

Environmentally Qualitative Assessment of Dhaka's Urban Space and its Quantitative Parameters

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Abstract:

The eco-design is designing the built-environment as a system considering the ecological footprint of the area. The outlook on urban quality is changing nowadays, as a part of general shift in cultural values. The need for change is primarily a result of the continuous process of intensification of land use. Openness has become an important issue in Dhaka today. The purpose of this paper is to assess qualitative parameters of dynamics of the urban spaces and its environmental degradation. The study identified the causes of deteriorating urban environment at Dhaka and over all other cities of Bangladesh to that of the lack of public awareness towards their life style and pattern of living. The buildings, concrete surfaces, vehicles and industrial activity of urban areas of Bangladesh have caused cities to maintain higher temperatures than their surrounding countryside. Globalization has given us the freedom to adapt to newer possibilities. When it comes to the Global options of materials and techniques of Constructions we need to make our approach more scientific, respecting to the law of nature through its ecological context in this age of accelerated degradation. Increasingly one is realizing that architectural processes and planning practices have ecological consequences that significantly degrade the environment. In a sustainable development perspective, we must address the quality and sustainability of our use of natural resources and ecosystems, threats of global change, and the impact of production and use of energy, which is essential to our economies and to our way of life, and also centrally important in environmental problems. Their depletion systematically undermines the well being of people. Livelihoods disappear, resource conflicts emerge, land becomes barren, and resources become increasingly costly or unavailable. This depletion is exacerbated by

the growth in human population as well as by changing lifestyles that are placing more demand on natural resources. As cities grow ever more densely developed, so the remaining green spaces grow ever more important for the well being of the cities' inhabitants and it is believed that Bangladesh being in the tropical area is better placed to tap the ecological resources in their built environment design.

Key Words: *Built Environment, Ecosystem, Eco Design, Ecology, Open Space, Globalization.*

1. Quantitative indicator of open space situation:

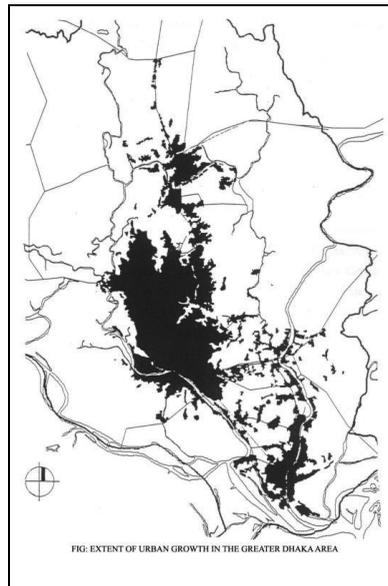


Fig 1: Extent of Urban Growth in the Greater Dhaka Area.
Source: Tareq, M. (1997)

The natural features, lush green spaces and water bodies surrounding the habitations that once made James Taylor write after his visit of 1824, "Dhaka looks like the Venice of the orient", are no longer there. While comparing Dhaka and Calcutta cities, Prof. N. Islam wrote, "Calcutta has more parks, open spaces, trees and these are better maintained. Most of its ponds and other water bodies are also better

kept". Lack of consciousness and initiative in terms of ecology, environment and socio-cultural aspects by both public and private sectors has given rise to:

- Rapid decline of open spaces and water bodies
- Speeding up of inaccessibility to the open spaces and water bodies.

Over the last 30 years or so the open spaces of Dhaka are fast diminishing. If the present trend continues, of the numbered parks, little open spaces, few trees, ponds and water bodies nothing will be left in Dhaka city. Though the banks of the Buriganga River are heavily built up and devoid of green spaces and most of its tributaries are filled up or encroached by illegal structures, it still has profound impact on the citizens of Dhaka.

2. An Urban Ecology checklist of Dhaka:

Dhaka is now a mega city of over 20 million people. The average growth rate has decreased from 7% to 2% but the urbanization rate has exceeded 6%. In the past the city was clean, the air was fresh to breathe, less traffic and the river was the main way to transport and lifeline for attraction. The city area has accommodated a number of administrative, educational and commercial activities resulting in environmental degradation. We have number of attributes to check the ecological fitness of the Dhaka area, which we may call an urban ecology checklist.

2.1 Air Quality at Dhaka Area:

"...the air in the city is different in that it carries a heavy load of solid, liquid and gaseous contaminants." (Lowry, 1971). An eco-city would reduce that load to as near zero as possible. Extensive use of vegetation is an integral part of the urban fabric that would ensure that dust and pollutants were filtered out. There would not be a 'heat island' and its net effect on the climate would no longer be disruptive.

