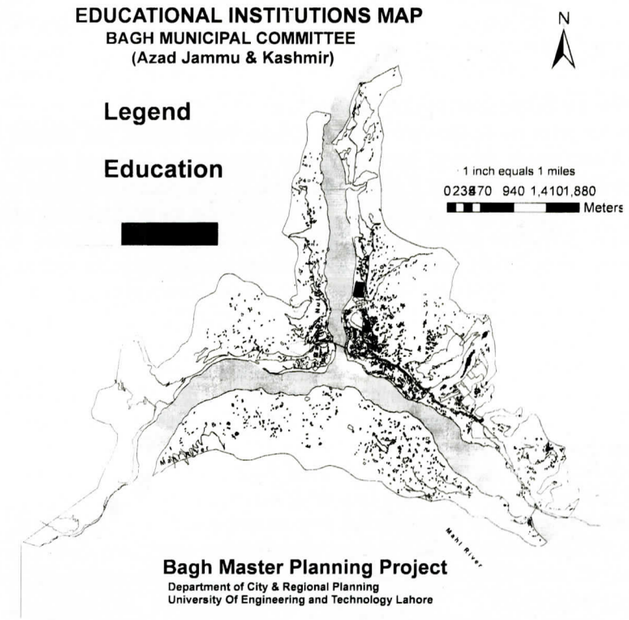

Figure 02: Location of Educational Institutions in the Master Plan of Bagh Town

4. State of Educational Institutions in Bagh Town after the Earthquake

At present, the overall condition of government sector educational institution buildings is unsafe. All of the schools and college buildings were constructed with stone masonry which could not withstand earthquake shocks (Fig: 3). After the earthquake, some 50 percent of the destroyed schools are being run in dilapidated buildings heavily damaged due to the earthquake and the rest are being run in open air (Fig: 4) and in the tents (Fig: 5). The present condition of private sector education institution buildings (20 in total) is somewhat akin to that of government buildings. Although, about 50 percent of the private school buildings have had some component of reinforced cement concrete but their present condition is recorded as bad or dangerous during the survey. It means about half of the private schools are working within cracked double storey buildings. This is more frightening situation and may lead to loss of innocent lives in future [6].

Figure 03: Destruction of a School in Bagh Town during the Earthquake in 2005

5. Lessons Learnt from the Earthquake Disaster in Bagh Town

It is shocking to note that all of the Government Buildings (Offices, Police Station, Jail, Hospital etc.) and all of the schools (government and private schools) were completely destroyed or damaged beyond repair during the earthquake of 2005 in Bagh town. In contrast, it was found out that all of the houses built by the residents' themselves were not destroyed completely on the same catastrophe. This indicates that the large buildings such as that of schools and Government offices had some general faults, therefore, need special consideration for seismic resistant construction. It has been noticed that the great loss of life was caused basically not by the earthquake, but due to faulty construction and bad location of buildings. Therefore, the following observations are made from the study of earthquake disaster in Bagh town from the point of view of safety of schools [7]:

1. The schools were constructed using poor building material i.e. locally available stones. Usually walls were made of stone masonry while the roofs were made of RCC lintels or wood and tin.
2. The construction of schools was not according to the earthquake resistant structural design i.e. seismic resistant frame structure.
3. Due to the absence of any Master Plan for the Bagh town, the entire city developed in the form of a huge slum. Therefore, the schools were located along narrow, zigzag streets which caused a great problem in movement for the rescue work after the earthquake.
4. Some schools were located in the areas of land sliding, which were marked as "highly dangerous areas" (red zone) in the seismic map for Bagh prepared after the earthquake (included in the Bagh Master Plan 2006-31).
5. Safety measures and safety equipment such as fire fighting equipment, first aid kits etc. were not available in the schools. This made the relief and rescue work difficult and a number of children died because of non-availability of emergency medical help.
6. The schools' children and their teachers were not prepared for dealing with the disaster of any kind. No safety drills or any other preparedness exercises were made by school authorities or local municipal authorities.
7. The school buildings were inadequate in size and lacked basic facilities such as water supply, sewerage etc. The congested class rooms with little space for circulation caused a great difficulty in immediate evacuation during earthquake.
8. The municipal authorities were unprepared, un-trained and ill-equipped to face a catastrophe of the 2005 earthquake. They did not have any cranes, or excavators for rescue operation for school children trapped in the collapsed buildings.

Figure 04: Open Air class after earthquake - an impromptu solution

6. The Need for School Safety

Safety for the school children is a crucial issue for every parent all over the world. However, these target groups are frequently exposed to serious physical threats resulting from natural and manmade disasters, particularly in some parts of the world like Pakistan where attention is rarely paid to this vulnerable group. Today, it is agreed that building of 'safe schools' needs to be a high priority throughout the world. In regions facing earthquake threats on a regular basis, it is imperative to build schools that provide a safe environment for the children [8].

Fauad Bendimerad [9] argues that there is a need for a global Field Act mandating strict seismic resistant construction standards for school building. He pointed out that since the adoption of the Field Act after the 1933 Long Beach Earthquake in California (USA), not a single school has collapsed or experienced extensive damage, and not a single child or adult was killed or injured in any School in California, which were built under the Field Act. The question arises that why we cannot do this in Pakistan and elsewhere in the world. Fauad Bendimerad points out the following:

1. School safety requires necessary regulations and laws that ensure adequate codes and strict quality control and supervision; as well as accountability.
2. Building safe schools makes economic sense. It means spending money on construction of safe schools proves to be economical in the long run.
3. The implementation of the laws and regulations requires training and certification of professionals (planners, engineers, architects, builders, building inspectors).
4. Knowledge (technology) to make safe schools exists for at least 3 decades. Therefore, unsafe schools are an avoidable error and sending children to unsafe buildings is an unjustifiable practice.

Figure 05: School in a Tent after Earthquake in Bagh Town

6.1 Recommendations for Safe School Construction

The following recommendations are made to ensure the development of safe schools in the disaster hit Bagh town and elsewhere in Pakistan:

6.1.1 Site Selection and Town Planning

Our schools, particularly those located in rural areas and small towns are more vulnerable to natural disasters such as earthquakes, floods, fires, heavy rains, and wind storms. This is mainly due to unplanned street design and poor site selection for the location of school buildings. The narrow streets in the unplanned areas, along which most of these schools are located, cause hindrance in the rescue work after the collapse of buildings due to earthquake, floods or any other natural disaster. Therefore, it is recommended that the school site should be stable and safe enough to withstand the total building load, their occupants and their belongings. The schools should not be constructed on fault lines, unstable slopes, river banks, marshy lands, fills and areas marked as red zone in the seismic map. These issues should be considered while preparing a Master Plan of the city. The detailed local planning or area development schemes' should be designed in such a way that it ensures suitable layout pattern according to the topography of the area and adequate width of streets and roads along which the school buildings are constructed.

6.1.2 Architectural Design of School Buildings

The shape, size and proportions of a building are important for its seismic safety. Buildings with asymmetric plan and elevations are more vulnerable to earthquakes than those having symmetrical ones [10]. Therefore, buildings with frame structure having square shape design should be preferred for schools. The C, E, or H shape designs may be avoided.

6.1.3 Foundations

The schools should have a proper solid foundation and the base on which the foundation rests should be compact. The foundation should be built according to the recommended seismic resistant design by the structural engineers and suggested in the ERRA guidelines [11].

6.1.4 Structural Design

The building should behave like a single unit for earthquake resistance. Therefore, the school building should be built according to a frame structure with beams at each level and RCC columns connected to the horizontal beams properly as indicated in the frame structure building in Fig.06. Special attention should be given to the type and quality of the bond within the walling (infill) units which are the main contributors to the integrity and strength of the buildings.

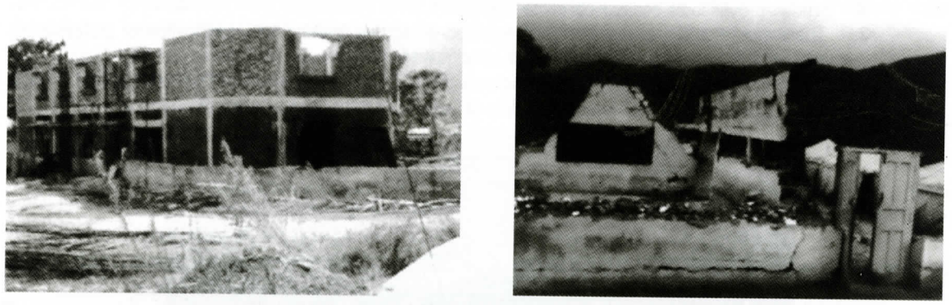

Figure 06: Earthquake effect on Frame and Non-frame structure

6.1.5 Building Material and Workmanship

The building material used for construction of schools should be according to the specifications provided by Earthquake Reconstruction and Rehabilitation Authority (ERRA), Pakistan [12]. The bricks should not be over or under burnt, deformed or undersized. Solid Cement Blocks should be of regular shape, and free from broken edges or any type of deformation or cracks. Concrete blocks should be at least 1:3:6 mix with crushing strength of 2000 psi. The blocks should be cured properly before use. Deformed steel should be free from heavy rust and scale. Plain steel bars are not recommended for use. Cement should be carefully stored to avoid moisture intake. Good quality sand and stones crush are recommended to be used in concrete mixtures. Proper shuttering and form work is also recommended. The masons should be properly trained to construct seismic resistant buildings for schools safety.

