Proceedings

Seminar on Sustainable Development of Bangladesh: Balancing Industrialisation, Urbanisation and Green Environment

Organized by
National Defence Course 2016
on 29 June 2016

NATIONAL DEFENCE COLLEGE BANGLADESH

National Defence College, Bangladesh

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NATIONAL DEFENCE COURSE - 2016
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Foreword

Sustainable development is conceived to be anchored on three pillars, which are to evolve concomitantly on sustainable factors, namely, economic, social and environmental; and to be centred on the human being, implying that the process of sustainable development is necessarily inclusive and should promote unity in cultural and other forms of diversity. But it is essential, in the context of establishing this unity, that diverse cultures, interests and wishes, particularly of the downtrodden and disadvantaged groups, are facilitated to flourish and find proper expressions in appropriate forms.

Such a process conducted within a broad framework under provision of the Constitution of the country should help all groups, the majority and the minorities, to understand each other's points of view and needs and find common grounds to work together for an all- inclusive, equitable social progress. Sustainable development also invokes intra- and inter-generational equity, i.e. equity among and within nations at the present time and the management of natural and other resources such that while the present generation meets its needs, the future generations can meet theirs too.

Bangladesh has achieved noteworthy successes in respect of all the three pillars of sustainable development, but much more needs to be done in relation to constructing a pathway for sustainable and accelerated development for the country.

It gives me much pleasure to pen this foreword for the seminar paper "Sustainable Development of Bangladesh: Balancing Industrialisation, Urbanisation and Green Environment". I congratulate all the course members who have contributed to this paper and Editorial Board as well for their effort towards publishing this paper. May Allah bless us all in our smooth journey ahead.

Lt Gen Chowdhury Hasan Sarwardy, BB, SBP, BSP, ndc, psc
Commandant
National Defence College

Editorial

A defiition of sustainable development can be: to meet the basic needs of people today without ruining the chances of future generations to do the same.

Development can occur when economies are strong and can provide for all the people in a country. In Bangladesh, where so many people are presently living in poverty, we need economic growth before our economy will be able to provide suffiient resources to overcome poverty.

Economic growth also has to be greater than population growth otherwise more and more people will form part of the poor. In the greater global environment there is a serious concern whether economic growth all over the world is sustainable. The main concern is around environmental issues. As more and more people populate the planet they consume more food and use up more of the earth's natural resources. Economies have to grow to look after the increasing numbers of people and economic growth is very often at the cost of environmental protection.

I personally believe that this paper will provide us with the invaluable means to share our thoughts with others and evoke some insights in the readers. I sincerely thank all for their valuable contributions and painstaking effort in order to publish this paper.

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Overview of the Seminar

Every year National Defence College (NDC) conducts a year long National Defence Course where members from defence services (Brigadier General/ Equivalent) of home and allied countries, Bangladesh Police, Civil Services (Joint Secretary/Equivalent) are trained on national security and development issues. As part of the course curriculum, Course Members undertake number of seminars and other individual and group research works.

The seminar on "Sustainable Development of Bangladesh- Balancing Industrialization, Urbanization and Green Environment" was held at NDC lecture hall on 23 and 29 June 2016 as part of the course curriculum of National Defence (ND) Course-2016. The seminars were participated by four groups of Course Members of ND Course 2016. On 23 June 2016, all groups presented their keynote papers on four different sub themes namely:

- Industrialisation in Bangladesh-benefits and costs
- Environmental costs of unplanned urbanization
- The state of environmental governance in Bangladesh
- Sustainable Development-strategy for green industrialisation and urbanisation in Bangladesh

Critique groups provided their comments and suggestions to the respective groups. Based on the presentations a new group (Group X) was formed with the Course Members to prepare a comprehensive seminar paper considering the keynote papers, comments and suggestions obtained during the seminar. Accordingly the Group X prepared the final seminar paper and presented it on 29 June 2016.

The subject of the seminar was very pertinent to the contemporary issues in regards to the development of Bangladesh. It was organized on broad theme and many issues have been elaborately addressed in the seminar. Some new ideas and thoughts came up during the discussion that needs separate research for further development of paper. In the process of the seminar, it was conclusive that sustainable development plays a pivotal role for the development of the country. At the end of the presentation there was an interactive session where Commandant NDC, Resource Persons, Faculty, Sponsor Senior Directing Staffs and all Course Members of National Defence Course 2016 participated and contributed.

Industrialization in Bangladesh- Benefits and Costs

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Industrialization in Bangladesh- Benefits and Costs

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KEYNOTE PAPER OF GROUP-A

INDUSTRIALIZATION IN BANGLADESH- BENEFITS AND COSTS

Introduction

The primary purpose of any government is the security and welfare of its citizens. To achieve this, nations set targets and embark on policies as well as programmes aimed at ensuring sustainable development. Lessons learnt from developed and developing countries indicates that security is crucial to the development of any nation. Robert McNamara, a former United States Secretary of Defence, buttressed this interconnection between security and development with the assertion that, "security is not military hardware, though it may include it. Security is not military force, though it may involve it. Security is not traditional military activity, though it may encompass it. Security is development and without development there can be no security".

Sustainable development is conceived to be anchored on 3 pillars, which are to evolve concurrently on sustainable factors, namely economic, social and environmental; Sustainable development also involve intra-and inter-generational equity, example equity among and within nations at the present time and management of natural and other resources such that while the present generation meets its needs, the future generations can meet theirs too. Article 18A: "Protection and improvement of Environment and Biodiversity, in the constitution of the Peoples Republic of Bangladesh states that, "The state shall endeavour to protect and improve the environment and to preserve and safe-guard the natural resources, biodiversity, wetlands, forest and wildlife for the present and future citizens". The pursuit of sustainable development is therefore a constitutional obligation for Bangladesh.

Bangladesh is a disaster- prone country due to its hydrological and geo-morphological realities, its location at the bottom of 3 major river systems- the Ganges, the Brahmaputra and the Meghna and being bound on the south by the Bay of Bengal makes the country very vulnerable to these natural disasters. Giving the evolving climate change, the country has begun to be visited by

extreme climatic events more frequently. These climatic events cause adverse socio-economic consequences for the affected people and therefore a major concern for national socio-economic progress. For example mega cyclone Sidr in 2007 and Aila in 2009 have caused huge losses and damages affecting a large number of people and consumed significant budgetary resources in relief and rehabilitation thereby constraining the country's development prospects by reducing resources availability for development activities.

Additionally, rapid economic growth coupled with a rising population is putting a high toll on the environment, ecology and natural resources in Bangladesh. In order to ensure the best possible opportunities for a productive and healthy life for the people while maintaining the balance in nature and ensuring sustainability for future generations, the country has to have a human centred sustainable development. It has been observed that Bangladesh has maintained an average annual growth rate of about 6 percent for more than a decade with rate exceeding 6 percent in the last 3 consecutive years. Sustained accelerated growth has led to improvement in per capita income and faster poverty reduction. Among the many challenges confronting the country in its attempt to attain the middle income status by 2021 is achieving sustainable development.

Despite the laudable nature of the SDGs, attainment of the goals has generated scepticism. The International Food Policy Research (IFPR) criticized the SDGs as not being ambitious enough, basing its claims on comparative analysis of growth in developed and developing countries.Conversely, the Economist Magazine argued that the 17 SDGs with 169 targets are broader in scope than the 8 MDGs, which were not totally achieved within the 15 year timeframe[6]. Similarly, it was noted that the poverty rating of $1.25 used for the SDGs was not a realistic measure for human subsistence. These criticisms have been a major source of concern to governments, donor countries, partners and the society as a whole. Since the achievement of the SDGs requires an integrated but government-led approach, it is imperative to examine the approaches and mechanisms necessary for success. It is equally important to determine how they impact on security of developing countries particularly in Bangladesh.

The purpose of this seminar is to examine Bangladesh's efforts in attaining sustainable development through industrialization, urbanization and green environment. In achieving this, the seminar paper will cover industrialisation and SDG from Bangladesh perspectives, followed by industrial sector in Bangladesh present status and future prospects, it will also look at industrialization and SDG with Singapore as a model, this will serve as a lesson for Bangladesh. Finally, itwill highlight on impacts of industrialization on environment with a view to making some recommendations.The seminar paper will be limited to the prioritized SDG that have direct impact on the sustainable development in Bangladesh.

SDG and Industrialization: Bangladesh Perspective

In ensuring that we have a common understanding of key concepts in this seminar the paper will try to critically examine in detail the terms Sustainable Development and Industrialization by putting them into proper context.

Sustainable Development

Sustainable Development is defined in the Brundtland Report as "development that meets the needs and aspirations of the present without compromising the ability of future generations to meet their own needs". The concept of Sustainable Development can be interpreted in many different ways, but at its core is an approach to development that looks to balance different and often competing needs against an awareness of the environmental, social and economic limitations we face as a society.

All too often, development is driven by one particular need, without fully considering the wider future impacts. We are already seeing the damage this kind of approach can cause from large scale financial crises caused by impossible banking, to changes in global climate resulting from our dependence on fossil fuel. The longer we pursue unsustainable development, the more frequent and severe its consequences are likely to become which is why we need to take action now.

This action manifested itself at the UN Sustainable Development Summit in September 2015; world leaders adopted the 2030 Agenda for Sustainable Development which includes a set of 17 Sustainable Development Goals (SDG) to end poverty, fight inequality and injustice, and to tackle climate change by 2030 amongst others. The SDG otherwise known as the Global Goals was built on the Millennium Development Goals (MDG) eight anti-poverty targets that the world was committed to achieving by 2015. The MDG adopted in 2000 aimed at an array of issues that included slashing poverty, hunger, disease and gender inequality among others.

Enormous progress has been made on MDG showing the value of a unifying agenda underpinned by goals and targets. For instance the MDG Bangladesh Progress Report 2015 was unveiled on 16 September at the Pacific Sonargon Hotel, Dhaka[11]. The report shows that Bangladesh has achieved remarkable progress in the areas of primary school environment, gender parity, lowering the infant and under-five mortality rate and maternal mortality ratio amongst others. However, in spite of these progresses the level of poverty in Bangladesh and even around the world still remains high. Therefore, the new SDG and the broader Sustainability agenda go much further than the MDG addressing the root causes of poverty and the universal need for development that works for all people.

Industrialization

This is the period of social and economic change that transforms a human group from an agrarian society into an industrial one, involving the extensive re-organization of an economy for the purpose of manufacturing. The first transformation to an Industrial economy from an agricultural one, known as the Industrial Revolution, took place from the mid-18th century to early 19th century in certain areas in Europe and North America. The second Industrial Revolution labels the later changes that came about in the mid-19th century after the refinement of the steam engine, the intervention of the internal combustion engine, the harnessing of electricity, railways and electric power lines.

Industrial revolution of eighteenth century, led first by coal than by petroleum, and revolution in the mass movement of people and goods by railway started to cause serious impacts on nature. These development drives were accelerated by the capitalists with their vested propaganda in the name of economic emancipation. Recent neo-liberalism further accentuated these development drives with newer concepts like free market economy etc. As a result, by the mid twentieth century, while human civilization has focused on massive industrialization and urbanization, the concerns of environmental hazards like global warming, greenhouse gases etc are already knocking at the door. Thus, development and environment degradation became two sides of the same coin.

According to the International Monetary Fund (IMF), Bangladesh's economy is the second fastest growing major economy of 2016, with a growth rate of 7.1%. Throughout the last few decades, Bangladesh averaged a GDP growth of 6.5%, leading the country to export-oriented industrialization. In recent years, Bangladesh has seen a major surge in export as Bangladesh textile industry, becoming second largest in the world, along with emerging pharmaceutical, leather, plastic, defence and IT industry etc. The country's exports are projected to cross US$50billion by 2021. By early 2016, per-capita income stood at US $3,840 (PPP) and US$1,466 (normal). However, while industry sector with 31.28% of GDP involves 30% of the labour force, agriculture sector though reduced to 15.33% of GDP still employs 40% labour force (FY 2015-16). Although food production has tripled as against doubled population, use of fertilizers and pesticides has also increased in manifold, thereby harming the nature.

Industrialization is an essential pre-requisite for rapid and sustained economic development and social progress. Industrialization is the process in which a society or country transforms itself from a primarily agricultural society into an industrial one, based on the manufacturing of goods and services. The growth of economy and the internal development of a nation depend upon the development of industrial sector. Modernization and structural transformation of the economy, diversification of the economic base, technological progress and productivity increase, accelerated economic growth and employment creation, increase in incomes and standard of living of the people – all

these are the universally recognized dynamic benefits arising from industrial development. Industrialization is thus pursued as an overriding development objective in its own right. That is why the United Nations (UN) has rightly endorsed 'Industry, Innovation and Infrastructure' to be the number 9 goal in the list of 'Sustainable Development Goals (SDGs).

Historically also, the industrial sector has been the sector that has driven growth, as countries have moved from low to middle income status. This is because industry can provide high-wage employment for large numbers of workers and can raise social productivity by producing high value goods on a mass scale. Poor or developing countries, like Bangladesh, can earn valuable foreign exchange by exporting manufactured products and the foreign exchange can be used to invest in newer machines and technologies so that a rapid move up the technology ladder becomes possible.Further, the average productivity of industry is higher than in agriculture or most service-sector activities -as people move out of agriculture into industry, Gross Domestic Production (GDP) increases. Therefore, for a country like Bangladesh, which is pursuing the attainment of SDGs, development in the industrial sector is one of the most essential requirements.

If we look at the agriculture sector of Bangladesh, we find that contribution of this sector is gradually decreasing. After its independence in 1971, Bangladesh used to be predominantly an agro-based economy. However, Bangladesh is a very densely populated country. As the population isincreasing, more and more lands are being utilized for the dwellings, causing loss to arable land. It is estimated that, since independence, Bangladesh has lost almost 7% of its arable land.Given the poor land to person ratio, Bangladesh is not capable of meeting its own requirements of food and agro-based products. So, each year, Bangladesh spends a good amount of foreign exchange for importing food and agro-based products. It is only in 2015-16 that Bangladesh has become surplus in food production. Currently, agriculture sector contributes only 15.3% of Bangladesh's GDP.Despite the tremendous success in growth, agriculture is unlikely to deliver rapid growth in Bangladesh because of the difficulty of setting up large-scale farms that can compete with countries that specialize in agriculture such as Australia or Argentina. Therefore, it is very much unlikely that Bangladeshwould prosper through agricultural growth alone.