The key factors that affect the air quality are the following in order of overall significance:

- Transport pollutants (NO_x, Co, CO₂, VOC_s)
- Power generation from fossil fuels (cause of urban smoke)
- Chimneys discharge (housing, factories, incinerators)
- Mining, chemical and metallic industrial activities

- Waste disposal pumps
- Airborne dust raised by wind
- Building operation dust and dirt
- Agriculture, animal and food production (allergens)

Air pollution is now a common complaint in Dhaka City. Mostly the exhaust from the vehicles plying on the city streets is responsible for air pollution. Black smoke coming out from the discharge is intolerable to breathe. It burns eyes and throat. The city dwellers are being slow poisoned by lead concentration in the city air- ten times higher than the government safety limit. Air, is an integral part of the physical environment of open space that help sustain life of both plant and animal kingdoms including human beings.. A huge mass of motorize vehicles move along the roads every day. Petrol, diesel, octane etc, the motor fuel produce a huge amount of harmful gases and Suspended Particulate Matters (SPM). The Department of Environment (DoE) report shows that the total load of SPM and harmful gases (CO, HC, NO_x, SO_x) in the Dhaka Area air is high, however there is a diminishing vegetation effect on these pollutants. The highest acceptable level of Sulphur dioxide (SO₂) is 60 microgram per cubic meter of air. But it has been recorded at 300 to 500 microgram in Dhaka. Bangladesh Atomic Energy Commission reports that automobiles in Dhaka emit 100 kg lead, 3.5 tons SPM, 1.5 tons Sulphur dioxide, 14 tons hydrocarbon and 60 tons carbon monoxide a day. Sample studies show that it is lower near vegetated areas.

The level of CO₂ absorption by plants relates to the rate of woody growth. Table-1 below shows the absorption per square meter planted area. Such data could be used to determine the approximate amount planting required to absorb certain amount of CO₂, with an aim to ensure sustainability of the development (i.e. CO₂ emission equals CO₂ absorption).

Most of the trees in open areas in Dhaka city are medium and small in size - small trees are higher in quantity than medium trees. So CO₂ absorption level by small and medium trees in open spaces varies from 04 - 1.4 kg/m²/year.

2.2 Water (Water Body) Quality at Dhaka Area:

An eco-city would neither pollute nor waste its water and would purify and recycle and supply

it back to nature. Dhaka is surrounded by a river system, these surface water sources around Dhaka directly or indirectly receive a large quantity of waste from the city. The river Buriganga flows by the side of the densely populated area of the old city. Dumping of waste to the river by the members of public owners of the industries is rather indiscriminate.



Fig 2: Lake water is polluted by the washer men.

Dhaka's lakes are not at better state of affairs. Innumerable municipal drains carrying sewage and sullage find their way into the water bodies in and around Dhaka city. The indiscriminate discharge of domestic sewage, industrial effluents, open dumping of solid wastes are becoming a great concern from the point of water-environment degradation.

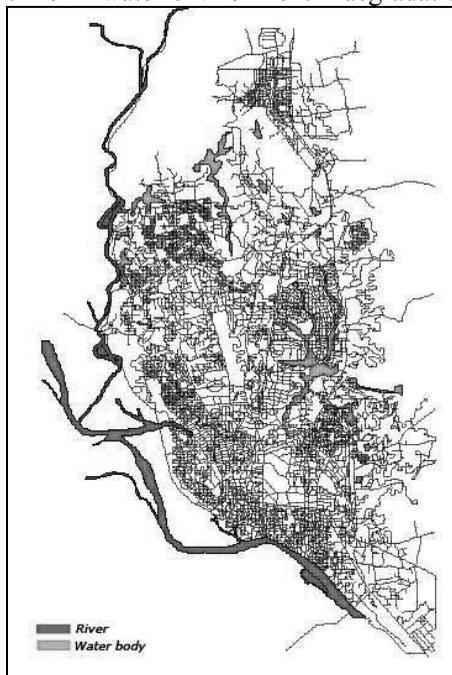


Fig 3: Map of Dhaka's Water body.

Rainfall induced flooding and water logging due to poor drainage system is a common

phenomenon in Dhaka City. Unplanned growth, indiscriminate filling of low-lying areas, unwise closer of natural drainage and navigational canals, unauthorized encroachment by squatter settlements aggravate the worse situation of flooding and water logging in Dhaka City.