7. General Recommendations for Making Schools Safer

Some general recommendations emerged as an outcome of the study of schools in Bagh town and various conferences on school safety are given below:

1. The schools should be planned as one of the most important public facility in all human settlements. Their size and location should be clearly marked in a Master Plan or Local Plan (Area Development Schemes) so as to have a suitable size of the schools according to established space standards and they are adequately located to serve their catchments areas. For example, the primary schools should have an area of 1.5 to 2.5 acres and they should be located at 5-10 minutes walking distance from the residences of the school children [13].
2. The construction material and standards of construction of school buildings should be such that they are seismic resistant. Normally, a concrete frame structure with burnt brick or cement block with cement mortar should be used for construction of schools. The guidelines for construction of school buildings provided by Earthquake Reconstruction and Rehabilitation Authority (ERRA) should be followed for construction of schools, particularly in the earthquake zone. The federal government should enact a Universal Building Code for construction of seismic resistant schools on the pattern of Field Act in the USA.
3. Accessibility to schools should be improved by widening the streets or roads along which they are located so that at the time of emergency, the fire-brigade, ambulances and other rescue vehicles can reach the school buildings [14].
4. Ensuring schools to function as post disaster shelters including consideration for adults, people with disabilities, and provide alternative sites for educational continuity with school based disaster management planning and training. Emergency drills should be regularly held in all schools to train the students' attitude at the time of emergency.
5. Strengthen accountability mechanisms and advocate for the creation of national programmes for school safety, where needed, to ensure that all new and existing, public and private schools are safe from all hazard threats. The existing school buildings should be strengthened through retrofitting and the new schools must be constructed according to new building code to be seismic resistant.
6. Trained personnel for multi-hazard disaster resistant schools planning, design, monitoring, maintenance, inspection, and approval at community - and all levels of government.
7. School safety is an opportunity to establish innovative and effective partnerships between national government policy and state, local government and community to ensure implementation of priority actions. Civil society and private sector organizations are critical partners in school safety action plan implementation through their provision of technical and project management expertise and financial support to national and local governments, and community groups [15].
8. Use national budget and infrastructure protection resources to make schools safe, with no funding cut from education sector.
9. All schools should be equipped with fire-fighting equipment such as fire extinguishers, sand buckets and fire hydrants at school site and first aid equipment. The use of this equipment should also be taught to the teachers and students.
10. The communities should represent continuity and sustainability for school safety and through training of trainers programmes to scale-up awareness, develop information, instruct evacuation plans, maintain safe havens and apply improved local technologies to broader community built environment. Therefore, local communities must be involved in all efforts to build safe schools.
11. The school curriculum should include lessons about disaster awareness, disaster management and coping with the earthquake situation during and after the earthquake.
12. Local skills development and training of masons about construction of seismic resistant buildings should be carried out through Non Governmental Organizations (NGOs) [16].

8. Conclusion

Earthquake is an unpredictable natural disaster, but the loss of innocent lives of the school children and property is mainly caused by man-made buildings which are non-resilient to the earthquake shocks. This loss can be avoided if the Government, NGOs, and the communities join hands in planning, financing, and construction of earthquake resistant buildings, particularly for schools. In general, the planning and design of School buildings needs to follow the standards of building construction and physical planning. In this process, the regional guidelines like those presented here for Bagh town are necessary to follow in order to save the children, particularly in the earthquake vulnerable parts of the world.

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Sustainability of Development Trends in the Urban Fringe: A Case Study on North-Eastern Dhaka City

Md. Shakil Bin Kashem
Lecturer
Department of Urban and Regional Planning
Bangladesh University of Engineering and Technology (BUET)
Dhaka-1000
E-mail: shakil_kashem@urp.buet.ac.bd

Prof. Dr. Roxana Hafiz
Department of Urban and Regional Planning
Bangladesh University of Engineering and Technology (BUET)
Dhaka-1000
E-mail: rhafiz@urp.buet.ac.bd

Abstract
Various tools and mechanisms are being developed for appraising sustainability both at the local and global levels. This study tried to formulate a mechanism to appraise sustainability using Multi-Criteria Analysis (MCA) at the local scale. It has selected the north-eastern fringe area of Dhaka to appraise the sustainability of development trends there. Three main spheres of sustainable development, i.e. environmental, social and economical sustainability were taken as Primary Tier Criteria (PTC). Under these PTC 28 Secondary Tier Criteria (STC) were selected. These STC were weighted using Analytical Hierarchy Process (AHP) under their respective PTC. Two sites within the study area (one in the inner fringe and another in the outer fringe areas) were selected for determining the overall sustainability level of the area. This sustainability level was measured in the form of Generic Sustainability Level (GSL). The result showed that, the study area is in a negative state of sustainability. The main reason was pinpointed to its deteriorated environmental condition caused by the ongoing unplanned development works there. Although the study area has experienced some progresses in its social and economic sustainability spheres, its highly negative environmental sustainability situation has rendered it in a negative state of sustainability. Through analysis of the results, this study proposed some actions that can promote sustainability in the whole study area.

Key words: Sustainability, Sustainability appraisal, Urban fringe area Development.

1. Introduction

The issue of 'Sustainable Development' or 'Sustainability' has been gaining momentum for the past few decades when technological advancement and rapid population growth are exerting enormous stress on the limited natural resource base of the earth. Now question arises as to whether the Earth's resources will be able to meet the demands of a growing human population that has rising aspirations for consumption and quality of life, while maintaining the rich diversity of the natural environment or biosphere. And, in the case of city or urban development, this issue of sustainability is raising much concern as being the root cause for exploiting the natural resources as well as providing improved amenities and services. Again, sustainable development is essentially not about the environment but rather about the capacity of human society to enact permanent reform in order to safeguard the delicate balance between humans and their natural life support system (Hamm & Muttagi, 1998 p.2). For this reason, this study tried to evaluate the issue of sustainability from all of its social, economic and environmental dimensions in the case of fringe area development and suggested policy options that would be necessary to ensure sustainable urban growth.

1.1 The Concept of Sustainability

'Sustainable Development' or 'Sustainability' means that in a global context any economic or social development can make improvement without harming the environment. The concept of 'Sustainability' has developed from a global political process over the last three decades of the 20th century into one that now touches every part of the society. In 1987 the Prime Minister of Norway, Gro Harlem Brundtland, launched the book Our Common Future which effectively began the era of sustainability. In this report, the Commission offered one of the first definitions of sustainable development as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987 p.43).

In the decade following the publication of the Brundtland Report, over 100 alternate, more detailed definitions of sustainable development, and related term of sustainability, were proposed (Murcott 1997, Elkington 2002). This proliferation was not only a reflection of the complexity of defining sustainability for a wide variety of actors, from individuals to communities to organizations, but also signaled a mounting concern over the deteriorating health of natural and social systems and a growing recognition of the economic benefits of sustainability. Thus when the issue of sustainability is referred it will be the simple idea that means the simultaneous achievement of social, economic and environmental sustainability. This concept is explained in Figure-1.

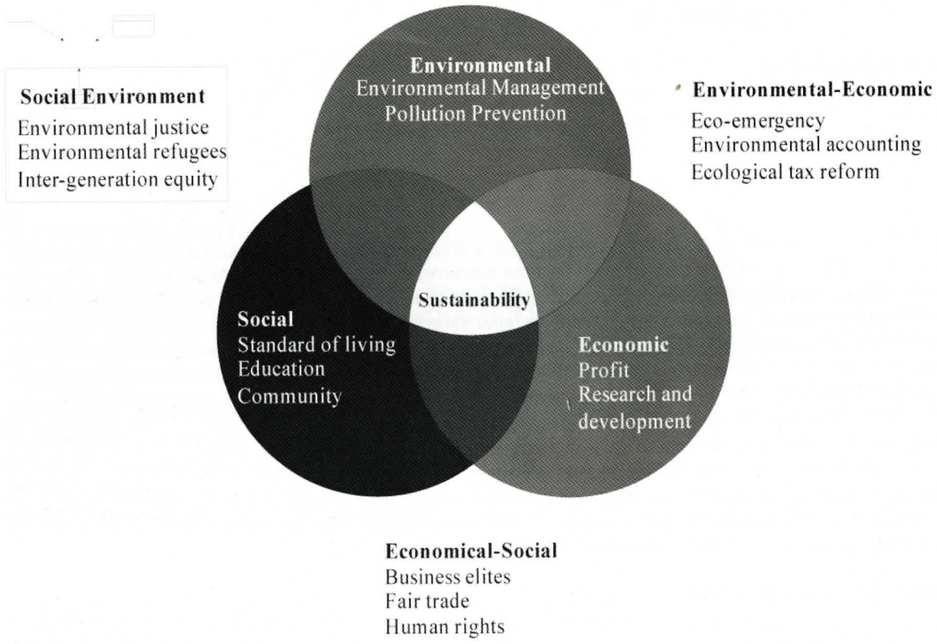


Figure 01: Issues within three spheres of Sustainability (Sustainability, 2002)

1.2 The Concept of Urban Fringe

The term fringe has been subject to a lot of discussions since the beginning of the 20th century. Many terms synonymous to fringe such as urban fringe, rural urban fringe, sub-urban areas, suburbs, urban periphery and more recently extended metropolitan regions (EMRs) have been used in planning literature. Whatever may be the designation, conceptually, fringe is related to the growth of cities that lies immediately outside the designated urbanizable limits and has strong interaction with present city and bears an urban reflection on the physical, occupational and demographic characteristics (Sinha, 1997).

Pryor (1968) distinguished 'urban fringe' from 'rural-urban fringe' by narrating 'urban fringe' as, "... that sub-zone that is in context with a contiguous to the central city. Its density of occupied dwellings is higher than the density of occupied dwellings for 'rural-urban fringe' as a whole. It has high proportion of residential, commercial, industrial and vacant land as distinct from farmland. And it has higher rates of increase in population density, of land use conversion from farm to non-farm and of commuting than does the rural-urban fringe as a whole."

Sinha (1997) classified fringe into two components- rural (outer) and urban (inner). According to his concept, the outer fringe (rural fringe) is more rural than urban areas whereas inner fringe (urban fringe) is more urban than rural and together may be called rural urban fringe. Sinha's concept can be visualized in Figure-2 below.

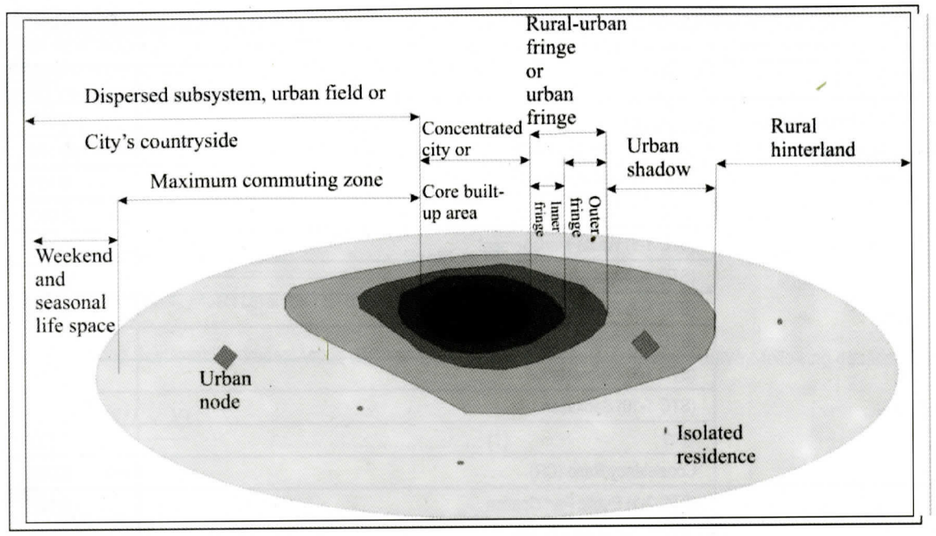


Figure02: The form of the regional city (from Bryant et al. 1982)

1.3 Objectives of the Study

The focus of this study circulated around determining the sustainability of present development trends in the selected fringe areas of Dhaka City, Bangladesh. Through this study it has been attempted to identify policy options that would ensure sustainable fringe area development. This study was also carried out with an objective to develop a mechanism for quick appraisal of sustainability of any development process that can assist in future development-planning activities. In the case study it applied a sustainability appraisal framework based on Multi Criteria Analysis (MCA) and evaluated its applicability in the local context of Bangladesh.