In the service sector, it is only the unskilled labour market abroad that Bangladesh could exploit so far. Since 80s, thousands of unskilled labours have migrated to different countries, especially in the middle-east. Theremittances from thoseunskilled laboursworking abroad has becomeanother major source of foreign exchange for Bangladesh.Currently, almost 9 million Bangladeshi migrant workers are contributing about 11% of Bangladesh's 'Gross National Income (GNI)'. However, as we see today, this labour market is also shrinking gradually. Especially other developing countries like India, Pakistan, Sri Lanka, the Philippines, etc. are taking control of this sector with more skilled manpower. Bangladesh is falling far behind to produce skilled manpower and compete with those countries. So this service sector is also not enough to contribute substantially towards the attainment of a sustainable economy.In case of other service sector, Bangladesh is yet to explore its potentials and develop necessary infrastructures to exploit markets like the ICT market, tourism, entertainment, aviation, etc.

Now in the industrial sector, Bangladesh has got good prospects. Just by looking at the Readymade Garment (RMG) industries in Bangladesh, we can get an understanding of our potentials in the industrial sector. We have natural resources like coal, water and a huge and cheaper labour force that we can utilize to develop in different other industrial sectors like leather, pharmaceuticals, jute, ceramics, food processing, tea, ship building and so on.

Industrial Sector in Bangladesh: Present Status and Future Prospects

Basing on the fixed assets excluding land and buildings, different industries of Bangladesh have been categorized as large industries, medium industries, small industries, micro industriesand cottage industries. Usually, when we talk about industrialization, we mostly refer to growth in the manufacturing sector, as it accounts for 70% of our industry.

As already mentioned, after independence, Bangladesh's economy was predominantly agro-based and depended on foreign aids. In the 1970s and the 80s, manufacturing sector performance was not up to the mark. This was mainly due to poor performing nationalized enterprises, inward looking trade

policies and inadequate private investment due to poor incentives and state controls. However, the manufacturing sector growth picked up pace in the 1990s and beyond, from average growth of 4.5% per annum, to 7-8% since the early 1990s. We can see this in the following table:

Table 1: Average Decadal Sectoral Growth Rates (2005-2006 base year)			
	1981-1989	1990-1999	2010-2015
Agriculture	1.8	3.4	3.7
Industry	5.6	7.0	8.8
Manufacturing:	4.7	7.2	9.3
Large scale	4.6	7.3	9.7
Small scale	5.4	6.8	7.6
Services	3.8	4.3	5.9
GDP	3.5	4.8	6.3
Source: Estimated from National Accounts, BBS			

This acceleration in growth performance can be attributed to the shift in policy stance, from a predominantly import-substituting inward-looking industrial policy to a largely outward-looking export-oriented policy. It was also supported by economic reforms that included market orientation, privatization, and de-regulation of investment, greater trade openness and flexibility in exchange rate management, and a general move towards a private sector driven economy replacing the historical public sector predominance in manufacturing.

According to 'Bangladesh Bureau of Statistics (BBS) Survey of Manufacturing Industries 2012', currently, there are around 42,792 registered manufacturingindustries in Bangladesh, where around 50, 15,937 workers are employed. Details are given in the following table:

Table 2: BBS Survey on Manufacturing Industries					
Category	Total	Micro	Small	Medium	Large
Number of Establishments					
No of establishments	42,792	17,384	15,666	6,103	3,639
Persons Engaged					
Total	50,15,937	2,71,644	7,38,800	10,41,220	29,64,271
Male	30,62,009	2,29,407	6,15,426	6,73,821	15,43,353
Female	19,53,928	42,237	1,23,374	3,67,399	14,20,918
Gross Output (taka in million)					
Gross Output	53,94,905	2,75,818	12,03,267	14,08,342	25,07,478
(Note: Statistics on cottage industries are not available)					

Notably, most of these industries are coming up through private investments. Among all theseindustries, the RMG sector is the largest in Bangladesh. Apart from foreign remittance, Bangladesh's economy is predominantly dependent on export in the RMG sector. The RMG sector employs almost 5 million workers and accounts for 80% of total export and 13% of GDP.The other industries like textile, jute, fertilizer, cement, electronics, leather, plastic items, food processing, etc. are not as large as the RMG sector, and mostly meeting the domestic requirements.In total, the industry sector, at present, contributes about 31.3% of the GDP.

However, the major drawback of the industrial sector of Bangladesh is the lack of diversity. As already mentioned, it is the RMG sector alone that has contributed much to the GDP from industrial sector. Depending on one industrial field is very much vulnerable as far as the sustainability is concerned. Therefore, Bangladesh needs to look for investments in diverse industrial fields. Bangladesh also needs to take care of some other shortcomings such as, lack of adequate capital, weak investment base, insufficient infrastructure, lack of technology know-how, shortage of energy, unskilled human resources, political instability and labour unrest, etc.

Now, let us see the prospects in the industrial sector. As has been mentioned by the previous speaker, Bangladesh, because of its access to cheap labour and resources, has a very good potential to develop its industrial sector. Around

one third of Bangladesh's labour force are underutilized. We are having natural resources like gas, coal, water sources, agricultural products, fisheries, etc. The Government also believes that rapid industrialization is a key to the country's economic development. Therefore, the Government has taken steps to develop infrastructures like industrial zones, roads, mega-bridges, port facilities, etc. and ensure utilities like gas, electricity and water, etc. for the entrepreneurs. Given the challenges of the free market economy and globalization, the government has rightly acknowledged the private ownership and management of industrial enterprises as one of the major guiding forces in achieving economic growth. Therefore, the Government has formulated the 'Industrial Policy 2010' in a manner so as to promote private and foreign investments in the industrial sector. In that, the Ministry of Industries has taken the role of a facilitator with a view to creating increased industrial activities in the country. Besides this, the government has also brought about many constructive and timely reforms in the running of businesses, and liberalized trade so that private entrepreneurs can seize opportunities of establishing and running industrial enterprises profitably and freely. Keeping in view the present challenges and shortcomings in the industrial sector, the Government has revised the 'Industrial Policy 2010' and drafted the new 'Industrial Policy 2016' that is likely to be promulgated very soon.

In order to further strengthen the country's industrialization process, the present government has identified the Small and Medium Enterprises (SMEs) as a priority sector and as the driving force for industrialization. A national taskforce led by the Principal Secretary of the Prime Minister's Office has been formed so that proper policies and planning are followed in establishing SMEs. At the same time, with a view to providing entrepreneurs with assistance in the establishment of SMEs, a cell has been created under the supervision of the Ministry of Industries comprising officials experienced in SMEs from the Ministry of Industries, Bangladesh Small and Cottage Industries Corporation (BSCIC), National Productivity Organization (NPO), Asian Development Bank (ADB), FBCCI, National Association of Small and Cottage Industries, Bangladesh (NASCIB) and women entrepreneurs.

The provisions of all facilities for attracting foreign investments have been envisaged in the Industrial Policy. The government has taken an initiative to

formulate a separate SME policy to provide entrepreneurs with necessary guidance and strategic support in respect of the establishment of SME industries all over the country. These strategic guidelines will be followed in establishing SMEs across the country.

With all these, a sustainable industrial sector is not a difficult proposition for Bangladesh. Given the policy reforms in the upcoming Industrial Policy 2016, it is expected that there will be acceleration in the industrial sector of Bangladesh. For example, the manufacturing sector has been growing at an annual average rate of about 8% from 2010 to 2014. The sector is projected to grow at a higher rate reaching 11.7% in fiscal year (FY) 2015-16 and accelerating to 14.0% by the end of FY 2021, when it will contribute 28% of Bangladesh's GDP (present contribution is around 19.01%). The vision of the Ministry of industries is to promote the contribution of the industrial sector in the indigenous production from 25 to 40 percent and to provide all sorts or assistance in uplifting the labor force in the industrial sector increasing from 16 to 25 percent by 2021.

Contributions of the Industrial Sector to the Attainment of the Sustainable Development Goals

Perhaps the most important requirement to attain the SDGs is the budget. We require a very good amount of financial support in order to meet the 169 targets of the SDGs. And to meet the financial requirement, our Government has already set a goal in the 7th Five Year Plan to attain a GDP growth rate of 8% by the end of 2020.However, as estimated by the Ministry of Finance, the Government would need 31.9 trillion taka (409 billion US$) in next five year to implement the 7th Five Year Plan that aims to reduce poverty, create more job opportunities and comply with the commitment of meeting the targets of SDGs. The Government plans to get most of this money through private and public investments. Especially, the Government expects to meet 78% of the financial requirement from private investments, which is mostly in the industry sector.

We know that, at present, Bangladesh's economy is at "take off" stage in the growth process. Both historical and cross-country evidence show that

the prospects of rapid GDP growth with extensive job creation require a high-performing and diversified manufacturing sector at the early stages of the take-off period. Therefore, industrialization is surely going to assist our Government in the attainment of higher GDP growth rate, which, in turn, will provide extra finance required to meet the SDGs' targets.

If we carefully look at the list of the SDGs, we find that there are three basic components of sustainability – economic, environmental and societal. Out of the 17 listed goals, 8 goals (goals 1 to 4, 7 to 9 and 11)are directly dependent on economic growth. Other goals also, to some extent, indirectly rely on sustainable economic development. So, economic growth, perhaps, is the principal component of sustainability and the major contributing factor in the attainment of SDGs.

Now, if we see how industrialization is going to help in the attainment of SDGs in Bangladesh, we can see that, firstly, industrialization means providing a secure basis for a rapid growth of income. More income means more purchasing power capacity. More purchasing power capacity, in economics, implies more demand. And when we have more demand, we open doors for new investments. Thus, with industrialization, we expect to see a growing economic cycle in Bangladesh that would boost our GDP growth. When we have growth in the economy, we can spend money for healthcare, sanitation, sustainable cities and communities and even, better environment.

Next, industrialization is going to provide more employment. Establishment of new industries will open the door of job opportunities for the unemployed youths of Bangladesh. The word 'unemployment' is often associated with poverty, hunger, inequality, social crimes, etc. With more and more employment opportunities, we can reduce poverty, hunger, economic inequality; which are, otherwise, some of the goals of SDGs. We can meet other goals as well – such as, quality education, descent work, good health and well-being, etc.

Extensive industrialization will also give room for the production of many consumer goods at much cheaper costs. This, in turn, will provide opportunity for the people to get consumer goods at relatively lesser price. Coupled with more employment opportunities,the access to consumer goods with cheaper prices will definitely provide the society with better living standard.

With the development in the industrial sector, the society will also experience technological progress. To make each product cost-effective and cheaper, the entrepreneurs always seek for newer and advance technologies to be adopted in their enterprises. Thus the society also gets exposed to new technologies. People seek to use those technologies in their day to day life as well and, thus try to improve their standard of living.

Finally, industrialization will assist the country to reduce its dependency on foreign resources. This, in turn, will help the Government to pursue independent foreign policy, development strategy and economic reforms. Thus, it will be easier for the Government to look after the people.

Achieving Sustainable Industrial Development through a System of Strategic Planning and Implementation: The Singapore Model

To meet the economic and social needs of humans' industrialization has been the key strategy adopted by many industrializing countries to achieve economic development and growth through the creation of industries, manufacturing output, job creation and government revenue. However, the industrialization process can often result in negative impact on the environment if stringent environmental regulations and control mechanisms are not properly implemented and enforced.

Under the UN Agenda 21, three dimensions of Sustainable Development have been identified and these are the economic dimension, social dimension, and environmental dimension. In the context of sustainable industrial development, the UN for Industrial Development Organization (UNIDO) defines that such development should accomplish three things: Firstly, it encourages a competitive economy, with industry producing four as well as the domestic markets, Secondly, it creates productive employment, with industry bringing long-term employment and increased prosperity, thirdly, and it protects the environment with industry efficiently utilizing non-renewable resources, conserving renewable resources and remaining within functional limits.

Against the above imperatives vis-à-vis development which requires support of Sustainability Planning this write up seeks to illustrate how Singapore

has maintained the fine balance between developments and environmental protection through a system of strategic planning and implementation. The study also highlights the important role that the industry has played in achieving Singapore's economic success and social benefits for the community by making conscientious efforts to minimize adverse impact on environment. The Singapore model could serve as a good example for Bangladesh.

Industrialization in Singapore did not come about by chance but was the brain child of visionary leaders and was impelled by the political and economic situations in the early 1960s. In 1965, Singapore was expelled from the Federation of Malaysia and two years later, the British declared that they would withdraw their troops from Singapore. Faced with a high unemployment rate, poverty and housing slums with poor sanitation and overcrowding conditions, the government proceeded to diversify the economy from its predominant focus on trading to manufacturing, and had since achieved economic success and job creation through the new sector. Therefore, the lesson for Bangladesh here is that, diversification of its economy should continue to be among its government policies in other for it to compete favourably amongst the industrial giants such as Singapore. Furthermore, with regards to good leadership such as Singapore, the establishment of a commission for monitoring and implementing of these policies for SDG in the office of the Honourable PM under her direct supervision is a step in the right direction.

The early industrialization strategy was aimed primarily at labour-intensive industries with high export potentials. This saw the birth of Singapore's first industrial estate: The Jurong Industrial Estate. The Jurong Industrial Estate was originally envisaged to cover an area of 2,025 hectares but was later increased to about 6,480 hectares as recommended by Dr Albert Winsemius, a United Nations expert. Industrialization was government driven and approximately 85% of the industrial land was developed by government bodies. As a key engine driving the industrialization program, the Economic Development Board (EDB) was set up in 1961 and was instrumental in the birth of Jurong Industrial Estate. In 1968, the Jurong Town Corporation was created as a fully-fledged statutory board of the EDB to undertake planning, development, leasing and management of all industrial estates.

Singapore's rapid and sustained economic growth through the 1960s -90s can be traced to the systematic development of its planned industrial parks and its ability to change and adapt its industrial structure to meet the needs of the changing markets and modern business trends. As mentioned earlier labour intensive industries were the key industrial categories in the early 60s which Singapore sought to attract given its own weak industrial base and abundance of cheap and unskilled labour. Furthermore, in the late 1970s, Singapore industrial focus switched to export-oriented industries. In the 80s and 1990s when faced with increased competition for markets and investments Singapore had to formulate and adapt a strategy for her future industrial development such strategy would employ the upgrading and restructuring all her industries. Bangladesh could take a cue here by ensuring that all her industries are upgraded to export oriented pattern as this is expected to be a better option for generating the much needed foreign exchange for the country.