In Dhaka we find very beautiful lakes but most of those were encroached. People ply boats, take bath, and wash in those lakes and the water is polluted by man himself. The different types of waste material like plastic bottles, poly bags, papers are found floating in the lake water. The fish and aqua warm cannot sustain because the use of the soap and detergent when people take bathing and washing. For a sustainable lake, environment species of food chain and various trophic levels need careful considerations. Ipil- Ipil, Water Lily, and Lotus are aquatic species of plants that may be recommended in lake, because these plants have extensive root system with rapid growth and a very good capacity for nutrient absorption. This will protect the lake from entrophication. Besides this Ipil-Ipil is a good fish feed. Among the fish varieties, Ruhi, Silver Curp, Grass Crup eats upper level food and purifies water. Sarputy and Rajputy are environment friendly species because they eat wastage in water like rotten leaves, insects and organic materials.

2.3 Soil Condition at Dhaka Area:

An eco-city would require a sustainable agricultural or plantation system as part of its planning and function. The Bangladesh Government after independence, decided to plant open spaces in Dhaka with deep vegetation. Government organizations took the initiative to plant saplings of alien plants, which would not grow naturally. For the growth of these saplings they used different types of chemical fertilizers and created a bad impact on the soil. Here we also found that no grass grew under the shaded tree like Bakul tree (it's a natural process). Alien trees have a bad impact on the soil and the environment, which does not support local flora and fauna for the ecological cycle.

2.4 Fire (Energy) Produce at Dhaka Area:

Field surveys show that, in Dhaka about 50% of the energy use and CO₂ emissions are associated with transport, about 25% with building and another 25% with different

activities. An effective strategy for clean air is to minimize energy consumption in these three areas. Pollution resistant plants may also be grown to tackle the problem. The buildings in the area may also adopt ecological means. Energy is an aspect that links a wide range of human and design considerations:

- Pollution (global, regional and global)
- Sun (solar gains, over shadowing, and power generation)
- Wind (natural ventilation, turbulence and power generation)
- Day Light (minimizing artificial light, visual comfort)
- Comfort (overheating, passive control)
- Health (pollution, toxins, sick building syndrome)

The temperature reduction capabilities of a single medium size tree by evapotranspiration are found to reduce shaded area temperature by 2degC to 3 degC. The latent heat transfer from wet grass can result in 6-8 degC cooler surfaces than exposed soft surface (Enam, 1994).

Each of these aspects plays a role in determining the overall quality of the urban environment. Energy use is thus an issue that will be discuss often in the context of urban planning issues. In Dhaka a huge stock of energy is needed for the administrative, commercial, recreational and educational purposes.. At night the total Dhaka area needs heavy watts per day. To The local inhabitants, commercial kitchens, office kitchens etc consume huge amount of natural gas. Road transport accounts for the largest fraction of transport energy use.

2.5 Biomass Situation at Dhaka Area:

Historically, the sum total of living matter or biomass in a region is drastically reduced when human setup an urban centre there. Biomass is defined as the weight of a species population per unit area and the concept was first developed in 1937 by Walter Pickles and obviously bio-mass can be determined for each link of a food chain or for each stratum of a community. The amount of living material expressed in terms of numbers per unit area present in the ecosystems or a trophic level at any given time is called the standing crop, which is often measured in terms of dry

weight, and this standing crop is called biomass. When numbers of animals and bio-

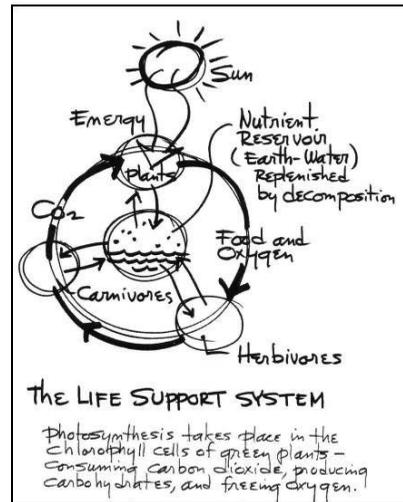


Fig 4: The life support system

mass or rates of animals per unit area are discussed, the production potentials of a given area or volume of a given habitat becomes important. From analytical studies, it was found that production efficiency decline rapidly from lower to higher trophic levels in the pyramids of numbers. The environment is disturbed and many species are lost, still it is better than any other areas in Dhaka. A number of Species of birds, animals, reptiles, trees and shrubs in Dhaka were lost forever.

2.6 Food Compilation at Dhaka Area:

An eco-city would make the maximum possible use of opportunities to grow food plants within its normal boundaries. Thus streets would have the minimum amount of hard paved surfaces. Street trees and plants would be chosen for their productive potentials as well as their aesthetics. Fruit trees might line the streets. Buildings would incorporate greenhouses and hydroponics as a matter of course. It is not impossible to imagine a city, which was an exporter of food. Dhaka's soil is suitable for different types of fruit trees.