1.4 Methodology of the Study

Various methods and frameworks have been developed worldwide for appraising sustainability of any development activity. But most of these methods need extensive data on the concerned activity, which is very difficult in the context of a developing country. For this reason, after reviewing a significant number of methods and techniques, this study decided that Multi-Criteria Analysis (MCA) would be the feasible technique that can be applied for appraising sustainability at the local context of Bangladesh. MCA is a decision-making tool developed for complex multi-criteria problems that include qualitative and/or quantitative aspects of the problem in the decision-making process (Mendoza and Macoun, 1999). For the present study Linear Additive Model of MCA was applied due to its flexibility, easy interpretation capability and above all minimum data requirement.

For conducting MCA this study has identified 3 Primary Tier Criteria (PTC), namely Environmental, Social and Economical. Under these PTC, 28 Secondary Tier Criteria (STC) have been identified. The Environmental PTC contains 10 STC, the Social PTC contains 9 STC and the Economical PTC has got 9 STC. These PTC and STC are listed in Table-1. Analytical Hierarchy Process (AHP) was applied in this study for weighting the STCs. All of the PTCs were given the value of 1 which was distributed among their STCs in the form of Sustainability Weight (SW) on the basis of AHP (Table 1). AHP is a multi-attribute modeling methodology, which was first developed and applied by Saaty (1980). It is a systematic method for comparing a list of objectives or alternatives. In AHP a pair wise comparison matrix is developed among the objectives/decision criteria which are gradually normalized to get weights of each of the objective/criteria. In this study, the pair wise comparison matrixes were developed by the researchers after extensive visits to the study area. These matrixes were normalized to get Sustainability Weights (SW) of each of the criteria (Table 1). Consistency Ration (CR) of each of the matrix was also calculated to ensure that the consistencies of the pair wise comparisons are within acceptable level. An AHP module developed in Microsoft Excel spreadsheet program was used in this process.

Table 01: Primary Tier Criteria (PTC) and Secondary Tier Criteria (STC) with their Sustainability Weight (SW) generated by AHP

PTC	STC	SW
PTC 1 (Environmental Sustainability)	(STC 1-1) Air Pollution	0.077
	(STC 1-2) Loss of wetland	0.189
	(STC 1-3) Water Pollution	0.109
	(STC 1-4) Noise Pollution	0.053
	(STC 1-5) Waste Management	0.109
	(STC 1-6) Agricultural Productivity	0.116
	(STC 1-7) Fisheries Production	0.077
	(STC 1-8) Ground water extraction	0.051
	(STC 1-9) Deforestation	0.076
	(STC 1-10) Sanitation	0.143
	Total	1.000
	Consistency Ratio (CR)	0.045
PTC 2 (Social Sustainability)	(STC 2-1) Public Participation	0.147
	(STC 2-2) Housing Quality	0.074
	(STC 2-3) Education Facility	0.211
	(STC 2-4) Healthcare Facility	0.134
	(STC 2-5) Access to safe drinking water	0.113
	(STC 2-6) Recreational Facility	0.053
	(STC 2-7) Gender equity	0.149
	(STC 2-8)Public security/ crime	0.053
	(STC 2-9) Disaster Management	0.067
	Total	1.000
	Consistency Ratio (CR)	0.025
PTC 3 (Economic Sustainability)	(STC 3-1) Increase of income	0.131
	(STC 3-2) Employment opportunity	0.173
	(STC 3-3) Increase of property value	0.088
	(STC 3-4) Economic equity	0.254
	(STC 3-5) Development of Industries	0.068
	(STC 3-6) Economic return of agricultural products	0.109
	(STC 3-7) Transport Facility	0.078
	(STC 3-8) Electricity Supply	0.052
	(STC 3-9) Gas Supply	0.046
	Total	1.000
	Consistency Ratio (CR)	0.025

Two sites within the study area were selected for achieving the best result from the analysis. Between these two sites one was in the inner fringe area and the other was in the outer fringe area. Based on the selected PTC and STC a close-ended questionnaire was prepared to identify the perception of the local residents regarding the positive or negative change of these criteria within last 10-15 years in the study area. Two focal group meetings were arranged in the sites in April 2005 comprising local political leaders, representatives from different professional and social groups and peoples who are residing in the study area for more than 10 years. Equitable presence of all income groups and sexes was also ensured. In these focal group discussions the purpose of the study was duly briefed and how the

questionnaire would be filled up was elaborately shown. The meeting attendees were then asked to answer about the level of change of each criterion as shown in Figure-03. 100 questionnaires (50 from each of the focal group discussions) were collected.

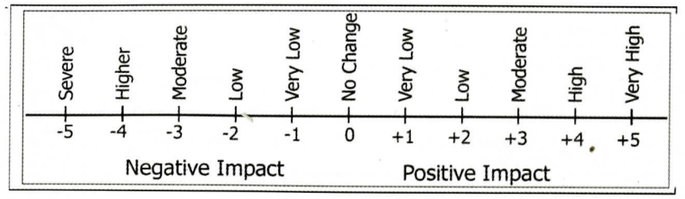


Figure 03: Sustainability Impact Level (SIL) for different STC

For calculating Sustainability Impact Value (SIV) of each of the STC from questionnaire survey, following equation was used:

$$SIV_{ji} = \frac{\sum (SIL \times X)}{\sum X} \quad \text{..... (1)}$$

Here,

SIVji = Sustainability Impact Value of i-th STC of j-th PTC
SIL = Sustainability Impact Level (SIL) assigned by the respondent
X = No. of respondent

After providing SW to all of the STC (by AHP), these SWs were then multiplied by SIVs of the respective STC. In this process the following equation was used to calculate Primary Sustainability Level (PSL) of each of the PTC:

$$PSL_j = \frac{\sum_{j=1,i=1}^{n} (SW_{ji} \times SIV_{ji})}{\sum_{j=1,i=1}^{n} SW_{ji}} \quad \text{..... (2)}$$

Here, PSLj = Primary Sustainability Level of j-th Primary Tier Criteria (PTC)
SW_{ji} = Sustainability Weight of i-th Secondary Tier Criteria (STC) of j-th Primary Tier Criteria (PTC) (here, $SW_{j1}+SW_{j2}+SW_{j3}+\text{---------}+SW_{jn}=1$)
SIVji = Sustainability Impact Value of i-th STC of j-th PTC
(here $-5 \leq SIV_{ji} \leq +5$)

Identified PSL of the three PTC were then calculated to identify Site Sustainability Level (SSL) of each of the sites using the following equation:

$$SSL = \frac{\sum_{j=1}^{n} (PSL_j \times SSV_j)}{\sum_{j=1}^{n} SSV_j} \quad \text{..... (3)}$$

Here, SSL = Site Sustainability Level
PSL_j = Primary Sustainability Level of j-th PTC
SSV_j = Sustainability Significance Value of j-th PTC

Here, Sustainability Significance Value (SSV) for different PTC was applied depending on the relative importance of the PTC on the total sustainability of the area. SSV is an arbitrary value depending on its significance. For this particular study, it was assumed that all the PTCs are equally important for the overall sustainability of the fringe area and hence all the SSVs were equally valued (=1).

In this way SSL1 and SSL2 were calculated for site-1 (inner fringe) and Site-2 (outer fringe) respectively. SSLs were then used to identify Generic Sustainability Level (GSL) of the study area according to following equation:

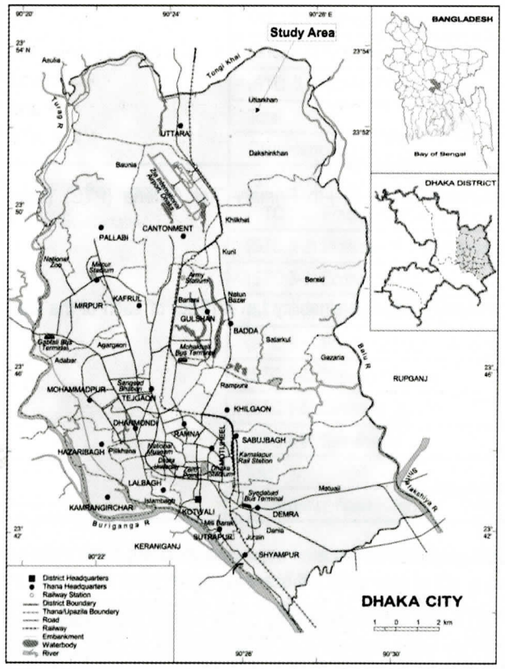
$$GSL = \frac{\sum_{k=1}^{n}(SSL_k \times SSV_k)}{\sum_{k=1}^{n} SSV_k} \quad \text{..... (4)}$$

Here, GSL = Generic Sustainability Level of the study area
SSLk = Site Sustainability Level of k-th site
SSVk = Sustainability Significance Value of k-th site

In this case also, Sustainability Significance Value (SSV) was applied for the two sites based on their relative locational importance on the overall sustainability of fringe area. These SSVs are arbitrary values depending on their significance. In this case, two of the sites were in inner fringe and outer fringe and sustainability of both of these sites were assumed to be equally important for the sustainability of whole fringe area.