Impacts of Industrialization on Environment

Although industrialization is important to our economic growth, especially towards the attainment of 169 targets of the SDGs, growth in the industrial sector is not without any cost. Perhaps the biggest cost is the degradation of our green environment. Industrialization and technological progress have always been accompanied by a growing negative impact on the environment in terms of its pollution and degradation. Industrialization carries with it the seeds of environmental damage, assisted and abetted by both needs and greed of man. Activities such as manufacturing, processing, transportation and consumption not only deplete the stock of natural resources but also add stress to the environmental system by accumulating the stock of wastes.

The productivity of the industries depends on the supply and quality of natural and environmental resources. While water, soil, air, forest and fishery resources are productive assets, the pollution of water, air, atmosphere and noise are the by-products of economic development, particularly industrialization. In global context, 'Green House Effects', 'Global Warming and Climate Change' and 'Acid Precipitation' are the major ill effects of industrialization. Bangladesh is the most affected country as far as environmental degradation due to global

warming is concerned. The ecosystem of Bangladesh is severely suffering due to global warming. Frequent cyclones, flood, river erosion, and increase in soil salinity in the coastal areas – all are due to the 'Green House Effects'.

If we look at other pollutions in Bangladesh, the present environmental condition of Bangladesh is not at all equilibrium. Severe air, water and noise pollution are threatening human health, ecosystems and even economic growth of Bangladesh. One of the major reasons for air pollution in Bangladesh is industrialization and associated burning of fossil fuels, and motorization. Likewise, the water pollution is caused mainly due to industrialization.

If we see the air pollution, we find that industrial emissions are the principal source of outdoor air pollution. The national ambient air quality standards of Bangladesh and amount of pollutants in the air of Dhaka city is shown in the following table:

Table 3: Bangladesh National Ambient Air Quality Standards

Category	8 hours' average concentration in μg/m3			
	CO	NO_2	SPM	SO_2
Industrial use	5000	100	500	120
Commercial use	5000	100	400	100
Residential use	2000	80	200	80
Other use	1000	30	100	30

Source: Department of Environment, 1997

Table 4: Pollutants in the Air of Dhaka City								
Location at Dhaka City	Sulfur Dioxide (SO2)		Nitrogen Dioxide (NO2)		Carbon Monoxide (CO)		Suspended Particulate Matter (SPM)	
	Concentration (µg/m3)	Permissible (µg/m3)	Concentration (µg/m3)	Permissible (µg/m3)	Concentration (µg/m3)	Permissible (µg/m3)	Concentration (µg/m3)	Permissible (µg/m3)
Gulistan	800	100	500	100	33200	5000	1332	400
Jatrabari	1300		500		67000		4667	
Pantho Path	900		500		85100		2666	
Mohakhali	1200		500		69300		2111	
Source: Proceedings of the International Conference on Mechanical Engineering 2009								

Air pollution mainly occurs due to burning of fossil fuels like coal, petroleum etc and associated black smoke. Over 99% of the brick kilns use fossil fuel but do not comply with the "Brick Kiln Ordinance" and pollute enormous air. Other manufacturing industries cause air pollution through smoke emission. Agro based industries like sugar, pulp, paper, tanneries and value added industries like textile, garments, pharmaceutics, oil refineries, fertilizer, and chemical industries are the major contributors for air pollution. The air pollution percentage of most five industrial sectors of Bangladesh in the year 2001 is shown below:

Table 5: Air Pollution Percentage of most Five Industrial Sectors of Bangladesh in the Year 2001		
Industry	Emission (tons/year)	Pollution (%)
Food	1,46,356.06	38.7
Cement/Clay	62,725.88 16.6	16.6
Pulp and Paper	51,963.92	13.7
Textile	39,831.01	10.5
Tobacco	16,992.22	4.5
Source: Research Work by Islam Faisal on 'Industrial Pollution in Bangladesh' in the year 2002		

Another threat to environment is water pollution. Water pollution creates serious health hazard for Bangladesh. The dumping of municipal wastes, hospital wastes and toxic environmental discharges from mostly industries pollute both surface and ground water sources. The most dangerous threat emanating from environmental degradation is the arsenic contaminationof ground water.

The main industrial areas of Bangladesh are at Dhaka, Chittagong, Khulna, and Bogra districts. The mostly contributing industries for water pollution are pulp and paper, pharmaceuticals, metal processing, food industry, fertilizer, pesticides, dyeing and painting, textile, tannery etc. More than 200 rivers of Bangladesh directly or indirectly receive a large quantity of untreated industrial wastes and effluent. Everyday approximately 700 tanneries of Dhaka city are discharging about 16,000 cubic meters of toxic wastes. The Department of Environment (DOE) has listed 1,176 factories that cause pollution throughout the country. Water pollution percentage of most five industrial sectors of Bangladesh in the year 2001 is shown below:

Table 6: Water Pollution Percentage of most Five Industrial Sectors of Bangladesh in the Year 2001

Industry	Emission (tons/year)	Pollution (%)
Pulp and Paper	91,768.10	47.4
Pharmaceuticals	30,866.72	15.9
Metal	27,174.61	14.0
Food Industry	23,403.39	12.1
Fertilizers/Pesticides	12,715.00	6.6

Source: Research Work by Islam Faisal on 'Industrial Pollution in Bangladesh' in the year 2002

Industries are one of the main sources of noise pollution as well. According to the Department of Environment (DOE), the perfect sound condition for Bangladesh is 45 dB for the daytime and 35 dB for the night in peaceful areas and 50 dB for the daytime and 40 dB for the night in residential areas. At present noise level in Dhaka city are estimated ranging from 60 to 100 decibel. If present situation continues then by the year 2017, 50% people of Dhaka city will loss 30 decibel of hearing power.

All these severe environmental pollution is threatening human health and economic growth of Bangladesh. Air pollution mostly affects the urban children. Immediate effect of smoke inhalation causes headache, vertigo, burning sensation of the eyes, sneezing, nausea, tiredness, cough etc. Its long term effect may cause asthma and bronchitis. Lead affects the circulatory, nervous and reproductive systems as well as affects kidney and liver including liver cancer or cirrhosis. Carbon monoxide hampers the growth and mental development of an expected baby. Nitrogen oxides cause bronchitis and pneumonia. Industrial emissions cause different waterborne disease as well.

Noise pollution causes mental and physical illness among the people. Sound pollution causes deafness to heart attack. Any sort of noise pollution seriously affectsexpecting mothers. It also causes high blood pressure, tachycardia, headache, indigestion, and peptic ulcer. Thus, many people die every year in many diseases due to environmental pollution.

So, at the end, although industrialization is the most important factor for the attainment of SDGs, it is also a major impediment to the attainment of many of the SDGs like, 'Good Health and Well-being', 'Clean Water', 'Sustainable Cities and Communities', 'Climate Action', 'Life below Water', and 'Life on Land', etc

Recommendations

The following recommendations are here by adopted by the Group for consideration and implementation accordingly:

a. Quality of investments be enhanced by improving budget processing and strengthening monitoring.
b. Focusing on investment in infrastructure programmes be enhanced.
c. Quality of education be enhanced at all levels.
d. Higher investments be ensured in R&D and IT.
e. Investment in climate change be improved through legal and administrative systems.

Conclusion

Bangladesh has achieved progress in the areas of primary school environment, gender parity, lowering the infant and under-five mortality rate and maternal mortality ratio. However, in spite of these progresses the level of poverty in Bangladesh still remains high. There are a lot of challenges Bangladesh has to face in the attainment of sustainable development particularly in areas of environmental hazards like global warming; greenhouse gases and other forms of pollution in the industrial sector. These challenges are also evident in other various sectors of the government. Therefore, there is the need for the government of Bangladesh to ensure proper planning and monitoring of the activities of industries in line with standard international practices.

The establishment of a commission for monitoring and implementation of these policies for the SDG in the Honourable PM Office under her direct supervision is a step in the right direction. This will definitely go a long way in ensuring to the success of achieving these SDG. In addition, focusing on infrastructure programmes like energy, ports, telecommunications and transport will aid public invested towards the attainment of SDGs. Bangladesh needs to develop human resource by investing in quality education in all the regions. This will also promote R&D and IT as it will give the beneficiaries external value to compete globally. Finally, investment climate should be friendly to encourage real estate and stock market in Bangladesh.

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Environmental Costs of Unplanned Urbanization

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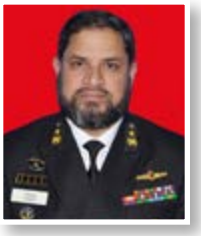

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KEYNOTE PAPER OF GROUP-B

ENVIRONMENTAL COSTS OF UNPLANNED URBANIZATION

Introduction

An international conference was held in Chicago in 1997 to which representatives were asked to note down what is considered to be the three most important problems facing the world. When the results were compiled, the following emerged as the most important problems: Peace; Environmental problems; and Education. The Quranic verse at reference induces to consider the environment from a broad perspective; that mankind should remember their Creator, who is the Owner of all environments and at the same time all of our Creator and that human being are His vicegerent and trustees to preserve the environment. Ibn Khaldun, wrote on the requirements for the planning of cities in the 14th century, identified the following as necessary to prevent them from falling into ruins: ample water fit for human consumption, pastures for livestock, fields suitable for cultivation and forests for fuel wood and building materials.

Urbanization, refers to "a broad-based rural-to-urban transition involving population, land use, economic activity and culture, or indeed any one of these." It is estimated that by 2050 more than two thirds of the world's population will live in cities, up from about 54 percent today. It needs to be recognized that this fast, yet often unplanned urbanization, brings profound threats to social stability, risk of critical infrastructure, impending water crises, triggering potentials for devastating spread of diseases and other environmental hazards. Cumulatively, these risks likely to be further exacerbated as this unprecedented transition from rural to urban areas continues. As such, there is an increased concern that unplanned urbanization is critically detrimental to sustainable development.

In these context, this seminar paper briefly highlights some key issues and summarizes the environmental impact of unplanned urbanization, especially in Bangladesh. It begins with a brief appraisal of environmental sustainability

and urbanization; followed by a review of planned vis-à-vis unplanned urbanization. Subsequently the paper will assess the environmental effect to identify the environmental cost of unplanned urbanization making a specific reference to Dhaka Metropolitan Area (DMA). The paper will finally make an endeavor to analyze the urbanization and sustainable development, with recommendations as future challenges for combating the environmental hazards caused due to unplanned urbanization.

Environmental Sustainability and Urbanization

Urbanization

Urbanization is the process by which large numbers of people become permanently concentrated in relatively small areas, forming cities. The earliest cities developed in ancient times after the rise of horticultural and pastoral societies made it possible for people to stay in one place. An urban area is spatial concentration of people, working in non-agricultural activities. Criteria used to define urban include population size, space, density, and economic organization (Long 1998). It is frequently used to refer to changes in land-use for specific areas (usually on the periphery of urban concentrations) as this land becomes 'urbanized' and is sold and developed for urban use (e.g. the sale of plots for housing) (McGranahan and Satterthwaite 2014:6).In 1950, 30% of the world's population was urban, and by 2050, 66% of the world's population is projected to be urban (UN DESA 2014:1).

Reasons for Urbanization

Urbanization could be caused by a host of factors; the main one being migration. It is a form of geographical or spatial motion between one geographical unit to another. Internal migration could be rural-rural, urban-urban, urban-rural and rural-urban. Rural-urban and urban-urban migration are the main causes of urbanization and by implication the main reason for the rapid growth of mega cities experienced over the world. Whatever the form, migration is caused by 2 main reasons; one is the push factor; which implies unfavorable conditions in an area that pushes the individual away from the area (source) and the pull factor; which implies a perceived presence of favorable conditions that pulls the individual towards the area

(destination). These factors could be categorized under social, economic and environment issues as shown in table 1.

Table 1 Push and Pull Factors of Migration

PUSH FACTORS Factors that make you want to leave a place (In the case of urbanisation away from rural area)	PULL FACTORS Factors that draw you to live in a place (In the case of urbanisation towards urban area)
Economic factors: Lack of employment. Natural disasters (earthquakes, floods). Lack of food or shelter. Lower standard of living.	**Economic Factors:** Hope for better employment. More money and food. Better shelter. Hope for family to have a higher standard of living.
Social Factors: Lack of health care. Lack of educational opportunities Lack of religious tolerance	**Social Factors:** Encouragement from family and friends. Better health care. Better educational opportunities. Religious tolerance.
Political Factors: Unfair legal system. Disenfranchisement (Not being able to vote) or lack of governmental tolerance. War and terrorism.	**Political Factors:** To gain protection under the law. Right to vote and freedom from persecution. Safety.

Current Trends in Urbanization

a. Today, more than half the world's population lives in urban areas, and the number of cities over 1 million stands at more than four hundred. By 2050, almost two-thirds of the world's population is projected to live in urban areas. The number of megacities—cities with populations over 10 million- rose from 3 million in 1975 to 16 million in 2000, and is expected to reach 27 million by 2025 (Population Reference Bureau, 2012).

b. Rapid urbanization poses both opportunities and challenges for developing nations. Jobs are more plentiful in cities than in rural areas and incomes are higher, and services such as health care and schooling are easier to deliver because people are living more closely together. In another advantage, women in developing nations generally fare better in cities than in rural areas in terms of education and employment possibilities.

c. However, in the large cities of developing countries homeless children live in the streets as beggars and people lack basic necessities that urban dwellers in developed countries take for granted. As the United Nations

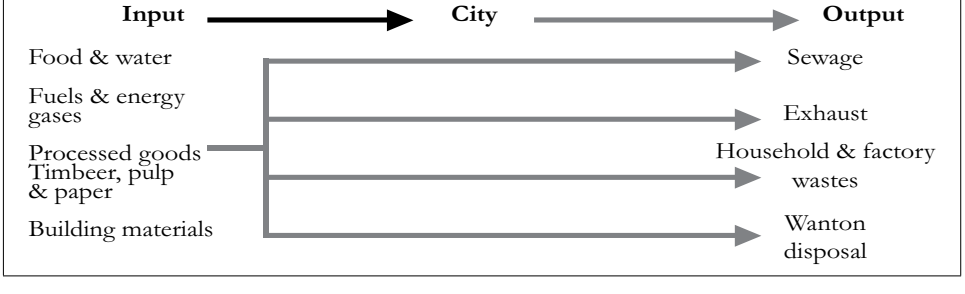
Population Fund (UNPF 2007) noted that; over one billion people live in urban slums, which are typically overcrowded, polluted and dangerous, and lack basic services such as clean water and sanitation. Also social problems such as unemployment, malnutrition, crime, gangs, prostitution and drug-abuse are results of people living in poor conditions.