During the field survey in Dhaka area many fruit bearing trees were found. By planting various types of fruit bearing trees in this site we can easily meet up fruit crisis of the city people besides creating a food chain supporting other flora and fauna of the area.

2.7 Biodiversity Position at Dhaka Area:

The Convention on Biological Diversity is one of the outcomes of the UNCED or the EARTH SUMMIT held in RIO DE JANEIRO in 1992. Major commitments of the contracting parties to the convention included its implementation through the preparation of respective National Biodiversity Strategy and Action Plans (NBSAPs). Many of our neighbouring countries have already prepared it; many are implementing their NABSPs and many have even gone for its revision based on feedbacks so far. Bangladesh supports a sizeable wealth of biodiversity, including some 113 species of mammals, 628 species of birds, 126 species of reptiles, 22 species of amphibians, 708 species of fresh water and marine fish, 400 species of mollusks, and over 5000 species of vascular plants (source: IUCN, UNDP, GEF).

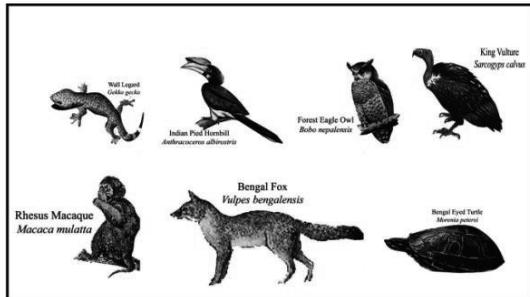


Fig 5: A number of Species of birds, animals, reptiles, trees and shrubs were lost forever from Dhaka city Area

2.8 Habitat Formulation at Dhaka Area:

An eco-city would be planned and evolved to create diverse habitats and relate its activities to the global web of life. A broad range of habitat types are found in Bangladesh, including

- Tropical evergreen forests
- Moist deciduous forests (Sal Forests)
- Mangrove forests
- Riparian and coastal wetlands
- The littoral and sub littoral
- Benthic communities of Indian Ocean

Over 50% of Bangladesh can be classified as wetlands. Bangladesh supports the largest remaining mangrove forest in the world, the Sundarbans. Here in Dhaka we find large and small trees and plants and huge lakes considered as the habitat of many different species of organisms. For the restoration and revitalization of the plantation and lake, it needs to take care that no linkage of surface drainage discharging storm water into the lake

nor any alien trees are planted. Otherwise we cannot ensure the sustainable habitat for the organisms in lake water and park around.

2.9 Eco-links Interact at Dhaka Area:

This clearly relates to the above points. ‘Eco-links’ is a term refers to the condition where ecological region is linked to another. Dhaka is an urban area, giving rise to an island effect in terms of ecology. An animals and seeds and severs functional ecosystem linkages. Even the parks and the open spaces are also bisected by wide roads, affecting its eco-life. An eco-city would be planned in relation to its entire region (and beyond) within an inviolable network of ‘ecological corridors’. Such corridors need to be introduced into the planned redevelopment of existing cities.

2.10 Waste Produce at Dhaka Area:

There is no such thing as waste in nature. People move all day long in Dhaka and produce waste like poly bags, packets of dry foods, plastic bottles, papers etc. The dropped leaves of trees are collected by the lower income group of the society for cooking foods by burning the dry leaves.

The pollution may be considered as any act, which defiles the earth matrix, the air, the soils, or the water supply and thus disrupts the fragile balance of life.

3. Summary:

The climate of the Dhaka area is characterized as mild Tropical with hot humid features. Wind velocities are high during wet season. Studies have shown that urban parks and green areas in cities can create a cool island, the intensity of which depends on the type and quality of the vegetation. Urban Parks with high and wide canopy trees have the maximum cooling effect during the hottest hours of the day and have a positive effect on human climatic comfort. An eco society is considered to be a society that cares for sunlight, air, water, land, greenery and other natural blessings, energy and generation of waste, which endeavors to return to natural cycle. The waste that is ultimately discarded after treatment minimizes the burden on the environment (Mowla, 2005b). This statement provides the checklist for qualitative assessment of Dhaka’s ecosystem. Trees grouped together create a refreshing park or oasis in a city and also cools nearby

neighborhoods. Grouped trees can protect each other from sun and wind, making them more likely to grow to maturity and live longer. In a nutshell, the eco-design is designing the built environment as a system within the natural environment. The outlook on urban quality is changing nowadays, as a part of general shift in cultural values. The need for change is primarily a result of the continuous process of intensification of land use. Openness has become an important issue in Dhaka today. The purpose of this paper is to present techniques that enable the designer to understand the settlement pattern of the built environment at the urban area of Dhaka.

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