2. Description of the study area

The study area is in the northeastern part of Dhaka city that falls to the east of Uttara Model Town. It has an area of about 40 sq.km (Chowdhury et.al., 2001). It is bounded by the Dhaka-Tongi railway line at the west, the Tongi Khal at the north, the Balu River at the east and the eastern fringe of Dhaka at the south. Notable places in the study area are Dakkhinkhan, Uttarkhan, Kachkura, Baparipara, Fayadabad, Chamurkhan, Dobadia, Atipara, Holan, Sonarkhola (Jamun) Borua gram (Langani Para) etc. As an urban fringe, the study area definitely contains less density of population than that of the core part of the city. It had a population of approximately 126,000 in 1990 (Chowdhury et.al., 2001), which increased to about 233,000 in 2001 (BBS, 2001).



Map 1: Location of the study area

The study area has a dynamic pattern of land use, which is changing rapidly with the span of time. It contains not only dense urbanized sites (in its inner fringe) but also rural homesteads and agriculture lands (mostly in its outer fringe). The land use pattern in the study area has undergone extensive changes over time, in response to accelerated economic growth, population pressure and increasing competition between different types of land uses in a limited area. Particularly earth filling and residential development in the study area is occurring due to socio-economic changes, development of roads and other infrastructures by different public agencies, plan for the bypass road cum embankment and functional linkages to the main city. Chowdhury et.al., 2001 classified the land use of the area into 6 major classes that are given in Table-02.

Table 02: Land use distribution of the study area in the year 2000.

Land use Category	Area in sq. Km.	Area in Percent (%)
Built-up area	14.55	35.31
Commercial	.58	1.41
Semi Urban	3.28	7.96
Rural	1.63	3.96
Agriculture	10.60	25.72
Depression	9.41	22.83
Rivers / Khal	1.16	2.81
Total Area	41.21	100

(Source: Chowdhury et.al., 2001)

2.1 Development Trends in the Study Area

This study had identified some key development trends in the study fringe area. These are briefly discussed here:

2.1.1 Filling of wetlands and change of land use

Presently agricultural land and depressions (i.e water bodies) dominates the land use of the study area, but urbanization is progressing very fast. and in this process of urban expansion, filling of low-lying areas is a common trend in this area. Figure-4 below shows the land use change of the area broadly in two categories - 'built-up area' and 'agriculture and water body' between the year 1990 and 2000. It shows that built-up area has increased by about 50% within this time period diminishing the total stock of agricultural land and water bodies.

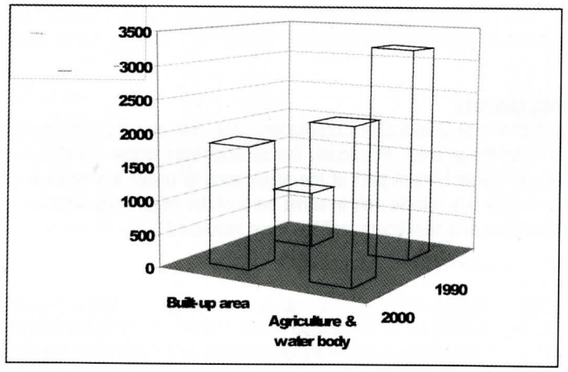


Figure 04: Pattern of land use change between 1990 and 2000 in the study area (Source: Chowdhury et.al., 2001)

2.1.2 Obstruction of natural flow of water

Obstruction of natural flow of water is one of the major causes of severe floods in and around Dhaka city. Recession of water after intense rainfall now requires longer time period due to the continuous shrinkage of natural water flow

In this way SSL1 and SSL2 were calculated for site-1 (inner fringe) and Site-2 (outer fringe) respectively. SSLs were then used to identify Generic Sustainability Level (GSL) of the study area according to following equation:

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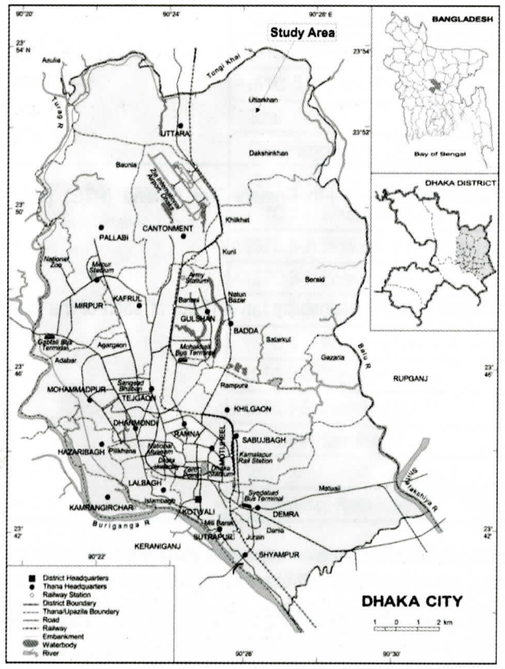

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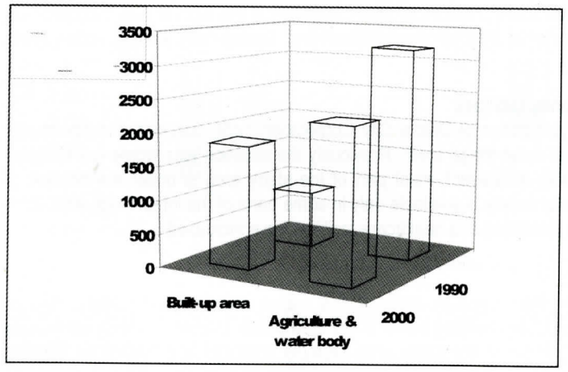

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Obstruction of natural flow of water is one of the major causes of severe floods in and around Dhaka city. Recession of water after intense rainfall now requires longer time period due to the continuous shrinkage of natural water flow

channels both in the inner city and its fringe areas. It was found that both public and private development works are causing obstruction to natural flow of water.

2.1.3 Real Estate Development

Due to its vicinity to the urban core of Dhaka, the study area is a lucrative choice for real estate developers. But for lack of adequate flood free lands, low lands are now being considered as potential sites for real estate development. Housing projects through earth filling of low lands is a common scenario here. Such housing developments pose threats not only to the wetlands within the study area but also to its greenery and natural serenity.

2.1.4 Conversion of agricultural land to other uses

In the process of urban expansion, huge tract of agricultural land within the study area are rapidly being converted to different urban land uses (mostly residential use). Field surveys revealed that the inner fringe of the study area is experiencing this conversion process more rapidly than that of the outer fringe.

2.1.5 Increase of land value

Land value in the study area has rapidly increased within last 10 to 15 years. Table 3 below shows the pattern of land value increase in this area as identified through field visits and personal interviews of local residents. It shows that, in the inner fringe land value has increased significantly than that of the outer fringe.

Table 03: Increasing pattern of land value in the study area

Location	Land Type	Land Value per katha (720 sq. ft.) in taka	
		1990-95	2000-05
Inner Fringe	High Land	200,000-300,000	500,000-1,200,000
	Low agricultural /wetland	50,000-150,000	300,000-450,000
Outer Fringe	High Land	70,000-150,000	300,000-600,000
	Low agricultural /wetland	15,000-40,000	50,000-150,000

Source: Field survey, 2005 and interview of local residents

2.1.6 Increase of transport facility

Road transport facility has significantly increased in the study area within last 10-15 years. Most parts of the inner fringe of the area have got easy access to road transport facility. Non-motorized transport (mostly rickshaw) is the main mode of the transport in this area, although it has some provision of public transport in the form of bus. People of the outer fringe area use both road way and waterway as their communication mean. During rainy season, native boats become the main mode of transport here.

2.1.7 Provision of utility services and community facilities

As most parts of the study area is out of the jurisdiction of Dhaka City Corporation, utility services and community facilities are not so developed here (mostly in its outer fringe area). Previously the situation was worse (as revealed through personal interview of the local residents); at present, most part of the study area is under the network of electricity and gas supply. Provision of piped water supply is available only in some parts of the inner fringe area. With improvement of road transport facility, access to education and healthcare facilities have increased.

2.1.8 Lack of adequate development control

Development control mechanism is very weak for the study area. Although this area is under the jurisdiction of RAJUK (the capital development authority of Dhaka), hardly any building owner of the area bother to obtain building permission from RAJUK. Irregular inspection by RAJUK officials in the study area prompts improper and hazardous building construction (i.e. construction defying zoning regulation and building code).

3.0 Analysis of the Study Result

Using the sustainability appraisal framework described earlier, the sustainability level of the study area was identified. At first the level of sustainability of both inner and outer fringe area was identified in the form of Site Sustainability Level (SSL). Analyzing the Primary Sustainability Level (PSL) of all the PTC, the mostly affected component of sustainability

was identified both in inner and outer fringe area. On the basis of the SSLs, the sustainability position of each of the sites can be identified according to Table 4. This table was also consulted to identify the position of the GSL.

Table 4: Qualitative Statement on Sustainability based on SSL and GSL

SSL/ GSL	Qualitative statement on Sustainability
-5 to -4	Severely Negative state
-4 to -3	Highly Negative State
-3 to -2	Moderately Negative State
-2 to -1	Low Negative State
-1 to 0	Very Low Negative State
0 to 1	Very Low Positive State
1 to 2	Low Positive State
2 to 3	Moderately Positive State
3 to 4	Highly Positive State
4 to 5	Very High Positive State

3.1 Sustainability Level of the Study Area

Figure 05 below shows the Sustainability Impact Value (SIV) of different Secondary Tier Criteria (STC) under the Primary Tier Criteria of Environmental Sustainability (PTC-1). It shows that only STC 1-5 (Waste Management) and STC 1-10 (Sanitation) of both inner and outer fringe are in a positive state of sustainability although with a very low value of SIV. All the other STC of this PTC are in a negatives state where STC 1-2 (Loss of Wetland) is in the worst position, which is followed by STC 1-9 (Deforestation). STC 1-3 (Water Pollution), STC 1-7 (Fisheries Production) and STC 1-8 (Ground Water extraction) are also in highly negative state as can be seen from Figure 5

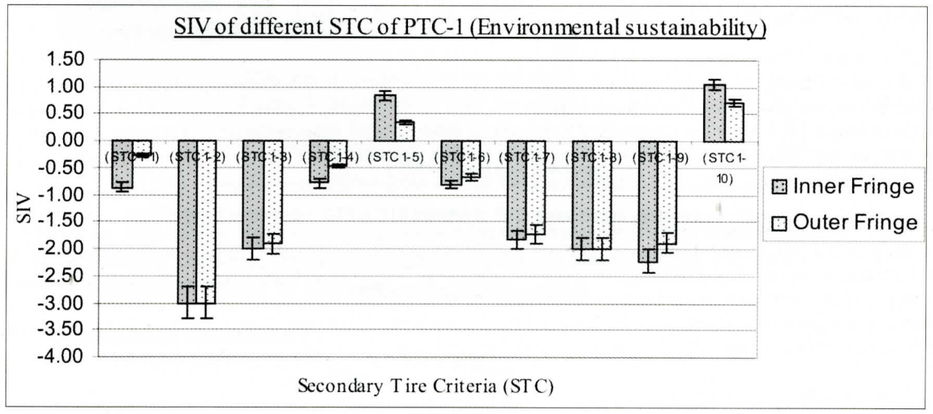

Figure05: Sustainability Impact Value (SIV) of different STC in PTC-1 (Environmental Sustainability)

Figure 6 shows the Sustainability Impact Value (SIV) of different Secondary Tier Criteria (STC) under the Primary Tier Criteria of Social Sustainability (PTC-2). It shows that both inner and outer fringe is in a positive state of sustainability in terms of Public Participation (STC 2-1), Housing Quality (STC 2-2), Education Facility (STC 2-3), Healthcare Facility (STC 2-4), Access to safe drinking water (STC 2-5) and Gender equity (STC 2-7) although all of them contains a low positive value of SIV. In terms of Recreational Facility (STC 2-6), Public security/crime (STC 2-8) and Disaster Management (STC 2-9) both of the sites are in a negative state of sustainability.