Effects of Urbanization on Environmental Sustainability

One of the major effects of urbanization is its impact on the environment. Since the Brunt land Report of the World Commission on Environment and Development in 1987 (titled 'Our Common Future'), Environmental sustainability has become a global concern. As a result, after the expiration of the MDGs, the 193 Member States of the UN met in September 2015 and agreed on the proposed agenda, entitled "Transforming Our World: 2030 Agenda for Sustainable Development," consisting of a Declaration, 17 Sustainable Development Goals (SDGs) and 169 Targets. Development is said to be sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs."(Soubbotina 2004: 9).

In the light of the SDGs, uncontrolled urbanization has become a major threat to environmental sustainability because of the amount of pressure the population place per unit area of environment and the amount of waste of all kinds generated from what is taken from the environment as shown in Fig 1.

Fig 1 Input from and Output to the Environment that a typical City Produces



Growing concern for the environment and environmental sustainability has been captured in the SDGs as;

Goal-11. Which is to; Make cities and human settlements inclusive, safe, resilient and sustainable. Urban dwellings need to keep these four essentials foremost for sustainable development.

Inclusive implies economic housing projects with urban benefits and building synergy across various sectors of urban planning.

Safe means; excessive urbanization leads to unemployment, crime, theft, prostitution and drug abuse, therefore security of life and property, rule of law and good healthcare assume importance.

Resilient implies; economic empowerment, employment, infrastructure across all sectors, balanced use of energy, sanitation, water management and controlled expansion.

Sustainable refers to; Smart energy consumption, proper sewage and waste management, use of recyclable materials, adoption of green areas, water treatment and control amongst others.

11 targets have been specified to achieve this goal.

Other relevant goals of UN SDG-2030 that are not directly linked to urbanization but deal with associated issues are;

Goal 6. Ensure availability and sustainable management of water and sanitation for all.

Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all.

Goal 12. Ensure sustainable consumption and production patterns; particularly; Target 12.5; substantially reduce waste generation through prevention, reduction, recycling and reuse.

All these goals are quite significant in the following ways:

a. **Socially,** attempts to exclude low-income populations from gaining access to urban benefits can be very harmful and inequitable. There need to be

some form of control and plan to absorb the growing numbers of people migrating into the urban areas.

b. **Economically,** the ability of cities to generate higher income for individuals and business and by implication taxes for government is one of the main reasons for its pull effect on migration.

c. **Environmentally,** there are advantages to be gained from urban agglomeration and compact urban forms, but some of the most important urban advantages require urban infrastructure, policies and planning that support the transition to more resilient, healthy and sustainable cities. (McGranahan and Satterthwaite 2014:5)

Planned vis-a-vis Unplanned Urbanization

The world is experiencing a historically unprecedented transition from predominantly rural to urban living. Need for better livelihood, requirement of sustainable economic security and access to newer technology leads to rapid urbanization across the globe. If managed well, urbanization can bring important benefits for development. The term urbanization has two sharp edges. The way planned urbanization offers a healthy, prosperous and sound city life, on the other hand unplanned urbanization leads to unsustainable, chaotic and miserable lifestyle which is detrimental to its citizen.

Planned Urbanization

According to Mr. Boyd, "A sustainable city is a place where people can happily live, work, play, raise their children and retire. It's a place where all residents enjoy clean air, safe water, comfortable housing. It is a place where the average ecological footprint is within Earth's capacity." Planned urbanization means creating urban environments where residents feel supported and engaged and can enjoy a vibrant urban life.

Trends of Planned Urbanization

Worldwide there are several initiatives for planned urbanization:

a. **Garden City Movement.** The Garden City Movement is an approach to urban planning that was initiated in 1898 by Ebenezer Howard. Garden cities were self-contained communities surrounded by greenbelts and containing carefully balanced areas of residences, industry and agriculture. The idea of the garden city was influential in Canada, Germany and England.

b. **American New Urbanism.** New urbanism was a movement in urban design which started in the late 1980s in the United States of America. The idea is to shift design focus from the car-centric development to concentrated pedestrian and transit-centric, walk-able, mixed-use communities to decrease dependency on transportation.

c. **European New Urbanism.** The European Urban Renaissance was unveiled in 1996. The criteria included revitalizing city gardens, healing the city, founding new traditional cities, urbanizing suburbs and constructing new traditional public buildings.

d. **Vancouver Model.** Canadian city, Vancouver is a model because its cutting-edge sustainability plan is focused on action. The city creates communities that prioritize sustainable modes of transportation, minimizing the dependence on cars. It facilitates high-quality urban design that contributes to an attractive, functional and safe city. The city design protects the beauty of the city and its surroundings, while allowing for density and growth. As the city is carefully crafted it is livable and sustainable.

Unplanned Urbanization

The city which does not have proper planning of providing its citizens a healthy environment for living is said to be unplanned. The unhealthy environment includes improper planning for residential and industrial area, improper drainage, sewerage system, and pollution both water and air.

Causes of Unplanned Urbanization

The prime causes of rapid and unplanned urbanization is focused below:

a. Population pressure, adverse person-land ratio, landlessness and poverty.
b. Frequent and severe natural disasters.
c. Lack of social and cultural opportunities (applicable for rural rich).
d. A large proportion of rural-urban migrations are due to marriage and other familial reasons.
e. Imbalance administrative development.
f. Neglected urban issues, e.g law and order issue.
g. Housing scarcity.

Problems of Unplanned Urbanization

Unplanned and unmanaged urbanization gives rise to numerous problems in the community. They are described below:

a. **Population Pressure.** Unplanned and unmanaged urbanization process causes enormous population pressure. When people from village areas migrate to town areas, there will be uncontrolled population in the town which brings adverse effects upon the environmental aspects.

b. **Lack of Facilities.** Unmanaged urbanization results and the lack of health service, transportation, electricity, communication facilities which leads to the condition of unemployment.

c. **Unhealthy Settlement.** A residential area needs fresh air, clean water, greenery and clean surrounding. When these facilities lack, the settlement becomes unhealthy in which unmanaged urbanization leads to unhealthy settlement.

d. **Poorly Maintained Roads.** Generally unplanned slums are devoid of suitable road networks, creating problem for basic utilities and emergency health-care.

e. **Social Disorder and Criminal Activities.** The urban areas which are not properly managed, have more population pressure. The service and facilities are inadequate for large population in which unmanaged urbanization also leads to social disorder. The criminal activities of all kinds remain unabated in such an environment where it is difficult to get the general mass accountable for legal issues.

f. **Environmental Degradation.** The town areas have to face the problem of deforestation, unmanaged disposal of solid waste and environmental pollution in which unmanaged urbanization causes environmental degradation.

The negative impacts of unplanned urbanization hamper the daily human life and also the environment around us. To make the urban environment healthy and peaceful, immediate attention of all concerned and workable solution to the problems are utterly necessary.

Environmental Effects of Unplanned Urbanization with Particular Reference to Bangladesh

Urbanization has become one of the greatest environmental challenges in the world today. Projections are that by 2050, the urban population will represent more than two-thirds of the world population (World Bank, 2007). Even though the urban surface area corresponds to only two percent of the world's terrestrial surface, those same areas consume nearly 75% of the world's natural resources and generate an enormous amount of waste (UNFPA, 2007; Redman and Jones, 2004). Currently, the rate of urbanization is much higher in developing countries than in the developed world; predictions indicate that by 2020, most of the megacities of the world.

Urban growth, fuelled by population growth and economic development, has two opposing facets. On the one hand, megacities act as engines of economic and social improvement to countries (Girard et al., 2003), but on the other, urbanization leads to the destruction of the environment. Numerous studies documented a number of negative impacts of urbanization on the environment. These include:

a. Vulnerability to natural hazards
b. Channel-bank and road-surface erosion
c. Habitat destruction
d. Landscape degradation and fragmentation
e. Climate change
f. Species extinction, and
g. The reduction of net primary productivity

Bangladesh is one of the most densely populated countries in the world. As the recent trend goes, the service sector is currently replacing agriculture, and the industrial growth is maintaining steady progress. This has resulted in considerable loss of arable lands. It also exerts tremendous pressure on limited resources, predominantly on cultivated areas and forest cover. For example, every year, more than 809 km2 agricultural/rural land is transformed into cities, roads and other infrastructure in Bangladesh.

Consequently, urban growth is exceedingly conspicuous and the urban population of the country rose from 14.1 million in 1981 to 35 million in 2005, and around 45 million in2011. One of the most important reasons for the population explosion in the cities of Bangladesh is a large scale rural to urban migration caused by the collapse of a sustainable rural economy. Rapid urban growth has simultaneously induced many adverse impacts on the environment. Some of the notable impacts are- an increase of flood risk potential, severe environmental pollution, uncontrollable growth of informal settlements, massive urban poverty and the enormous problems of solid and hazardous waste disposal.

Environmental Consequences of Unplanned Urbanization with Particular Reference to Dhaka Metropolitan Area

Most of the research suggests that unplanned urbanization of Dhaka Metropolitan Area (DMA) introduces many environmental adversities. Few important ones are:

a. **Land Use and Land Cover Change.** Urban expansion onto natural lands is extremely rapid, leading to the destruction of natural habitats and rural lands. Essentially, the low-lying lands are under tremendous pressure of development for housing since these areas are significantly cheaper than any other land. In contrast, other land use/cover classes such as, water bodies, cultivated land, low-lying lands and vegetation, have all been significantly reduced.

b. **Vulnerability to Natural Hazards**

(1) **Floods.** The unplanned urbanization brings vulnerability to natural hazards, particularly to flooding and water logging during monsoon. At present, flooding has become the most pervasive and damaging phenomenon, especially in Dhaka city. Assessment indicates that flood damage is on the rise due to the progressive construction of additional infrastructure. Inappropriate physical planning of the city further aggravates the risk. Research suggests that a significant amount of the wetlands and low-lying areas, which previously served as retention ponds during the wet season, is now being developed in housing areas without considering the potential consequences of recurrent flooding.

(2) **Earthquake.** Apart from flooding, vulnerability to earthquake is also a matter of tremendous apprehension. Since the residents of DMA have no recent experience dealing with earthquake hazards, any tremor with a 7.0 magnitude would bring major human tragedy (Paul and Bhuiyan, 2010), such a tremor could cost the lives of between 50-100,000 people with much more injuries. Moreover, the construction of buildings and other urban infrastructures, which are now mainly through earth-filling on alluvial deposits, is elevating the potential of earthquake and soil liquefaction related risk. Since 80% of the buildings in Dhaka was constructed with poor geological foundations violating the standard building code, these buildings are extremely vulnerable to a devastating earthquake.

(3) **Other Hazards.** Other common hazards include severe local storms such as tornados and Nor'westers. Time series analysis of Nor'wester occurrences (1954–2000) in Bangladesh revealed that Dhaka is highly exposed to damaging storms, resulting in severe property damage (Dewan and Peterson, 2003). Since urbanization replaces natural land with metallic and concrete infrastructures, rising temperatures during the summer is directly responsible for the formation of severe local storms such as tornadoes. These weather-related hazards are likely to deepen in the context of global warming and climate change.

c. **Air Pollution and Public Health**

(1) In Bangladesh, air pollution typically originates from the high content of lead in gasoline, the large number of polluting vehicles on the road, the use of impure fuel, and poor traffic management. In addition to vehicular pollution, manufacturing industries located in and around Dhaka contribute considerable pollutants to the air, making it one of the most polluted cities in South Asia.

(2) While motor cars, aging busses, and trucks contribute to the largest percentage of the total emission, the contribution from motorcycles and auto-rickshaws is not negligible. Studies indicate that 90% of the vehicles now travelling Dhaka's street are defective, poorly maintained and emit black smoke exceeding the allowable limit.

(3) Industrial emission is another source of air pollution. Leather, food, pulp and paper, textile industries and brickfields around the city significantly contribute volatile organic compounds to the air. In addition, burning discarded tires for cooking indoors, and the household-use of kerosene, wood, and biomass are all sources of severe indoor pollution.

(4) The air quality of Dhaka has already reached an alarming state, which has serious implications for public health. Study shows that blood lead concentration levels among children in Dhaka are 10-15 times higher than the normal, that can seriously degrade their childhood development. The population of DMA has a high incidence of

bronchitis and other respiratory diseases, which is evidently due to the exposure to polluted air (UNDP, 1987). As found by a research that due to burning biomass for cooking, the slum children are typically affected by redness of eyes, itching of skin, cough, shortness of breath and chest diseases.

d. **Water Pollution**

(1) Apart from air pollution, contamination of both surface and groundwater of Dhaka appears to be seriously deteriorated due to a number of reasons including industrial effluents and unplanned urbanization. The water quality is further aggravated by flooding since tube wells are contaminated with organisms during monsoonal inundation and prolonged water-logging. Hence, water-related communicable diseases have become widespread both during and after monsoon.

(2) Surface water contamination is also tremendously impacting the aquatic diversity of floral and faunal species. The increasing concentration of chromium, lead and zinc in the peripheral rivers threatening the ecological processes of rivers. The chromium concentration in the Buriganga River was found to be extremely high, more than 90%of which come from the Hazaribagh area, which houses approximately 160 tanneries (Karn and Harada, 2001).

(3) Researchers asserted that if these non-biodegradable organic components persist in the water systems for long, they could eventually enter into the food chain damaging the human physiology. Also, slum dwellers typically build open-latrines on the roadside or construct hanging latrines on the water bodies. This also results in severe water pollution.

e. **Noise Pollution.** The noise pollution of Dhaka city has been seen as a matter of concern, posing a considerable threat to public health. Noise measurement revealed that the average level of noise excelled the allowable limit during day and night-time. The frequent use of high-pitched horns, motor vehicles are found to be the major cause of noise pollution. The use

of microphones at public meeting, waz, kawali etc contribute to serious noise pollution.

f. **Solid Waste Management**

(1) Three primary sources of municipal solid waste in DMA are residential, commercial, and street sweeping. Solid waste discharge, which amounted to 1,040 tons/day in 1985, rose to 3,200 tons/day in 2004 (JICA, 2005), demonstrates a300% growth since 1985. Reportedly the percentage of the organic portion is decreasing, whereas the percentage for paper and plastic waste is increasing.

(2) Medical waste contributes a small portion of the total solid waste, estimates are that approximately 10% to 25%of medical wastes are hazardous, and hence present a potential threat to public health. Although organic waste constitutes a major part of the total waste, composting has not yet become a popular option. As a large proportion of those domestic wastes remain uncollected and become part of the surface runoff, both surface and groundwater become contaminated, posing potentially hazard, which may have considerable implications to public health.

g. **The Growth of Slums and Squatters**

(1) Unfortunately in DMA the growth of slums and squatters is distinctive and pervasive. Given that it is the capital city, it provides better job opportunities, wages, infrastructure, and other public services, which encourages people to migrate. The large influx from rural- urban migration, particularly by marginalized and landless rural people has caused a rapid increase in the number of slum dwellers. The number of slum clusters (nearly 5,000 at present) increased about 70% since past few years.

(2) This tremendous growth might be attributed to the blooming of ready-made garment industries since the 1980s. The contribution of these people to the growth of Dhaka's economy is significant since they provide cheap labour to the manufacturing, service and

other sectors (World Bank, 2007). 90% of the members of the slum population are extremely poor with an average income of Taka 4-5 thousand/month/household, which is significantly below the poverty line. It is estimated that over 70% of slum dwellers do not have access to potable water and safe sanitation and the living conditions are extremely poor. Burning biomass for cooking and uncollected solid wastes produced around the slum produce number of environmental problems for the dwellers including blockage of the drainage system.

Analysis

The economic costs of unplanned urbanization is pretty high on a nation. When planned urbanization can bring desired changes to the lives and life-style of the individuals and community, the toll of unplanned urbanization becomes heavier on the urban population from both economic and development perspectives. Unplanned urbanization destroys the dream of the community to live in a healthy environment with access to proper education, healthcare and sanitation. The social and economic fabric of the community are severely degraded in such a dire situation. The rapid growth of unplanned urban centers strains the capacity of the municipality to provide basic services such as energy, education, health care, transportation, sanitation and physical security. Consequently, unhealthy settlement deteriorates the purity of various factors of environment such as air, water and land. The cost is even more when the future generation is exposed to hazardous environment.

Since one-sixth of the global population is currently living in shantytowns, these are the places where social problems such as crime, alcoholism, and drug smuggling are very common, creating 'unrest' condition in developing countries. Rapid unplanned urbanization, coupled with growing poverty and income inequality, will undoubtedly initiate more slums and squatter settlements. This will potentially expose even more people to unhealthy and degraded environmental conditions. And, we should brace ourselves for such a grim future.

The unplanned urbanization and the toll it takes on the environment needs to be taken as an ongoing transition. A holistic yet focused approach

towards correct management i.e. planned urbanization reflecting the related environmental cost thus needs to be considered as an opportunity that is very likely to offer economic, social and even environmental benefit in the socio-political realm, in line with the SDG- 2030.

There are legal frameworks available in terms for urbanization and environmental protection in Bangladesh, as 'Environmental Conservation Act-1995', and 'Environmental Conservation Rules-1997'. It is true that we have severely failed until now to implement the laws but we have the legal basis. We, as a responsible nation may benefit from the legal instruments of environmental protection, if we so desire.

Last, but not the least, from the perspective of National Security, that encompasses economy and development of the people as integral elements, we should no longer avoid the importance of protecting the environment affecting the urbanization, when it is not planned in a desired manner. Security and well-being of our nation is tied to the well-being of our future generation, who has all the rights to live in a secured and healthy environment.

Recommendations

In view of the above analysis, following recommendations are made as a way forward to mitigate future challenges of unplanned urbanization:

a. **Carefully Considered Urban Planning and Good Governance.** To protect rapid and unplanned urbanization and to provide opportunities of economic emancipation, carefully considered urban planning and good governance with effective regulatory frameworks in line with available Acts and Rules, is a necessity.

b. **Formulation of Proportionate Development Plan.** The principal way to mitigate the impact of urbanization on environment is the formulation of a proportionate development plan. This approach will utilize the available resources to the optimum level in each region.

c. **Ensuring Basic Amenities in Rural Areas.** Rural communities should be facilitated with basic amenities such as road network, electricity,

communication, health services and education to discourage mass migration to urban areas.

d. **De-centralization and Re-location of Public and Private Sector.** Business, industry, construction works, RMG, tannery and other related services sector should be re-located outside urban areas which will help to generate employment opportunities, reduce health hazard and discourage undue migration.

e. **Formulation of Strategic Master Plan.** Appropriate city reform strategy and long term master plan to be developed to improve the urban environment in line with the SDG and Perspective Plan of the Government

f. **Reviving Dead Water-bodies.** Recovery of dead canals, khals and their integration with the surface drainage system. This would have multi-faceted dividend in the economic, social and environmental domain.

g. **Developing a Planned and Sound Real Estate Market.** The principal idea of sustainable real estate market to develop cities keeping focus on the environment, in particular giving importance to the concept of green city.

h. **Political Commitment.** The national and local city government must have strong political commitment to ensure a planned urban center with sustainable environment.

j. **Taking Care of the Slums.** Slums are the breeding places of all sorts of anti-social activities and the communicable diseases, which has to be taken care of.

k. **Public Awareness.** Another important aspect is the public or self-awareness. People themselves should realize the importance of environmental sustainability and their responsibilities to carry out urbanization and industrialization without breaching established rules and regulations.

l. A Holistic Yet Focused Approach Towards Correct Management.
In order to overcome the environmental impact of unplanned urbanization, and to strengthen human security within the broader ambit of national security, a holistic and focused approach cannot sufficiently be emphasized.

Conclusion

Urbanization is a part of modern economic growth, which is at times blamed for contributing to climate change and related environmental burdens. It is imperative to distinguish the effects of urbanization from those of economic growth. When urbanization leads to higher productivity, it can be said to be contributing to the larger ecological footprint. However, higher productivity is also likely to be a key ingredient in any successful attempt to reduce global environmental burdens without causing economic hardship. Environmental cost, on the other hand, depends heavily on local governance and geography, but also vary systematically with economic development. That's why effective management of the changing urban environment is considered a prerequisite to achieving sustainability.

If one were to take a stock in the way of soul searching of the present state of affairs in the country, would certainly ponder, do our actions make a conservational use of the environment for our survival, or do our own actions leading us to the gradual extinction from the face of the earth? Reflecting on the spirit of winning the top United Nations Environmental Prize for Policy Leadership by our Hon'ble Prime Minister Sheikh Hasina, and in recognition of Bangladesh's far-reaching initiatives to address climate change to achieving social and economic development, let's stop unplanned urbanization to save the nature and protect the environment for ourselves and for securing the future of our next generations.

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The State of Environmental Governance in Bangladesh

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KEYNOTE PAPER OF GROUP-C

THE STATE OF ENVIRONMENTAL GOVERNANCE IN BANGLADESH

Introduction

Environmental governance is synonymous with interventions aiming at changes in environment-related incentives, knowledge, institutions, decision making, and behaviours. More specifically, "environmental governance" is referred to the set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes. Governance is not the same as government. It includes the actions of the state and, in addition, encompasses actors such as communities, businesses, and NGOs. Key to different forms of environmental governance are the political-economic relationships that institutions embody and how these relationships shape identities, actions, and outcomes. International accords, national policies and legislation, local decision-making structures, transnational institutions, and environmental NGOs are all examples of the forms through which environmental governance takes place.

In order to achieve the sustainable use of resources and the protection of environmental quality, environmental governance is imperative. This objective requires a transparent system of well-functioning environmental institutions, policies, and programs that actively involve the public in their formulation and implementation. Environmental governance is an essential component of sustainable development. Effective environmental governance is necessary to promote sustainable development (Bicknell, 2009). Bangladesh is one of the environment vulnerable countries in the world. According to EPI 2016 (Environmental Performance Index), Bangladesh ranked 173 out of 180 countries.

Throughout last decade, Bangladesh averaged a GDP growth rate of 6.5% leading the country to export oriented industrialisation. In recent years, Bangladesh has seen a major surge in export as Bangladesh Textile industry, becoming second largest in the world, along with emerging pharmaceutical, leather, plastic, ship building and IT industry etc. The country's exports are

projected to cross US$ 50 billion by 2021. By early 2016 per capita income stood at 1,466 USD. However, while Industry employing 30% of the labour force, the resulting migration has caused unplanned rapid urbanisation. Since the Independence food production has trebled as against doubled population, use of fertilizers and pesticides has also increased in manifold, thereby harming the nature.

Agricultural production and industrialisation in Bangladesh hardly considered environment. Excessive use of natural resources like water is forcing ground water level to go down in one hand, the untreated poisonous industrial waste and use of fertilizers polluting the rivers on the other hand. Harmful industrial wastes even pollutes soil, causing poisonous effects on food cycle and major health hazards. On the other hand, rapid growth of ready-made garments, knit wear and apparel industries besides others have also caused major migration of workers from rural to urban areas, mostly living in unhygienic conditions due to unplanned rapid urbanisation.

All these together have put a serious burden on the environment. Natural resources, their consumption and replenishment cycles did not maintain natural balance, causing increasing environmental hazards.

This internal crisis has been multiplied with global impacts on the environment caused by heavily industrialised developed countries. For example, scientists forecast that Bangladesh is going to be one of the worst climate victims due to global warming, which is caused not due to insignificant carbon emission by Bangladesh but by the developed countries. The consequent hazards are going to affect the next generation – the security of the nation and the state as a whole.

Overview of Environmental Law and Institutional Arrangement

Environmental Policy, Law and other Legal Instruments

The first official regulatory legislation for the control, preservation and mitigation of pollution in the environment of Bangladesh was the Environment

Pollution Control Ordinance 1977. This was a general ordinance which repealed the pre-existing Water Pollution Control Ordinance, 1970. The Environmental Pollution Control Ordinance 1977 was repealed with the enactment of the Environment Protection Act 1995. This Act provides for the conservation, improvement of environmental standard and control and mitigation of the pollution of the environment. The Act led to the creation of the Bangladesh Department of Environment (DoE). The Act centres on two issues:

a. Environmental clearance requirement for establishing or undertaking industrial units or projects.

b. Formulation of environmental guidelines and standards for the control and mitigation of environmental pollution and the conservation and improvement of environment.

Under Article 20 of the Bangladesh Environmental Conservation Act 1995, the Environment Conservation rules 1997 (ECR) were established by the Ministry of Environment and Forest of Bangladesh. The ECR 1997 encompasses the following:

a. Declaration of ecologically critical areas.
b. Procedure for granting environmental clearance.
c. Setting environmental standards for air, water, noise, odour and other environmental components.
d. Setting waste discharge and emission standards.

In terms of enforcement, the Environmental Conservation Act 1995 is a "Command and Control" type regulation with no economic incentives for compliance. In terms of technical assessment of compliance and subsequent enforcement, the DoE is as yet under resources in terms of personnel and suitable laboratory facilities.

As far as the International area is concerned, Bangladesh has ratified three international environmental treaties:

a. Framework convention on Climate Change.

b. Kyoto Protocol to the framework Convention on Climate Change.

c. Convention on Biological Diversity.

Bangladesh has adopted various policies and laws to address different environmental problems. It is estimated that there are about 200 environmental laws in the country. The major policies and laws formulated by the country are as below:

a. Forest Act, 1927
b. Wildlife Preservation Act, 1973
c. The Water Pollution Control Ordinance, 1970
d. The Environment Pollution Control Ordinance, 1977
e. Motor Vehicles ordinance1983
f. Environmental Policy, 1992
g. The Forest Policy, 1994
h. EIA Guidelines for Industries, 1997
j. Brick Burning (Control) Act, 1989 amended in 1992 & Brick Burning (Control) Rules, 1989
k. Social Forestry Rule, 2004 (amended in 2010 & 2011)
l. Building Construction Rules, 1952 amended 1996 and 2004
m. Ozone Depleting Substance (Control) Rules, 2004.
n. Sound Pollution Control Regulations, 2006
p. Biosafety Guidelines of Bangladesh, 2007.
q. Medical Waste (Management & Processing) Rules, 2008.
r. Renewable Energy Policy, 2008
s. The Ship Breaking and Recycling Rules, 2011
t. The Bangladesh Biodiversity Act, 2012
u. Sustainable Renewable Energy Development Authority (SREDA) Act 2012 (passed in National Parliament)

Environment Court Act 2000 (amended in 2010): It defines the jurisdiction of the Environmental Court for Trial of offence or for compensation under environmental law. The court can impose penalty for offences under any environmental law, to confiscate equipment or a transport used in the commission of such offence or an article or other things involved with the offence, and to pass order or decree for compensation in appropriate cases.

Conservation of Playing field, open space, Garden and Natural Water Body Act, 2000: It was enacted to restrict the change of land including playground, open space, garden and natural water bodies as well as to prohibit selling or leasing out and usage of these spaces for other purposes.

Strategies & Action Plans

National Biodiversity Strategy and Action Plan for Bangladesh, 2004: It provides a framework for conservation, sustainable use and sharing the benefits of biodiversity of the country. A major focus of the NBSAP, 2004 is the need for cross-sectoral linkages, reflecting the fact that in Bangladesh, biodiversity conservation is closely inter-woven with social and economic development. Thus, the NBSAP also provides a framework for securing the necessary environmental conditions to reduce poverty, ensure sustainable development and respond to the implementation of elements of the country's Poverty Reduction Strategy Paper (PRSP).

Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009: Its main objectives were to increase the country's resilience to climate change, to reduce the risks climate change posed to national development; and to rapidly develop the country, following a low-carbon growth path. It is a 10-year programme (2009-2018). 44 Actions under 6 thematic areas namely Food security, social protection & Health, Comprehensive disaster management, Infrastructure, Research & knowledge management, mitigation & low carbon development, Capacity building & institutional strengthening have been included in it. Under BCCSAP, 2009, Government of Bangladesh has established National fund titled 'Climate Change Trust Fund' to combat challenges of climate change impacts. During the period of 2009-2015, about US$300 million have been allocated by government for the trust fund.