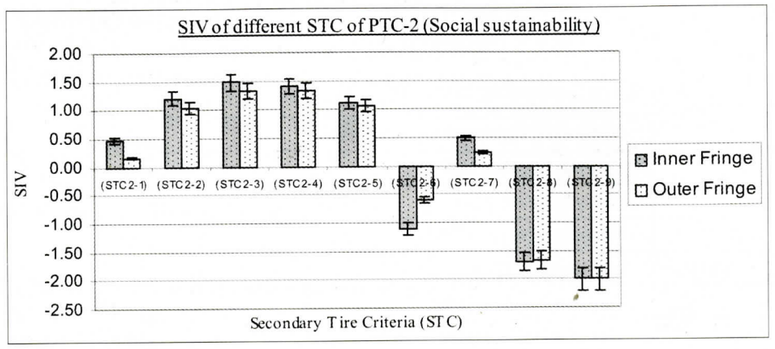

Figure06: Sustainability Impact Value (SIV) of different STC in PTC-2 (Social Sustainability)

Figure 07 shows the Sustainability Impact Value (SIV) of different Secondary Tier Criteria (STC) under the Primary Tier Criteria of Economic Sustainability (PTC-3). It shows that both inner and outer fringe is in a positive state of sustainability in terms of increase in income (STC 3-1), employment opportunity (STC 3-2), value of property (STC 3-3), development of Industries (STC 3-5), economic return of agricultural products (STC 3-6), transport facility (STC 3-7), electricity supply (STC 3-8) and gas supply (STC 3-9) although all of them contains a low positive value of SIV. But, in terms of economic equity (STC 3-4) both of the sites are in a highly negative state of sustainability.

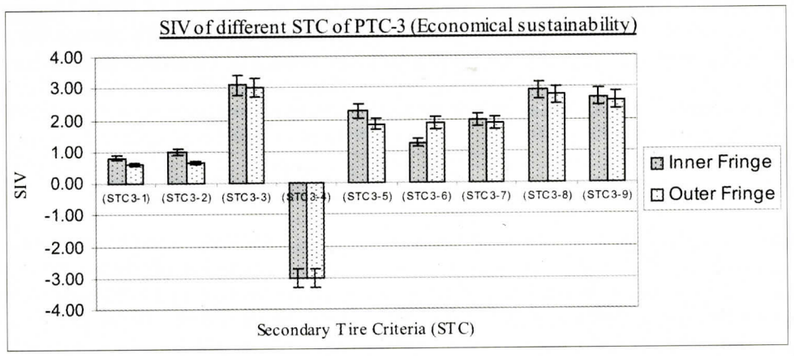

Figure07: Sustainability Impact Value (SIV) of different STC in PTC-3 (Economic Sustainability)

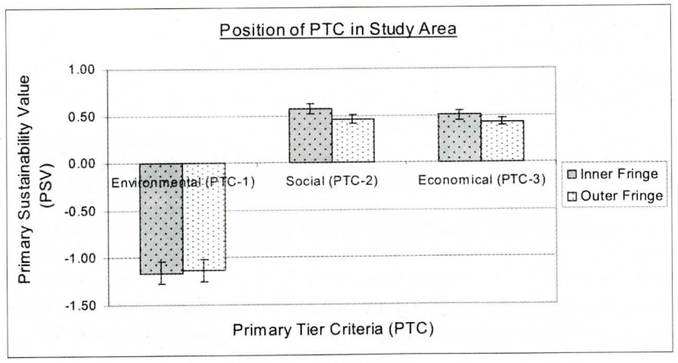

Figure 08: Position of Primary Tier Criteria in the study area

Primary Sustainability Value (PSV) of different PTC was calculated using Sustainability Impact Value (SIV) of their respective STC according to equation (2). Figure 8 shows the relative position of all the Primary Tier Criteria (PTC) in inner and outer fringe of the study area. Although both of these sites are in very low positive state in terms of social and economical sustainability, it is in a significantly negative state of environmental sustainability. For improving overall sustainability of these sites, this issue of environmental sustainability needs to be addressed adequately.

The Site Sustainability Level (SSL) of both inner and outer fringe was calculated using the Primary Sustainability Level (PSL) of all the Primary Tier Criteria (PTC) according to equation (3). It was found that SSL of Site-1 (inner fringe) is 0.026 and Site-2 (outer fringe) is -0.08 which indicate that both the sites are in a 'very low negative state' of sustainable development (according table 4).

Generic Sustainability Level (GSL) of the whole study area was calculated by using the Site Sustainability Level (SSL) of the two sites according to equation (4). It was found that, the study area has a GSL value of '-0.053'. It indicates that the study area is in a 'very low negative state' of sustainability in its development process. It means that, if the development trends of the study area continue in the same manner as it occurred for last 10-15 years, it would proceed further towards an unsustainable situation. For achieving sustainable development in this area, some sensible and planned initiatives need to be taken here. Some recommendations in this regard are discussed in following sections.

4. Proposals for Promoting Sustainability

From the findings of the study results, some proposals are made here that will promote overall sustainability of development trends in the study area.

4.1 Promoting environmental sustainability

For promotion of environmental sustainability adequate focus should be given on following issues:

- Balu river, that flows through the periphery of the study area is highly polluted by the effluents of the industries located in the northern bank of it. This pollution is highly deteriorating the overall environmental condition of the study area. So, pollution control mechanism need to be improved to combat adverse impact of water pollution and air pollution in the study area. It is also necessary for improving overall public health situation in the area.

- Detail Area Planning (DAP) is the tool for implementing the policies set out by the Dhaka Metropolitan Development Plan (DMDP, 1995-2015). But, delay in preparation of DAP has already caused huge damage to the environmental quality of the study area. Unplanned earth filling of wetlands are not only deteriorating the overall environment of the study area but also posing threat to the drainage system of the core urban area. Proper development control measures need to be taken here for discontinuing this trend of filling of wetlands.

- Although the study area have gained some improvement regarding sanitation situation in recent years, its progress is not so satisfactory for advancing towards environmental sustainability. Steps should be taken locally in this regard to improve the sanitation situation of the whole area.

4.2 Promoting social sustainability

For promotion of social sustainability of the area focus should be given on the followings:

- For attaining social sustainability, public participation is one of the vital issues that needs to be addressed sufficiently. Although public participation in development decision making in the study area has increased to some extent (as can be seen through its positive sustainability level), any formal structured public participation process is yet to be developed here due to weak local government system. To promote social sustainability here, strong local body should be formed.

- Although the study area have improved to some extent in recent years in terms of community facilities like education, healthcare etc. it still need to have a lot of progress in this aspect for proceeding towards social sustainability of a satisfactory level.

- Promotion of gender equity is one of the most vital issues for attaining social sustainability. Although in recent years there have been some formidable progresses in this regard in the study area due to extensive government initiatives, still lots need to be done in this regard for attaining social sustainability to a satisfactory level. Awareness programs among the women need to be taken focusing on the issue of women rights for equal opportunity in work place, education, health care and other community facilities.

- The issue of disaster management is getting importance day by day with the increasing affect of climate change. But this issue is yet to be addressed locally at the study area that is facing the adverse affect of flood every year. For this reason, flood-warning system should be improved in the study area with wider participation of local political leaders, CBOs and NGOs.

4.3 Promoting economic sustainability

For promoting economic sustainability of the study area focus should be given on following issues:

- Poverty alleviation is one of the prime concerns for attaining economic sustainability. Although, the process of urban expansion in the study area has brought economic benefit to a significant portion of upper and middle income people (as revealed through positive sustainability level of income and employment opportunity), in some cases the poor have to face the adverse affect of this process (as indicated by the negative sustainability level of economic equity). For this reason, special credit facility for the poor need to be introduced here for enabling them to break the vicious cycle of poverty.

- Promotion of small industries will bring economic benefit to wider section of the community in the study area. For promoting small industries, convenient credit facilities need to be provided to the potential entrepreneurs.

- Although the study area has gained some progress in the sector of transport facility in recent years, still a significant part of it (in the outer fringe) is without adequate road network. Hence, road network need to be improved here with proper consideration of natural flood flow channels and water bodies. Water transport facility through the bounding rivers also needs to be improved to provide the dwellers with cheaper mode of transport.

4.4 Sustainability Appraisal Framework

Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), Socio-economic Impact Assessment (SIA) etc. are the widely used methods for assessing viability of any development plan or proposal in our country. Some economic indicators (i.e. BCR, NPV, IRR etc.) are also widely applied here for appraising any project. Although these methods have the ability to efficiently judge and compare the suitability of any project, they are narrowly focused on some limited issues. For example, EIA and IEE focuses mainly on the environmental issues, while SIA on the socio-economic issues. But, any kind of physical development has some sort of positive or negative impact on the environmental, social and economical aspect of its proposed location which need to be addressed broadly to attain the highest benefit from it. Here comes the issue of sustainability that encompasses all these aspects both at local and global scale. Sustainability appraisal would consider all these aspects of a development proposal with only one mechanism. This study has formulated a framework for appraising sustainability using Multi-Criteria Analysis (MCA). Here focus was given on the data requirement of the framework and time requirement to conduct such kind of sustainability appraisal. Through this case study it was found that this framework can be effectively applied to any on-going or proposed development initiative in the local context of Bangladesh. Lack of adequate data and lack of enough time duration for decision making processes are common phenomena in this country. This framework can be an effective alternative to appraise sustainability in these circumstances. But more research should be conducted on this framework to make it more robust and more versatile that can be applied to different development sectors.