Institutional Arrangements

The National Environment Council: High level committee headed by the Prime Minister & includes 29 members, and the Executive committee headed by the Minister, MoEF and 24 members formed to provide policy guidelines and directions to ensure environment friendly development in the country.

Ministry of Environment and Forests (MoEF): The nodal agency in the administrative structure of government for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. 6 departments are working under it. These are:

a. Department of Environment
b. Department of Forest
c. Bangladesh Forest Research Institute
d. Bangladesh Forest Industry Development Corporation
e. Bangladesh National Herbarium
f. Bangladesh Climate Change Trust

Department of Environment (DoE): Functions under MoEF, legal basis-section 3 of the BECA, 1995. Major functions: environmental impact assessment, issuing of environmental clearance to industries and projects, operating enforcement activities and environmental damage assessment, continuous monitoring of air quality, monitoring of water quality, increase public awareness for environmental conservation, declaration and management of Ecologically Critical areas and conservation of biodiversity and so on.

Field Office of DoE: In 21 Districts including 6 Divisional Offices. Required strength:735 but 436 working, rest of the posts are vacant.

Bangladesh Climate Change Trust. Bangladesh Climate Change Trust Act, 2010 was enacted for establishment of an organization called Bangladesh Climate Change Trust under Ministry of Environment & Forests for proper management of climate change trust fund. Its functions are governed by a 17-membered Trustee Board.

Enforcement Method

a. Enforcement operation by DoE's Monitoring & Enforcement Team of Head Office and Divisional Team-resulting in damage assessment or court case.

b. Issuing Situational & Environmental Clearance, i.e. Licensing of industries and yearly renewal of Clearance.

c. Mobile Court Operation by Magistrates from city corporation, DoE and district administration specially for the case of air pollution through illegal operation of brick fields, air pollution from motor vehicle, usage of polythene, hill cutting etc.

d. Special trial by the Environment Courts

Enforcement and Implementation of Environmental Legislation: Experience at National Level

Review of Key Policies and Plans

Environment is a complicated and cross-sectoral issue. Environment policy of Bangladesh addressed 15 sectors to address overall environmental issues. These sectors are

a. Agriculture
b. Industry
c. Health and Sanitation
d. Energy and Fuel
e. Water Development, Flood Control and Irrigation
f. Land
g. Forest, Wildlife and Bio-diversity
h. Fisheries and Livestock
j. Food
k. Coastal and Marine Environment
l. Transport and Communication
m. Housing and Urbanization
n. Population
p. Education and Public awareness
q. Science, Technology and Research.

It is not possible for an Environment Policy to ensure environmental protection for a long time. Degradation of environment indicates the ineffectiveness of the policy or its implementation. Therefore, it is needed to review an Environment Policy very frequently to anticipate latest environmental instruments and

global initiatives. As such Department of Environment (DOE) has revised the Environment Policy 1992 time to time to make it updated and compatible with the current national and international situation. The Govt. has enacted Environment Conservation Act 1995 (ECA 1995) and subsequently amended in 2000, 2002 and 2010. Besides, the Govt. has enacted the Environment Court Act, 2000, formulated the National Environmental Management Action Plan (NEMAP) and Sustainable Environment Management Plan (SEMP).

NEMAP is a wide ranging and multi-faceted plan, which builds on and extends the statements set out in National Environmental Policy. A segment of NEMAP, centered on green initiatives, was launched in 1998 by MoEF through a US $ 26 million 'umbrella' program called the "Sustainable Environment Management Program (SEMP)" which lasted until 2006. They implemented 26 individual projects addressing various aspects of NEMAP. Another segment of NEMAP, launched by MoEF was the US$10 million Bangladesh Environment Management Project (BEMP) which dealt with capacity building of the government for sustainable environmental management. Brown issues like improving the air quality was addressed through the Air Quality Management Project (AQMP). On completion of AQMP the government with the assistance of Canadian government (CIDA) launched Bangladesh Environment Institutional Strengthening Project (BEISP). A Strategic Plan was also prepared. It provides guidance on DOE's direction for the five-year (2010-14) period. The plan proposed to adhere to six areas of concentration:

a. Enhancement of environmental compliance.
b. Mitigation of potential environmental impacts through the environmental assessment and clearance process.
c. Spreading of efforts to address critical urban air quality and water quality problems.
d. Facilitation of meaningful stakeholder participation in environmental management.
e. Natural resources conservation through identification of ecologically critical areas.
f. Ensuring effective, efficient and accountable DoE's service.

The other strategies and plans that provides guidelines for sustainable developments are

a. National Biodiversity Strategy and Action Plan for Bangladesh (NBSAP),
b. Perspective Plan (2010-2021), the NSDS (2010-21).

The other sectoral policies that involves environment are:

a. The National Forest Policy of 1994
b. Wetland Policy, 1998
c. Tourism Policy
d. National Water Policy (2012)
e. The National Land Use Policy 2001
f. The Coastal Zone Policy (CZP) 2005
g. The Industrial Policy, 2010
h. National Energy Policy 1995
j. National Agricultural Policy, 1999.

Key Strength of the Policies/Programs/Projects

Article 18 A of the constitution ensures environment protection and the pursuit of sustainable development is therefore a constitutional obligation.

The concern about environmental issues also has been reflected in different policy initiatives taken by Bangladesh government. The major policy initiatives, strategies and plans emphasized environment and natural resources management to achieve sustainable development.

Acknowledgement of the inter linkage of poverty, population pressure, illiteracy, inadequate health care facility and environmental awareness in environmental management and acknowledgement of the need to address these situations in an integrated manner.

The Environment Policy attempts to address environment degradation and pollution by providing guidelines to the sectors which are responsible.

MoEF has a wealth of experience on GO/NGO collaboration in the planning, designing and implementing environment management projects. MoEF sought to involve the civil society, CBOs & NGOs. A major work was undertaken with active participation of these actors, which in turn generated public opinion through an elaborate consultation process at the grass roots, has been the formulation of NEMAP in 2005.

Under ECA'95, EIA has been accepted as a mandatory tool to identify and predict impacts and undertake proper mitigation measures in a project scale. To ensure that people likely to be affected takes part in making development decision. EIAs of projects & industries are made public & scrutinized.

DoE routinely does the public hearing. It does also make disclosure of EIA. This program has increased its accountability.

Notable Project Implementations

Air Quality Management and Standards

The history of air quality management in Bangladesh is relatively recent. Ambient air quality standards were first introduced in Bangladesh in 1997 under the environmental conservation rules (ECR) 1997. The Air Quality Management Project (AQMP) implemented by the DOE during 2000-2007 with support from the World Bank was the first major project aimed at air quality management in Bangladesh. The objectives of the AQMP included reducing vehicular emissions in the metropolitan areas, setting standards, enforcing pilot programs towards cleaner technologies, as well as implementing air quality monitoring and evaluation.

Bangladesh ranks 169th (out of 178 countries) at the Environmental Performance Index for Air Quality (2014 score). As such, World Bank has invested in the Clean Air and Sustainable Environment project (CASE) program under which "A modern Air Quality Research and Monitoring Centre (AQRMC) has been established at the Centre for Advanced Research in Sciences (CARS) of Dhaka University (DU)". For monitoring the air quality 11 CAMS (Continuous Air Quality Monitoring Station) have been installed all over the country including Dhaka).

Air Pollution Control. To control air pollution in the country following measures have been taken:

a. Banning of two stroke three wheelers since 2003.
b. Incorporation of air quality standards in ECR.
c. Introduction of air quality index and vehicular emission standards.
d. Most notably in 2013 enactment of Brick Making and Brick Field Establishment (Control) Act 2013.
e. Introduction of clean technology of Vertical Shaft Brick Kiln (VSBK) which emit around 60%-70% less particulate matter than the traditional fixed kilns.

In 2014-15 the national coverage of modernized brick fields was 57%.

Enforcement with Polluter's Pay Principle

Operating Mobile Court and about Tk. 106 crore and 33 lakh has been paid by 1788 industries as compensation for creating damage of environment. In the year 2014-15, about 1929 Million BDT was imposed by enforcement team as fine after environmental damage assessment in 1993 industries under Bangladesh Environment Conservation Act 1995 (amended in 2010).

ETP Coverage

Installation of Effluent Treatment Plant (ETP) is 812 (as of May, 2014). The coverage of ETP in Bangladesh in 2014-15 was 72%. Government has taken initiative to install a Central Effluent Treatment Plan (ETP) for treatment of effluents from Tannery Industries. MoEF, (2015).

Ban of Polythene Shopping Bag

Bangladesh was the first country to ban plastic bags. The Bangladesh Environment Conservation Act was formulated in 1995. The law of section 1 under this act was revised in 2002. According to Rule 6ka of Clause-5 under Section-9, restriction has been imposed in the production and uses of polythene shopping bag. According to Rule 6ka, the penalty and punishment will be

a. For production, import and marketing – 10 years sentence of vigorous prison, or 1 million taka fine, or both punishment together.

b. For sale, exhibition for sale, store, distribution, transportation or use for commercial purpose – 6 months sentence of vigorous prison or 10 thousand taka fine, or both punishments together.

However, Bangladesh is still struggling with the issue of plastic bags and enforcing the ban. The Bangladesh government runs few mobile courts per year and enforce little amount of fines which is not enough to enforce the ban.

Declaration of Forest Protected Areas: 37 protected forest areas including dolphin sanctuaries, 10 other conservation sites including botanical garden and eco- parks have been declared under Forest Act 1927. The first Marine Park of the country has been declared in 1738 km area of the Bay of Bengal.

Declaration of Ecologically Critical areas (October 2009): As per provision of Bangladesh Environment Conservation Act 1995, (amended in 2010), 12 areas of the country have been declared as Ecologically Critical Areas (ECA)**.** Restrictions have been imposed on hunting, fishing, all activities that could result in the destruction of floral or faunal habitats, activities that could destroy natural characteristics of water and soil, activities detrimental to fishery, installation of polluting industrial units, and discharge of domestic/ industrial liquid waste. Local community has been involved in the management of ECAs and community based approach is being used in the environment conservation activities.

Coastal Green Belt Project: The Project improved the natural environment by establishing plantations along almost 14,000 km of roads and embankments and in numerous homesteads throughout 12 coastal districts, heightening public appreciation of forestry and conservation. The Project did not create the coastal greenbelt intended as a buffer against tidal surge and cyclones. The Project only marginally achieved its objectives to create considerable alternative income opportunities and help improve the living conditions of targeted local beneficiaries.

Green Tax: 1% Surcharge has been imposed on the products of environment polluting industries that has come in effect from July 2014.

Social Forestry: Notable achievement has been done in social forestry including plantation of 24,184 Ha and 10,944 km benefiting 109,400 participants with BDT 2372.6 million and generating BDT 2203.6 million BDT for the GoB.

Shifting Industries and Industrial Zoning: A process for shifting industries outside Dhaka has been initiated.

Industrial Sludge Management: Guideline for Industrial Sludge Management has been drafted and pending for government approval. Also DoE is working on promoting Zero-Discharge policy among the industries. Few cement industries (i.e. Lafurge Shurma Cement Ltd.) have started adopting it.

Renewable Energy Sector: As part of climate change adaptation activities, 12,872 Solar Homes have been established which contributed to encourage generation of renewable energy as well as sustainable energy consumption in the country.

Restriction in Industry set up in forest land: Restriction in industry set up in certain areas in Gazipur to protect forest land and biodiversity by gazette notification was imposed in 2008 by MoEF.

Implementation of Multilateral Environmental Agreements (MEA): Progress in Bangladesh

Multilateral Environmental Agreements (MEA). Multilateral environmental agreements play a critical role in the overall framework of environmental laws and conventions. Complementing national legislation and bilateral or regional agreements, multilateral environmental agreements form the overarching international legal basis for global efforts to address particular environmental issues. The role of multilateral environmental agreements in achieving sustainable development has long been recognized. Some multilateral environmental agreements focus on particular themes. These are:

a. The biodiversity-related multilateral environmental agreements (Convention on Biological Diversity, Convention on International Trade in Endangered Species of Wild Flora and Fauna, Convention on the Conservation of Migratory Species of Wild Animals, Convention concerning the Protection of the World Cultural and Natural Heritage, International Treaty on Plant Genetic Resources for Food and Agriculture and International Plant Protection Convention).

b. The chemicals-related multilateral environmental agreements (Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and Stockholm Convention on Persistent Organic Pollutants).

Other outcomes of international conferences are:

a. The Rio Conventions (Convention on Biological Diversity, United Nations Framework Convention on Climate Change, United Nations Convention to Combat Desertification).

b. The Regional Seas Conventions and Action Plans, deal with specific regions.

In recent years, several multilateral environmental agreements have focused on linking their mandates to the development agenda, and strategies have been developed to contribute to sustainable development. The Strategic Plan for Biodiversity for the period 2011–2020 addresses issues of sustainable development contributions to the Convention on Biological Diversity through its governing body. Similarly, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the Convention on the Conservation of Migratory Species of Wild Animals, the United Nations Framework Convention on Climate Change, the Basel and Rotterdam conventions and others have developed action programmes and strategic links connecting their mandates to sustainable development, thus strengthening the link between the multilateral environmental agreements and the 2030 SDG Agenda.