5. Conclusion

Initiated by the Brundtland Commission Report (WCED, 1987), the issue of sustainable development or sustainability is generating wider interest among the scholars and policy makers of both developed and developing countries. This study took the issue of fringe area development for appraising the sustainability of it through its present development trends. It studied the development trends of northeastern fringe area of Dhaka city and identifies its present level of sustainability. It was revealed through the study that, this part of the city is in a negative state of sustainability due to the high negative state of its environmental sustainability situation. Unplanned urban expansion promoted by wide scale of land filling and deforestation is causing the major damages to its environment. Although it experienced a very low level of progress in its social and economical aspects within last 10-15 years, it's rapidly deteriorating

environmental aspects makes its total sustainability level at a negative state. For proceeding towards sustainability in this part of the metropolitan area there need to be taken a lot of improvement programs in its social and economic sector along with adequate development control to improve its environmental condition.

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Berger Awards Programme for Students of Architecture, BUET. 2006-2007 Award Cycle

Berger Awards Programme for Students of Architecture, BUET, was launched in September 2006 for excellence in the field of Architectural education and research, as part of Berger's corporate social responsibility. Berger introduced this programme to promote young Architects, thereby giving them a real life experience and inspiring them to go further. A Memorandum of Understanding (MOU) was signed between Bangladesh University of Engineering & Technology, Dhaka (BUET), and Berger Paints Bangladesh Ltd (BPBL). The Berger Awards Programme for the Students of Architecture of BUET consists of the following awards:

01. Berger Travel Grant for Students of Architecture, BUET
02. Berger Best Portfolio Award for Students of Architecture, BUET
03. Berger Promising Design Award for the Students of Architecture, BUET
04. Berger Best Design Award for Students of Architecture, BUET

According to the MOU between BPBL and BUET the Head of the Department formed a Programme committee to direct and monitor the Programme as a whole. The Committee is comprised of three members from the teachers of the Department of Architecture, BUET. The Departmental BRTC Management Committee selected the Programme Committee for a maximum period of two award cycles.

Dr. K. Shabbir Ahmed, Professor, Department of Architecture, BUET, was the Director of Programme committee for 2006-07-08 Award Cycle along with Ms. Catherine D. Gomes, Assistant Professor, Department of Architecture, BUET as Member secretary and Mr. Mahmudul Anwar Riyaad, Assistant Professor, Department of Architecture, BUET as Member.

To evaluate the submitted projects a Jury Board was selected by the Programme Committee with the consent of the Head of the Department. The Jury was comprised of three members from the teachers of the Department of Architecture, BUET and two external members proposed by BPBL. Three internal members for this award cycle were Dr. Zebun Nasreen Ahmed, Professor, Dept. of Architecture, BUET, Ms. Shamim Ara Hassan, Associate Professor, Dept. of Arch., BUET and Sheikh Ahsanullah Mojumder, Assistant Professor, Dept. of Arch., BUET. The two external members were selected to evaluate the works in the jury board. Mr. A S M Ismail , Chief Architect, Dept. of Architecture, PWD was selected as professional architect having experience of 12 years or more with Abul Barak Alvi, Professor, Institute of Fine Arts, Dhaka University from the field of art and culture other than architecture having experience of 15 years or more in his respective field.

Figure 01: Award ceremony 2007

Berger Travel Grant for Students of Architecture, BUET

The grant tenable in SAARC countries only will be awarded to winning idea submitted individually or in a group that has potentials to give insights on Architecture of Bangladesh through travel and study of broad range of topics-from art to building and settlements. The grant covered the costs of travel, living expenses, food and documentation. The awardees were required to submit a report and a multimedia presentation of the experience/finding. This award values BDT equivalent of 1500USD (Fifteen hundred US dollar) plus cost of Travel Insurance.

On March 12, 2007 Jurors selected three groups in 2006-07 cycle out of 10 groups after an interview with the applicants on their concept of travel and their proposed budget. The five-member jury board unanimously decided to distribute the award money among three groups.

Table 01: List of Travel Grant Award 2006-07 Winners

	Name	Level/Term	Jury Citation
TG-10	Matluba Khan Anindita Das	L 4/T 1 L 4/T 1	The proposal is highly focused and has possibilities. Their presentation was excellent and well prepared. High potential to contribute new knowledge.
TG-08	Saiqa Iqbal Suvro Shovon Chowdhury Bhuiyan A.R.M.Tareque	L 4/T 2 L 4/T 2 L 4/T 2	An interesting way to look at the image of cities and comparing them with Dhaka. The jury feels that the study may be limited to comparing Delhi and Dhaka.
TG-03	Monon-Bin Yunus M.F.A. Quaim Masrur Moin	L 3/T 1 L 3/T 1 L 3/T 1	The proposal has the potential to contribute towards an understanding of vernacular architecture and the local context. The study should however focus on the climatic and energy related issues.

The jury board sat separately on 21 July 2007 and 25 July 2007 to evaluate the entries for the remaining three categories. Each entry was coded without showing their Identity. In this Award cycle 56 projects were submitted by the students of different level and terms according to the award category.

Seventeen participants from level 2 to level 5 participated in the competition for Best Portfolio Award 2006-07. Mohaimeen Islam (Student No. 0501004, level-2/term-1) received the best portfolio award for this cycle. The aspirants were required to submit a portfolio of creative work for the respective award cycle as per prescribed format. This award aims to encourage students to document personal development by compiling all forms of creative work in a presentable manner. This award values Tk 30,000/-.

Table 02: List of Participants

Sl. No	Name of participants	Level/Term
01	Mania Tahsina Taher	4/2
02	Muhtadin Iqbal	5/2
03	Kumar Bishwajit Debnath	2/1
04	Md. Shakhawat Hossain	3/1
05	Tasneem Tariq	3/2
06	Md Robiul Islam	5/2
07	Mohammad Mahfujul Hoque	4/2
08	Bhuiyan A R M Tareque	5/1
09	Md. Yusuf Reza	5/1
10	Mishuk Dutta	2/1
11	Rashed Chowdhury	4/2
12	Mohaimeen Islam	2/1
13	Samina Majumder Tuli	3/2
14	Pratik Nath Emon	3/2
15	Saika Iqbal	5/1
16	Suvro Shovon Chowdhury	5/1
17	Minhaz Bin Gaffar	5/1

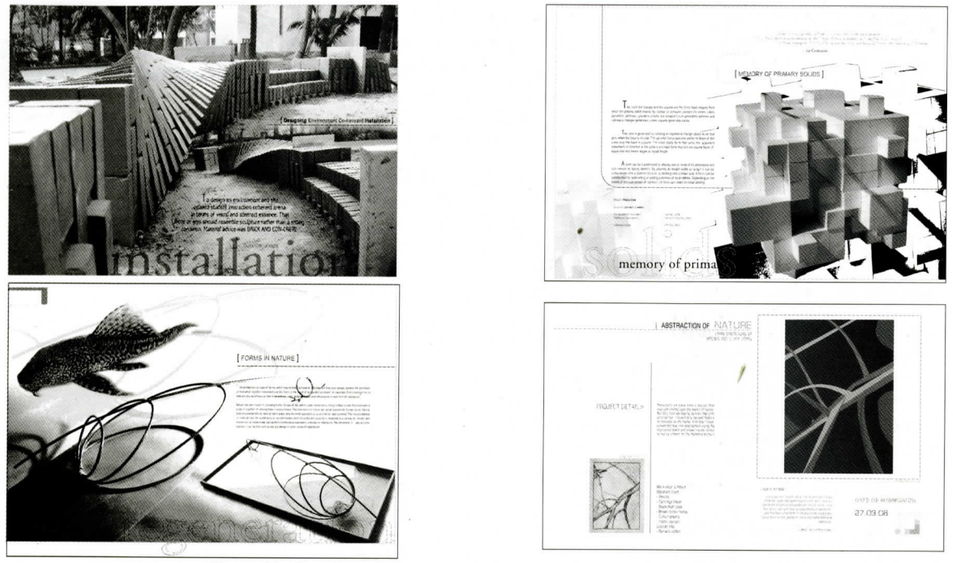

Figure 02: Best Portfolio Award Winner, Mohaimeen Islam.Level-2/Term-1

Eleven participants from Level 2 and level 3 submitted their design works in portfolio format for Berger Promising Designer Award for Students of Architecture. Mohaimeen Islam (Student No. 0501004, level-2/term-1) again received the Promising Designer Award for this cycle with Md. Shakhawat Hossain of Level-3 Term1 as Honorary Mention. The Award aims to highlight and encourage individuals early in their studies with the promise of excellent design capability. This award values Tk 30,000/-.

Table 03: List of Participants

Sl. No	1 Name of participants	Level/Term
01	Md.Tarek Morad	3/1
02	Kumar Bishwajit Debnath	2/1
03	Kashfia Alam Khan	3/1
04	Md. Shakhawat Hossain	3/1
05	Tariq Ahmed	3/1
06	Md. Rubayet Tanvir	3/1
07	Pranab Roy Chowdhury	3/1
08	Tasneem Tariq	3/2
09	A S M Shahedur Rahman	2/1
10	Mohaimeen Islam	2/1
11	Samina Majumder Tuli	3/2

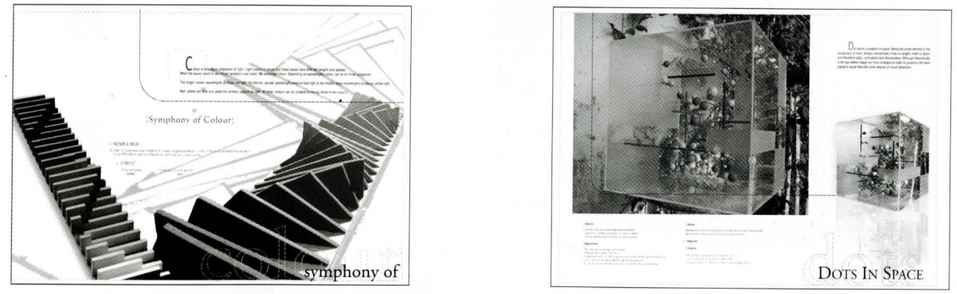

Figure 03: Promising Design Award: Winner Mohaimeen Islam

In Berger Best Design Award for Students of Architecture, BUET, 2006-07, eighteen entries from Level-3 to Level 5 were evaluated by the jury board and from there they selected Apurba Kumar Poddar (Student No. 0001033,L-5/T-2) as the Best Designer. Ms.Dilruba Ferdous Shuvra received Honorary Mention. The Award aims to encourage excellence in architecture by recognizing outstanding design. This award values Tk 30,000/-.