Implementations of MEA

a. **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989**: Bangladesh has imposed ban on the import of all sorts of hazardous wastes in the Import Policy Order 2012-2015. Restrictions have also been imposed by the Hazardous waste and Ship Breaking Waste Management Rules 2011 promulgated under Bangladesh Environment Conservation Act 1995 (amended 2010). Hazardous waste has been defined (section-2, Bangladesh Environment Conservation Act, l997 (amended in 2010) and National Chemical profile, 1996.

b. **United Nations Framework Convention on Climate Change (UNFCCC), 1992**: Bangladesh has submitted its Green House Gas Inventory or assessment on national Green House Gas emission through Second National Communication in October, 2012. Preparation of Third National Communication is going on.

c. Based on the decision of COP-20 of the UNFCCC at Lima in 2014, Bangladesh has prepared and successfully submitted its Intended Nationally Determined Contribution (INDC).

d. Bangladesh has also prepared the National Adaptation Programme of Action (NAPA) in 2005 and also adopted Bangladesh Climate Change Strategy and Action Plan in 2009.

e. **Convention on Biological Diversity, 1992**: Under this convention the National Biodiversity Strategy and Action Plan for Bangladesh was developed by **MoEF** in 2004. As per the commitment given, the Fourth National Reporting of CBD was submitted by DoE in 2010. The report aims to portray the status, trends and threats of biodiversity; stock take the country's accomplishments in terms of implementation and mainstreaming of the National Biodiversity Strategy and Action Plan; review the status of NBSAP mainstreaming and gaps and assess the progress towards 2010 biodiversity targets; and finally, Drafting of the Fifth National Reporting 2015 is under process. Also the drafting of Biodiversity Act, 2015 and ECA Rules has been completed and is under the process of enactment.

f. Following the commitments made under Agenda 21 in 1995, the National Environment Management Action Plan (NEMAP) was developed by the government after consultation of all stakeholders, NGOs, civil society, lobbyists. NEMAP aimed at integration of environment and development decision making.

g. **United Nations Convention to Combat Desertification (UNCCD), 1996**: Bangladesh prepared and submitted 10- years' strategic plan and framework- UNCCD 5th National Report as per the decision2/COP-19.

h. **Cartagena protocol on Biosafety to the Convention on Biological Diversity, 2000**: In Bangladesh MoEF has formulated Biosafety Guidelines of Bangladesh in 2007 under this protocol. Special permission for importing GMO is given after the recommendation of MoEF based on the decision of national technical committee.

j. **Convention on Persistent Organic Pollutants, Stockholm, 2001**: As stocktaking of DDT remaining in substances is going on under this convention, the national reporting on the production and use of DDT and other information relevant the evaluation of continued need for DDT for vector disease control was submitted by Bangladesh recently.

Success in Implementation of Environmental Legislations & MEAs in Bangladesh

a. Online service for **Issuing Environmental Clearance**: As a part of the government's commitment stipulated in Vision-2021 for building Digital Bangladesh, DoE launched the online service for issuing environment clearance to industries in 2014.

b. **99% ETP Cove**rage in major industrial districts: Due to strong enforcement activities and awareness building in Dhaka and nearby cities, the coverage of Effluent Treatment Plant (ETP) has increased upto 99% in some major industrial districts like Gazipur, Narayanganj.

c. **Constitutional recognition** to protect and improve environment and biodiversity in Bangladesh was given in its fifteenth amendment in year

2011 where a special article was inserted as Article 18A. The Article stipulating that- "The state shall endeavour to protect and improve the environment and to preserve and safeguard the natural resources, biodiversity, wetlands, forests and wildlife for the present and future citizens."

d. **Phasing out of HCFC and ODS** in some sector under Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 : In order to reduce the use of Ozone Depleting Substances (ODS) Bangladesh has phased out use of CFC 100% from refrigerator, aerosol and pharmaceuticals by 2014. Besides, Carbon Tetra Chloride and Methyl Chloroform was totally phased out in 2010. Also the use of CFC-11, CFC-12 in pharmaceuticals industry have been phased out particularly in manufacturing inhalers. In 2013, Bangladesh started and become successful in total phasing out HCFC-141b from foam sector. As a result, 60 percent use of ODS has been reduced in the country & the country was awarded by the Secretariat of Montreal Protocol.

International Recognition

a. Very recently the initiatives of Bangladesh government in climate change have been appreciated in the international forum and as such the Honourable Prime Minister was awarded as 'Champions of the Earth' in the Policy Leadership Category of UNEP. The government initiative in developing Bangladesh Climate Change Strategy and Action Plan, 2009 and generating a revenue fund called Climate Change Trust fund is playing significant role in building climate resiliency and socio economic development of the country.

b. Co-management approach of NBSAP in social forestry was appreciated and a co-management team was awarded the Equator Award by the UN.

Key Issues and Challenges in Implementation of Environmental Legislations & MEAs in Bangladesh

a. **Inadequate Manpower and Organizational Setup of Department of Environment**: It is the biggest concern; the organization set up of DoE exists only in 21 districts out of 64 districts of the country. DoE is working with only 446 personnel.

b. **Coordination Gap**: Notable gap in coordination among other ministries/ departments closely related to environment issues, i.e. Ministry of agriculture, land, water resources, fisheries and livestock, industries, health and family welfare as well as lack of coordination among different other stakeholders (governments, NGOs, private sector and civil society).

c. **Lack of Integration**: Environmental issues are interdependent (i.e.cross-cutting), not only with development and sustainable economic growth, but also with trade, agriculture, health, peace and security. Hence, lack of integration of environmental concerns in development initiatives is a major problem in Bangladesh.

d. **Lack of Public Awareness**: Lack of education and awareness on environment protection among people and industrialists, businessmen, importers hinders the enforcement and implementation of environmental instruments to a great extent. It creates major challenge in implementing MEAs.

e. **Lack of Database**: Absence of environmental database on licensing, industries as well as database of flora, fauna, air, water and soil quality is critical challenge for the country. All institutions related to environment lack (including DoE) essential data on resources and basic technical expertise for effective management.

f. **Absence of SEA System**: The Strategic Environmental Assessment (SEA) is an analytical and participatory approaches aiming to integrate environmental considerations into policies, plans and programs and evaluate their inter-linkages with economic and social considerations. But except very few cases, SEA has neither become formally institutionalized nor being practised. It is still lacking in the legal system.

g. **Lack of Political Will**: Lack of political will for solving environmental problems and political persuasion in favour of business establishments to avoid damage assessment under polluters pay principle sometimes hampers the enforcement activities.

h. **Limited Resources**: Limited financial resources and insufficient direct investment in the environment are responsible for promotion of environmental governance.

j. **Poverty**: The presence of severe pockets of poverty, social exclusion, deprivations, slums and scattered settlements within urban areas.

k. **Migration**: The rural-urban migration process and the pattern of economic activity, driven by industrialization and exposure to environmental risks.

l. **Context of Climate Change**: frequent extreme events, SLR.

Specific Challenges in Enforcement of Environmental Legal Instrument in Bangladesh

a. Lack of knowledge of law at the operational level.

b. Uncertainties and ambiguities in the provisions in expressing powers, functions, authorities and jurisdiction.

c. Lack of by-laws, Institutional weakness and lack of policy orientations.

d. Uncertainties over the legal status of resources.

e. Conflict between public and private tenure.

f. Problems with resources survey, settlement and record or rights.

g. Lack of adequate monitoring and environmental quality measurement capabilities.

h. Inefficient measurement tool (i.e. SPM & air quality).

j. Inadequate tools and mechanisms for establishment of evidence.

k. Non-cooperation, lack of awareness, lack of shared understanding, lack of technology and institutional set up, transboundary movement issue, illegal trafficking.

Example from Basel Convention

a. The main challenge is in identifying that a transboundary movement of hazardous wastes or other wastes may be a case of illegal traffic.
b. Lack of awareness by importers or disposers about the requirements of the Basel Convention.
c. Lack of cooperation by importers or disposers in complying with the requirements set out in the convention.
d. Difficulty to dispose of the waste in an environmentally sound manner.
e. Difficulties in communicating and cooperating with other States concerned by the case of illegal traffic (State of transit, State of export).
f. Lack of shared understanding among States concerned of how to operationalize the provisions.
g. Lack of guidance on how to operationalize.
h. Sometimes attempts are made to import hazardous wastes in other names.

Contributions of Civil Society

Contribution of Non-Government Organisations

A number of national and international organisations look after the environmental aspect of the country. Some of the prominent ones are given below:

a. **Bangladesh Centre for Advanced Studies**: Bangladesh Centre for Advanced Studies (BCAS) is an independent, non-profit, non-government, policy, research, and implementation institute working on sustainable development at local, national, regional and global levels. BCAS addresses sustainable development through four interactive themes:

    (1) environment-development integration,
    (2) good governance and people's participation,
    (3) poverty alleviation and sustainable livelihoods, and
    (4) economic growth and public-private partnership.

b. **Bangladesh Environment Lawyers Association**: BELA, an advocacy group of lawyers, was established in 1992 with the broad objective of promoting environmental justice and contributing to the development of sound environmental jurisprudence. The broad objective of BELA is to promote environmental justice and contribute towards the development of a sound environmental jurisprudence.

c. **Proshika** - Proshika's one of the major activities is social forestry programme. It is a systematic intervention to enhance the plantation, protection and regeneration of the forest resources.

d. **Bangladesh Rural Advancement Centre (BRAC).** BRAC has two environment related program: Disasters & Climate Change The programme seeks to:– promote better disaster preparation and management–increase awareness about climate change and its impact– undertake research to identify successful risk reduction and coping mechanisms Water, Sanitation & Hygiene

e. **Wildlife Trust of Bangladesh (WTB)**. WTB is a non-profit organization whose aim is to conserve the country's biological diversity. WTB's activities include: Research and monitoringInstitutionalandpolicydevelopmentCommunicationandeducationWildlife-humanconflictmitigationLegislation and law enforcement

f. **Bangladesh Poribesh Andolon (BAPA).** BAPA is a common forum of citizens and organizations concerned with the environment of Bangladesh. BAPA, acting as a pressure group against any kind of environment degradation, is trying to create a broad-based citizen's movement for protection and betterment of environment in Bangladesh. It organizes seminars, meetings, conferences and workshops to draw attention to general and specific problems in environment and educate the public on such issues. It holds rallies and demonstrations to build up public awareness and secure wide participation of people on environmental issues.

Bangladesh is faced with rampant poverty, high population density, recurring natural disasters and a dwindling natural recourse base. All these factors make it imperative for the country to integrate all development concerns. The role of NGOs especially those dedicated towards environmental causes are

crucial towards the end. Role of these NGOs has earned more credibility and commendation as they surely play a role in raising community environment consciousness, promoting protection and the needs of sustainable development.

Role of NGOs working on environmental issues in Bangladesh can be synthesized in the following form: Programme implementation (social forestry, crop diversification) Policy initiation or providing policy inputs (National Environment Management Action Plan) Assistance in international negotiation Research Environmental movement (GM food) Watchdog role (ship breaking)

Contribution of Media

Last but not the least, the role of media, both electronic and print is praiseworthy in raising awareness for environmental protection. Drawing public attention time to time the media has been vocal for the cause of environmental protection. Without the support of the media it would be difficult for the GO and NGOs to raise public awareness and draw support for the cause of environmental governance.

Recommendations

Keeping all in mind the paper recommends the followings:

a. The prime need is to strengthen the manpower and increase the capability of the Department of Environment staff in terms of knowledge, skill and technical knowhow. There is an immediate need to increase the manpower of DoE and expand its official set up all over the country.

b. Education and awareness for consensus building and participation of community is a must in every environmental initiative.

c. Strengthening of local government organization with resources and authority.

d. Planning Commission and MoEF can jointly collaborate to develop a legal instrument on conducting SEA. Alternatively, SEA can be included

in the Bangladesh Environment Conservation Act, 1995 (amended, 2010) and Environment Conservation Rule, 1997. Like EIA, Department of Environment should develop a guideline for SEA.

e. Due to their critical role in service delivery and implementation, civil society organizations have long been recognized as "partners" of the UN system, especially in environmental negotiations. Civil society should play a major role in the following areas to streamline the environmental governance particularly in Information collection and dissemination; Policy development consultation; Policy implementation; Assessment and monitoring; Advocacy for environmental justice.

f. Orientation of officials from MoEF, DoE, Customs, Tax, Boarder guards and other stakeholders to international conventions for implementing MEAs should be regularly given by the development partners and MoEF.

g. Integration between government and other knowledge based institutions also necessary.

h. Establishing environmental database and sharing among different departments is essential.

j. Establishment of couple of Central Effluent Treatment Plan at zoning basis is important to ensure full time monitoring of the effluents and to improve the state of environment of the country.

Conclusion

Environmental Governance has three distinct components. These are the governmental institutions with their rules and regulations with implementation; Global commitment in assuring the international community in the commitment and role of the country and finally the civil society which will include the NGOs, think-tanks, corporate commitment and the media. Bangladesh with her aspiration to become middle income country by 2021 and developed country by 2041has to go for rapid industrialisation. This in turn has given rise to rapid unplanned urbanisation. These two factors with massive population has taken its toll on the environment. The need to preserve the environment for the future generation against the need of the present requirement of development has put the country in a balancing act. We can

neither overlook our goal of coming out of poverty nor can we ignore the need for sustainability. The existing Acts, Rules and Regulations if complied with will allow our environment to recuperate sufficiently for sustainment. But our inadequate monitoring and implementation without the incentive leaves much more to be achieved. Awareness being one of the major hurdles in understanding the implications of noncompliance also has to be dealt with for proper governance in the field of environment. Where almost all sectors has an impact on the environment, need to understand, cooperate and coordinate their efforts to ensure a better environment for our future generations.

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Sustainable Development - Strategy for Green Industrialization and Urbanization in Bangladesh

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KEYNOTE PAPER OF GROUP-D

SUSTAINABLE DEVELOPMENT - STRATEGY FOR GREEN INDUSTRIALIZATION AND URBANIZATION IN BANGLADESH

Introduction

It is no secret that Bangladesh has recorded an average GDP growth rate more than 6 per cent over the past 5 years. This performance has contributed significantly to its rating as a lower middle income country. However, although the drivers of growth are diversifying, Bangladesh continues to rely heavily on agriculture and RMG industry as the main drivers of its economy. Based on the realization that industrialization is an imperative for sustainable growth, Bangladesh is making efforts towards accelerated and profound economic structural transformation, through reallocating economic activities from less productive sectors to industrialization for sustainable and inclusive growth of its economy.

One of the most important questions however is, how should Bangladesh pursue its industrialization? Many pathways exist, but as a newcomer it can learn from others' experiences while defining and designing its own pathway-based on its own realities and learning from history and the experiences of other countries- to leapfrog traditional, carbon-intensive methods of growth and champion a low-carbon development trajectory. Bangladesh can also take advantage of new innovations, technologies and business models on a pathway that uses its natural resources optimally and efficiently as inputs to an industrialization process powered by our endowments of clean sources of energy. It is necessary for Bangladesh to pursue a different pathway to industrialization, in short, one that enables the nation to green its industrialization. In so doing, it will pursue its development agenda along a pathway that ensures that economic growth is truly sustainable and inclusive through green jobs and positive spill overs.

As Bangladesh economy grows and depends more and more on manufacturing and organized services, urbanization will grow. The challenge will be for Bangladesh to manage its transition from an agrarian economy to a modern green industrialized economy through appropriate institutions, programs and

policies. Ambitious urban development programs, therefore, need to be taken up based on the policies and strategies that will cover spatial, economic, social, cultural, aesthetic and environmental aspects of urban life. It is expected that implementation of these programs will be instrumental in achieving an urban reality that can enhance capacity to live a healthy life; ensure access to education, shelter, and basic services, and lead to a secure and livable environmentally friendly Bangladesh.