Table 04: List of Participants

Sl.No	1 Name of participants	Level/Term
01	Mania Tahsina Taher	4/2
02	Mohammad Hedayet Hossain	4/1
03	Saiful Hassan Tariq	4/1
04	Samia Sharmin	4/2
05	Sajal Chowdhury	4/2
06	Suraiya Farzana	4/2
07	Tasneem Tariq	3/2
08	Khandaker Ashifuzzaman	4/2
09	Syed Abu Sufian Kuhol	3/2
10	Md.Ashraful Azad	5/2
11	Md Robiul Islam	5/2
12	Monon-Bin-Yunus	3/2
13	Md.Nymul Haque	5/1
14	Suvro Shovon Chowdhury	5/1
15	Ashique Ibne Shahbed	5/1
16	Amreen Shahjahan	5/1
17	Dilruba Ferdous Shuvra	5/2
18	Apurba Kumar Poddar	5/2

Figure 04: Best Design Award - Apurba Kumar Poddar

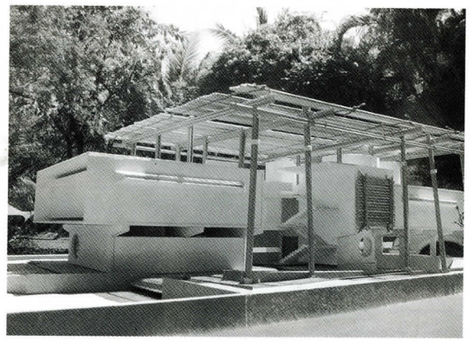

Figure 05: Honorary Mention (Best Design Award) - Dilruba Ferdous Shuvra

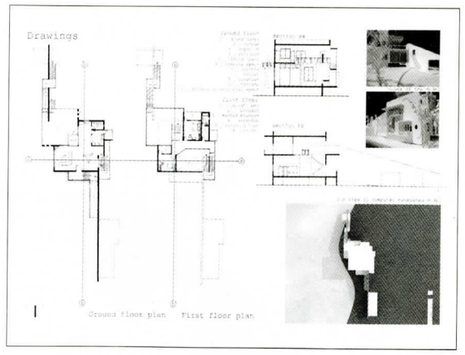

Figure 06: Honorary Mention (Promising Designer Award)- Md. Shakhawat Hossain

The awards were announced in two separate programmes organized by BPBL in BUET Auditorium. On 24 March 2007 the Travel Grant Award was declared by Professor Dr. Nizamuddin Ahmed, the Head of the Department where Professor Dr. A.M.M. Safiullah, the Vice Chancellor of BUET delivered his speech and handed over the cheques to the winners in the inaugural session. A remarkable cultural programme by the Students of architecture BUET followed the ceremony.

Later on May 08, 2008, the grand award giving ceremony took place in the Auditorium of BUET organized by Berger paints Bangladesh Limited. The Vice Chancellor of BUET Professor Dr. A.M.M. Safiullah was the Chief Guest and Managing Director of BPBL Ms. Rupali Chowdhury graced the occasion as special guest. The award giving ceremony ended with a musical programme by eminent band Renaissance.

Compiled by:
Catherine D. Gomes,
Assistant Professor, Department of Architecture, BUET
Member Secretary, Berger Awards Programme Committee

Berger Awards Programme for Students of Architecture, BUET. 2006-2007 Award Cycle.

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Katholieke Universeteit Leuven (KU Leuven) and BUET Academic Exchange Programme

From February 18th to 21st an Academic Exchange programme was organised between Katholieke Universeteit Leuven (KU Leuven) and BUET Academics where Department of Architecture BUET was the host. In this occation Wageningen University, Netherlands also joined. The programme was coordinated by Prof. Dr. Farida Nilufar and Ar. Fahmid Ahmed of BUET. The objective of the programme was to share the views between these three institutes. In the occasion students and teachers got the opportunities to exchange the ideas in the field of Architecture, Urbanism and Planning. One professor and one researcher including thirteen Masters Students from KU Leuven came to join the event which was part of their study trip in Bangladesh. On the other hand one professor including twelve students came to participate in the programme from Landscape Architecture masters programme from Wageningen University of Netherlands. It was an international student group from different part of the world including Europe, Africa, Asia, North and South America.

The fourth and fifth year students of Department of Architecture, BUET were involved in the programme including some teachers. During their stay in Dhaka the foreign students participated in the fourth year design studio works for one day with local student where the students showed their analysis of their urban design studio projects. The programme also included trip to historical city of Dhaka with BUET students, teachers and professional Architects. They had visited different historical sites including Asan Manjil, LalBagh Fort, Khan Mohammad Mridha Mosque, Shakhari Bazar, and Riverfront. The programme included boat ride in the river Buriganga. They also visited National Assembly Building in Sher-e-Bangla Nagar and other modern and historical buildings like Art Institute, Carjon Hall, Dhaka University TSC etc. The group also visited some other urban design interventions like Dhanmondi Lake projects.

The brief programme is given below:

Monday 18 February 2008

1. Introduction to Architecture Education and studio discourse in BUET.
2. Studio Interaction- Urban Design studio process: Case study: Edge of River Buriganga- Dialogue between river and city.
3. Exploration of Views and Ideas in the Studio
4. Dialogue: Visiting teachers and Head, Department of Architecture, BUET.
5. Experiencing Dhaka, Day 01: Dhanmondi Lake, Dhanmondi Residential Area and shopping street.

Tuesday 19 February 2008

1. Experiencing Dhaka, Day 02: Rickshaw ride to old Dhaka and visit historical building.
2. Lecture series, Presentations and Exchange of Ideas: Urban design studio projects of the Department of Architecture BUET.
3. Lecture series, Presentations and Exchange of Ideas: Urban design and Landscape design by visiting professors KU Leuve and Wageningen University.

Wednesday 20 February 2008

1. Experiencing Dhaka, Day 03: National Assembly Building and other buildings and Urban Design Projects in the University campus.
2. Cultural Programme in BUET by the Department of Architecture.

Main focus of the programme was on the lectures, students' presentation and open discussion. The lectures were given by the three visiting scholars Prof. Kelly Shannon, Ward Verbakel and Prof. Joerg Rekittke. Presentation of student works was also delivered by the Teachers and Students of Department of Architecture, BUET.

Figure 01: Trips to historical sites, Buriganga River and Assembly Building

The brief synopses of the lectures are given below:

Landscape Structuring Urbanism
Dr. Kelly Shannon

Landscape Structuring Urbanism attempted to build up a discourse, backed by design interventions, that simultaneously promotes and challenges 'landscape urbanism' as it has been developing over the past decade. Beyond mere recovery of post-industrial sites, landscape has the capacity to requalify urban regions/tissues and to structure new urbanization. The urban park in Nakuru (Kenya) was a powerful tool of negotiation between the Kenya Wildlife Service and the municipality. Previously, the park formed an economically and physically impenetrable edge for locals and city was polluting the park with solid and liquid waste. The strategic project redesigned of the placement of the fence between the city and the safari park expanded the public realm (accommodating social and recreational spaces), restructured the city/nature interface and protected the park from damage to its fragile ecology. The city's backyard was transformed into a front. In Hiep Phuoc (Vietnam) an alternative to the new mega-city port development that is commonplace in Asia was developed. The project was premised a land_structure / infra_scape strategy whereby development works with the logics of the landscape and does not resort to mono-functional landuse. The proposal developed a 3400 port city that co-existed with mangrove expansion and urban programs integrated into the harbor functions. Water purification and open spaces structured a growth scenario that could strategically adapt to the uncertainties in politics and economics. Finally, a studio project of post-gradate students for Mumbai's controversial mill lands and Eastern Dockland revealed the 'agency of mapping' and how the existing logics of landscapes (including its historical layers and ad-hoc daily appropriations) could be reorganized at different scales and connected to new (infra)structures. Specific logics from the 'junkyard' of the city's existing landscapes were stressed and new interventions of 'social infrastructure' with structural capacities were proposed to reformulate reality.

Operative Urbanism
Ward Verbakel

Starting from a historical notion of integrated infrastructural operations in urban conditions, the presentation focused on three design projects located between the disciplines of landscape architecture and urban design. The common approach in each is design as a transformative operation. The design project by PLUS office architects for the Greenway, part of the London Olympics 2012, needed to perform for a short-term intensive event, yet be equally operational for a long period after dealing just with local residents and commuter flows. This double time scale became the code to design a series of operative infrastructures that allowed for natural fluctuations in occupancy of species, users and vegetation. The multiple temporalities designed into the infrastructure enabled them to operate within shifting blends of urbanity and landscape. The Oporto waterfront revitalization project is also seen as an operative intervention, this time operating on multiple scales. The proposed design interventions correspond always to three scale levels and corresponding agendas: a regional sustainable tourism, a metropolitan connectivity including the Douro valley and a local transversal sequence of public space supporting a strong district identity. Finally, the operative design approach is explained with an urban design project in Bonheiden Belgium by "TV Derman Verbakel Architecture - Ward Verbakel Architect". As an alternative to a master plan, the project presented a "design tool-box", a matrix of highly flexible pinpointed interventions of various scales and budgets that can be arranged and modified based on demand. A common denominator of these interventions is the ability to operate always on urbanity and landscape. Each element is designed as a hybrid instrument in which urban and natural dynamics play, operating as a stimulator for its surrounding sites at both levels. Designing urbanism or landscapes from an operative approach is an attempt to rethink two-dimensional logics inherent in zoning and planning within our fields.

XL Landscape Architecture
Prof. Joerg Rekittke

Bringing students of landscape architecture from the Netherlands to Bangladesh means confronting them with circumstances that are not comparable to those of their country of origin. The Netherlands are a nation completely dependent on engineer's solutions, which are complex and extremely expensive. Without all the dykes and water-management constructions, the Netherlands would be almost completely inundated. But this kind of technical approach to landscape and nature is not only a Dutch speciality, it is more or less an European attribute.The lecture shows one of the craziest water management projects of whole history - the plan of lowering the Mediterranean Sea of about 40 meters in order to win land and water energy for "supposed salvation" of Europe and Africa. It was a project of the early nineteen-thirties, conceived by the German engineer Herman Soergel. He was supported by the most famous avant-garde architects at that time, like Mies van der Rohe, Peter Behrens and others. Thank God! The project was not implemented.

We - as landscape architects - are coming to Bangladesh to search for the meaning of "essential landscape architecture". We are not interested in expensive technical solutions; we are interested in the potential of basic landscape architecture in Bangladesh. What we saw so far, was a beautiful country with vital big cities in which the applied fundamentals of landscape architecture could lead to an unspectacular but significant enhancement of urban open space quality and quality of life.

Figure 02: Lecture event

Figure 03: Studio Interaction.

Three BUET students presented their undergraduate thesis projects. All the projects were urban design projects with analysis, synthesis and design. The project brief is given below:

THESIS TITLE: Designing the Threshold between Industry and Habitat
Muhtadin Iqbal

In the recent past, a great interest shown by many private and foreign investors to invest in the industrial sector of Bangladesh .This opened up a great opportunity for the holistic development to establish a long term development pattern through architectural master planning and interventions. There are many common needs and demand of the industry and its host settlement, but they remain a very segregated identity and there remain a huge contrast in the development pattern. The thesis aims to generate a guideline model to predict the spatial quality and physical development pattern of the threshold between housing, industry and rural settlement for a codependent seamless character.

THESIS TITLE: Towards a sustainable urban form for Khulna CBD: considering socio-economic aspects.
Apurba Kumar Podder

There are many development activities held in urban areas. But very little development work reflects the insights of future and long-term strategies. In most situations development activities occurred on ad-hoc basic to solve the problem. As a result, it becomes mono focused and cannot achieved any sustainable conclusion.

Khulna city is an important town of southern region of Bangladesh. The city is known as industrial estate of Bangladesh. Historically she has significant contribution in propagating urbanization in southern area through forming a mega chain of commercial activities. And thus she created a big opportunity of employment for her surrounding remote areas. People, especially those with marginal or without capital came by river and used this area as a platform for their economic development. But after 70's the top down development decisions taken by relevant authority hampers the spontaneity of this process as it lacks significant features of micro level sustainability which in turn affecting the macro level also. Hence the policies hover around theoretically and cannot regenerate the former acceleration in spite of consistent interventions.

Identification of the problem led the Study area to be focused on the Central Business Area as it is the most significant and oldest tissue in the city. And here the newly proposed regular grid by the Authority is being imprinted over the deformed grids neglecting the morphological aspects of this area. Lack of sufficient considerations over the identification of proper target group, high land value, current traffic pattern, historic essence and also the civic facilities needed in context of city is degrading the vitality, though it is guided by the existing major roads (Jessore road), railways and commercial and corporate zones (and a portion of area currently serves as a commercial and transportation hub). So, improper utilization of land stagnant the development growth and in coarse of time could endanger the city's economic activity.

The objective of the research was to achieve a sustainable guidelines for a cohesive physical development for CBD satisfying the relevant and original target groups which will also enhance the vitality of the river and to show that a 'development' could be made with the participation of poor also rather than devoid them from the economic process.

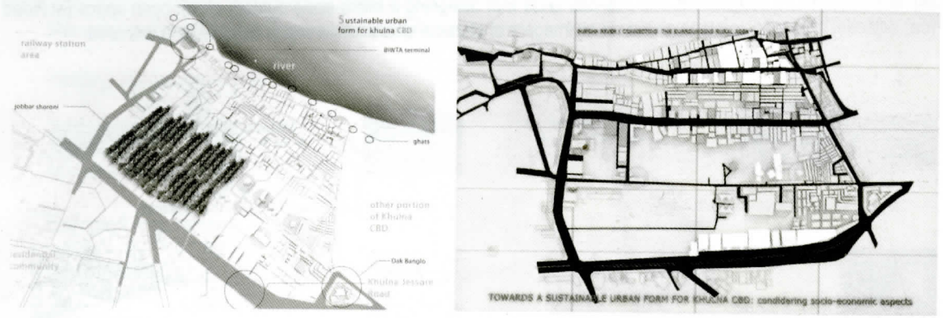

Figure 04: Sites and Design of student projects

Thesis Tile: TOWARDS A CHILD FRIENDLY URBAN LIVING ENVIRONMENT: A proposal for Dhanmondi Residential Area
Md. Rashed Bhuyan

Over the past decade Child Friendly City (CFC) initiative has been developed throughout the world to make the cities more livable and friendly to its children and also to the future child to come. To ensure such objective Convention on the rights of the child (CRC), formulated in 1990 by UNICEF, provides a common framework for action regarding children in the cities or urban context. This paper tries to interpret some selected articles of CRC in terms of physical environment.

Children from middle and upper middle income group, living primarily in the recently grown apartment complexes are deprived of quality contact with nature, safe mobility, autonomy and their capacity to explore their surrounding. It is an irony that the poorer children can enjoy these benefits more than the well of though they 'enjoy in an unhealthy and unsafe environment' (Marco Corsi, 2002). This study deals mainly with the children of middle and upper-middle income group (aged between 2-11 years) and their surrounding physical environment in Dhanmondi Residential Area, the first planned residential area in Dhaka.

Dhanmondi Residential Area was developed as a low density (almost 10 person per acre) high income residential area during 1950s. During the last three decade the area experienced a rapid change in density, land use, building types, traffic pattern etc. Such phenomena had their major repercussions on children.

This thesis tries to understand the issue of child friendliness in terms of physical environment based on some selected CRC guidelines. By studying the open space structure of Dhanmondi R/A area, some actionable ideas and respective

alternative patterns are suggested. As part of the analysis, visual survey of the study area, questionnaire survey in a selected sample area, configurationally analysis with 'space syntax' and building typology based on present by law are studied. At the end, a redesign alternative pattern is proposed for the area to create locality or sense of place. Along with other supportive suggestions this exercise ends with designing a micro scale outdoor green open space (at Road 10a) adjacent to dwelling plots to give a visual imagery of physical environment that is actionable in this area.

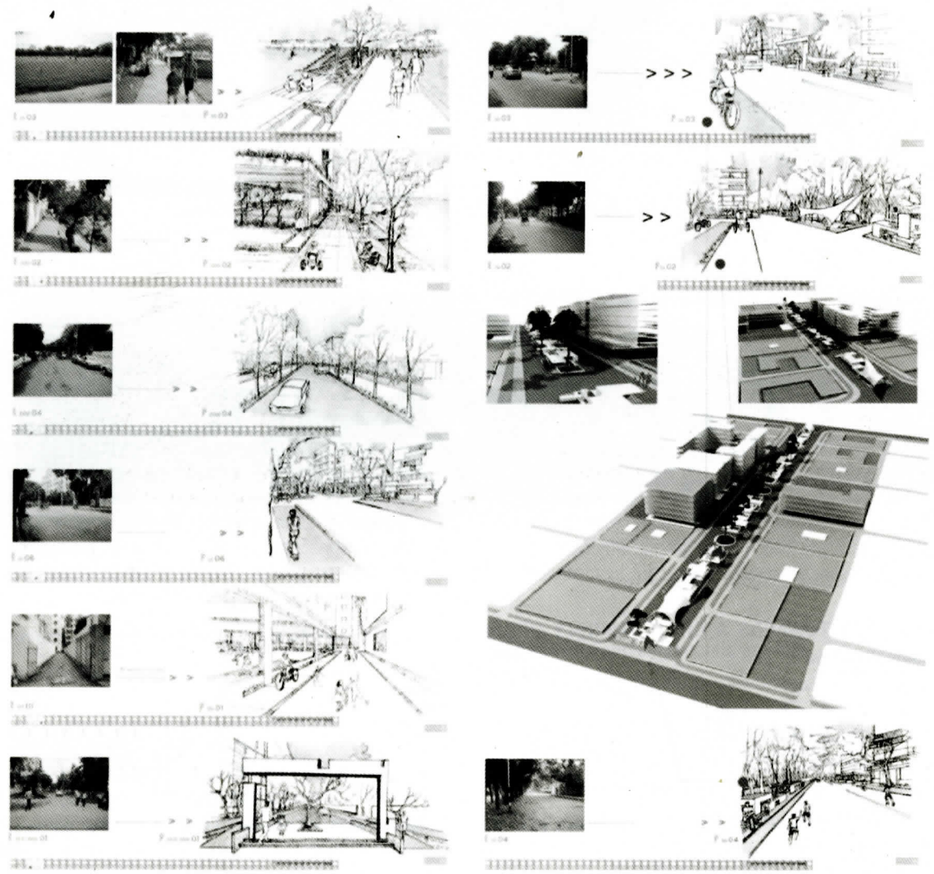

Figure 05: Sites and Design of student projects

Compiled by
Fahmid Ahmad
Lecturer, Department of Architecture, BUET.

General Instruction for paper submission

Generally papers should not exceed 3000 words including references, however primary research papers may contain a maximum of 5000 words. Short contributions of 1500 words may also be sent.

All contributions should indicate 4/5 keywords and have an Abstract of less than 200 words.

Manuscripts should be submitted on one side of A4 size paper.

Heading 14 Arial narrow bold

Sub Heading 11 Arial narrow bold

Body text 10 Arial narrow

End note 9 Arial narrow

Double-spaced and leaving 1.2 inch margin space on all sides of the paper.

Referencing should preferably follow the Harvard system (Author's surname, followed by publication year in the main text; Bibliography in alphabetic order compiled at the end of the paper). Endnotes can be given if desired by putting reference number in the text in 9 point (Arial Narrow) superscript [1].

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Editor, Protibesh
Department of Architecture
Bangladesh University of Engineering and Technology
Dhaka-1000, Bangladesh.
Fax: +880 2 8613046
E-mail: protibesh@arch.buet.ac.bd
Web site: www.buet.ac.bd\arch

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