It should however be noted that Bangladesh's strive towards economic advancement is not without some cost on its ecosystem due to urbanization and industrialization among other factors. This is evident from natural calamities, loss of bio-diversity, deforestation, destruction of wetlands and inland fisheries, arsenic contamination in the ground water in the southern part of the country, soil nutrient depletion and inland salinity intrusion in the South West region, and creeping desertification in the Northern region. Bangladesh is also one of the most natural disaster prone areas that suffer from ravages of floods, cyclones, storm surges and drought. In urban areas, air pollution, sound pollution and waste load from industries, hospitals, and municipalities are a matter of great concern.

Equally important is the need to have an effective strategy to tackle associated challenges when natural disasters happen. Bangladesh's goal therefore should be to implement strategies to protect it from unpleasant effects of climate change and global warming that could arise as a result of increased industrialization. The objective will be to take all necessary actions to protect the vulnerable people from natural calamities, to take actions for the prevention of industry and transport related air pollution and to ensure disposal of waste in a scientific manner. Required steps will also be taken to make Bangladesh an ecologically attractive place and to promote environment-friendly tourism.

It is in line with the above that Group D was tasked to present a keynote paper on Sustainable Development-Strategy for Green Industrialization and Urbanization in Bangladesh. To achieve this, Group D will start by presenting a brief overview of global initiatives, concepts and features of SDGs with special reference to Green Industrialization and Urbanization. Thereafter, it will highlight the impact of unplanned industrialization on the environment by looking at the challenges and strategies for sustainable green industrialization

in Bangladesh. Furthermore, the group will examine the impact of unplanned urbanization on the environment as well as the challenges and strategies for sustainable green urbanization in Bangladesh before a brief discussion on Sustainable Development vs Development and round up with some case studies, conclude and make some recommendations.

Overview on The Concept and Features of SDGs with Special References to Green Industrialization and Urbanization

Concept of Sustainable Development

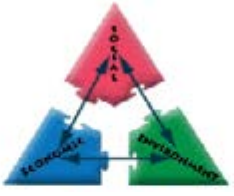
General. Sustainable development is a process for meeting human development goals while sustaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend. Sustainable development has its roots in ideas about sustainable forest management which were developed in Europe during the seventeenth and eighteenth centuries. In response to a growing aware of the depletion of timber resources in England, John Evelyn, an English writer, gardener and diarist argued that "sowing and planting of trees had to be regarded as a national duty of every landowner, in order to stop the destructive over-exploitation of natural resources". As the concept developed, it has shifted to focus more on economic development, social development and environmental protection.

Definition of Sustainable Development. The most accepted definition of sustainable development was published in the report of World Commission on Environment and Development (Brundtland Commission) in 1987. The concept became one of the most successful approaches to be introduced in many years. In fact, it helped to shape the international agenda and the international community's attitude towards economic, social and environmental development. The Brundtland Commission's report defined sustainable development as **"Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs"**. The concept supports strong economic and social development, in particular for people with a low standard of living. Sustainable development ensures a harmonious process of social and economic betterment that satisfies the needs and values of all interest groups while maintaining future opportunities and conserving natural resources and biological diversity.

Focus of Sustainable Development

The focus of sustainable development is far broader than just the environment. It's also about ensuring a strong, healthy and just society. This means meeting the diverse needs of all people in existing and future communities, promoting personal wellbeing, social cohesion and inclusion and creating equal opportunity.

People concerned about sustainable development suggest that meeting the needs of the future depends on how well we balance social, economic, and environmental objectives--or needs--when making decisions today. Some of these needs are itemized around the puzzle diagram.



Services	Equity	Biodiversity
Household Needs	Participation	Natural Resources
Industrial Growth	Empowerment	Carrying Capacity
Agricultural Growth	Social Mobility	Ecosystem Integrity
Efficient Use of Labor	Cultural Preservation	Clean Air and Water

Many of these objectives may seem to conflict with each other in the short term. For example, industrial growth might conflict with preserving natural resources. Yet, in the long term, responsible use of natural resources now will help ensure that there are resources available for sustained industrial growth far into the future.

Global Initiatives So Far with Special Emphasis on Rio Summit 1992

General. A greenhouse gas (sometimes abbreviated GHG) is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Without greenhouse gases, the average temperature of Earth's surface would be about 18 °C (0 °F), rather than

present average of 15 °C (59 °F). Human activities since the beginning of the Industrial Revolution (taken as the year 1750) have produced a 40% increase in the atmospheric concentration of carbon dioxide, from 280 ppm in 1750 to 400 ppm in 2015. This increase has occurred despite the uptake of a large portion of the emissions by various natural "sinks" involved in the carbon cycle. Anthropogenic carbon dioxide (CO_2) emissions (i.e. emissions produced by human activities) come from combustion of carbon-based fuels, principally coal, oil, and natural gas, along with deforestation, soil erosion and animal agriculture. It has been estimated that if greenhouse gas emissions continue at the present rate, Earth's surface temperature could exceed historical values as early as 2047, with potentially harmful effects on ecosystems, biodiversity and the livelihoods of people worldwide.

The United Nations Conference on the Human Environment. First summit, "The United Nations Conference on the Human Environment" was held in Stockholm, Sweden from June 5-16 in 1972. The meeting agreed upon a Declaration containing 26 principles concerning the environment and development, an Action Plan with 109 recommendations, and a Resolution. One of the decisive issues that emerged from the conference is the recognition for poverty alleviation for protecting the environment.

Rio Summit 1992. Rio Summit 1992 or Earth Summit was the second such summit with the theme "Environment and Sustainable Development" was held in Rio de Janeiro from 3 to 14 June 1992. Salient of the summit were:

Patterns of production - particularly the production of toxic components, such as lead in gasoline, or poisonous waste - are being scrutinized in a systematic manner by the UN and Governments alike.

Alternative sources of energy are being sought to replace the use of fossil fuels which are linked to global climate change.

New reliance on public transportation systems is being emphasized in order to reduce vehicle emissions, congestion in cities and the health problems caused by polluted air and smog.

There is much greater awareness of and concern over the growing scarcity of water.

Important Legal Bindings

Convention on Biological Diversity. The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, is a multilateral treaty. The Convention has three main goals:

1. Conservation of biological diversity.

2. Sustainable use of its components.

3. Fair and equitable sharing of benefits arising from genetic resources. Its objective was to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

United Nations Framework Convention on Climate Change (UNFCCC). The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty negotiated at the Earth Summit. The UNFCCC objective is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The framework set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms.

United Nations Convention to Combat Desertification. The United Nations Convention to Combat Desertification is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

The documents resulted from the Summit are as follows:

1. **Rio Declaration on Environment and Development**. It is a set of 27 principles that highlights the need for sustainable development.

2. **Agenda 21**. Agenda 21 is a non-binding, voluntarily implemented action plan of the United Nations with regard to sustainable development. It is an action agenda for the UN, other multilateral organizations, and

individual governments around the world that can be executed at local, national, and global levels. Agenda 21 is a 300-page document divided into 40 chapters that have been grouped into 4 sections:

3. **Section I**. Social and Economic Dimensions is directed toward combating poverty, especially in developing countries, changing consumption patterns, promoting health, achieving a more sustainable population, and sustainable settlement in decision making.

4. **Section II**. Conservation and Management of Resources for Development Includes atmospheric protection, combating deforestation, protecting fragile environments, conservation of biological diversity (biodiversity), control of pollution and the management of biotechnology, and radioactive wastes.

5. **Section III**. Strengthening the Role of Major Groups includes the roles of children and youth, women, NGOs, local authorities, business and industry, and workers; and strengthening the role of indigenous peoples, their communities, and farmers.

6. **Section IV**. Means of Implementation: implementation includes science, technology transfer, education, international institutions and financial mechanisms.

Forest Principles. The Forest Principles is a non-legally binding document that makes several recommendations for conservation and sustainable development forestry.

Follow up of the Summit. In 1997, the Kyoto Protocol - an international treaty was concluded and established legally binding obligations for developed countries to reduce their greenhouse gas emissions in the period 2008-2012. The 2010 Cancun agreements state that future global warming should be limited to below 2.0 °C (3.6 °F) relative to the pre-industrial level. The Protocol was amended in 2012 to encompass the period 2013-2020 in the Doha Amendment, which -as of December 2015- not entered into force. In 2015 the Paris Agreement was adopted, governing emission reductions from 2020 on through commitments of countries in ambitious Nationally Determined Contributions.

Rio+5 (1997). In 1997, the UN General Assembly held a special session to appraise the status of Agenda 21 (Rio +5). The Assembly recognized progress as "uneven" and identified key trends, including increasing globalization, widening inequalities in income, and continued deterioration of the global environment.

Millennium Development Goals. The Millennium Development Goals (MDGs) are the eight international development goals that were established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. All 189 United Nations member states at the time (there are 193 currently), and at least 23 international organizations, committed to help achieve the following Millennium Development Goals by 2015:

1. To eradicate extreme poverty and hunger.
2. To achieve universal primary education.
3. To promote gender equality and empower women.
4. To reduce child mortality.
5. To improve maternal health.
6. To combat HIV/AIDS, malaria, and other diseases.
7. To ensure environmental sustainability.
8. To develop a global partnership for development.

Rio+10 (2002). The World Summit on Sustainable Development (WSSD) or ONG Earth Summit 2002 took place in Johannesburg, South Africa, from 26 August to 4 September 2002. It was convened to discuss sustainable development by the United Nations. WSSD gathered a number of leaders from business and non-governmental organizations, 10 years after the first Earth Summit in Rio de Janeiro. (It was therefore also informally nicknamed "Rio+10").

Rio+20 (2012). The United Nations Conference on Sustainable Development (UNCSD), also known as Rio 2012, was the third international conference on sustainable development aimed at reconciling the economic and environmental goals of the global community. It was held from 13 to 22 June 2012. Rio+20 was

a 20-year follow-up to the 1992 Earth Summit / United Nations Conference on Environment and Development (UNCED) held in the same city, and the 10th anniversary of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg.

Objectives. The conference had three objectives:

1. Securing renewed political commitment for sustainable development.
2. Assessing the progress and implementation gaps in meeting previous commitments.
3. Addressing new and emerging challenges.

Conference themes. The official discussions had two main themes:

1. How to build a green economy to achieve sustainable development and lift people out of poverty, including support for developing countries that will allow them to find a green path for development.

2. How to improve international coordination for sustainable development by building an institutional framework.

Sustainable Development Goals (SDGs). SDGs were the follow up of the Millennium Development Goals (MDGs). The MDGs emphasized that each nation's policies should be tailored to that country's needs; therefore most policy suggestions were general. As with the end of target year 2015, all the goals could not be achieved, SDGs with 17 specific goals were adopted in UN Summit in September 2015. These have come into effect from 2016 to 2030. Among the 17 Goals, SDG-9, SDG-11 and SDG-13 directly relates to Industrialization, Urbanization and Environment respectively.

Figure 1: Sustainable Development Goals (SDGs)

SDG-9 (Industry, Innovation and Infrastructure). Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

SDG-11 (Cities and Communities). Make cities and human settlements inclusive, safe, resilient and sustainable.

SDG-13 (Climate Action). Take urgent action to combat climate change and its impacts taking note of agreements made by the UNFCCC forum (The Guardian, 2015).

Impact and Challenges of Unplanned Industrialization on Environment and Strategy for Sustainable Green Industrialization in Bangladesh

Industrialization and Environment. The Industrial Revolution, a historical process that characterized the transition from an agrarian and crafts-based society to one based on trade and industry has profoundly altered our world. Major changes have taken place in agriculture and spread gradually over last 150 years to all sectors including energy, transport, textile, metallurgy, electricity, steel and chemicals resulting in radical a transformation of our societies, commerce, economy, politics, and the environment. However, the changes

and transformations over past decades in all sectors of industrial activity are extremely deep, varied and complex, as are the solutions to many challenges they pose to humanity. A new industrial revolution will again fundamentally affect the way we produce, trade, in short, to live. Industrialization has inherent costs to any society or country as listed below:

1. It leads to the depletion of natural resources.
2. It leads to air, water and soil pollution.
3. Global warming, climatic changes are the major consequences of industrialization.
4. It causes acid rain and related effects on eco-systems.
5. It leads to the degradation of land quality like metallic contaminant like Cd, Zn, Hg etc, destroy bacteria and beneficial microorganisms in the soil.
6. It leads to the generation of hazardous waste whose safe disposal become a big problem. Industrial wastes including toxins enter in the food chain causes number of undesirable effects to living beings and animals.
7. Industrial effluent damages the natural biological purification mechanism of sewage treatment causing several soil and water borne diseases.
8. Radioactive industrial pollutant cause undesirable disease when food containing radio-nuclides is taken by man.

Impact of Unplanned Industrialization on Environment. The positive economic and social results of industrial growth have been accompanied by serious environmental degradation, as well growing threats to health from occupational hazards. To some extent, these problems are analogous to those of early industrial revolution in Europe and elsewhere. In the 19th century, the shift from a rural, agrarian society to an urban, industrial society involved many effects as highlighted below.

Demographic Changes. Widespread social and economic disruption, unplanned city based industrializations draws workers form rural areas or economically backward communities from distant parts of the country. Economic opportunities offered by industrialization even driven communities to long distance cross border migration that changes demographic composition

of societies. These has been cause for socio-political tensions leading to conflicts and destabilization in many regions of the world.

Unemployment. Unplanned industrialization and well thought out large scale modern production facilities employing robotics will generally shrink job opportunities that give rise to unemployment.

Homelessness. Industries concentrated in a an area without low-cost accommodation facilities leads to lack of housing to low wage earning workers affecting societies as well safety security and wellbeing of industrial workers.

Pollution and Increased Exposure to Health Hazards. Often many factories or industries compromise health hazards to its workers to maximize profit as ensuring these involves cost. This culture is rampant due to weak supervisions and corruption that is a barrier to enforce existing laws and policies on the part of the govt. machineries.

Industrial Wastes Polluting Farm Lands, Rivers and Ecosystems. Pollution and degradation of ecosystems has been a most overlooked issue in industrialization. This has been a problem in most rapidly growing countries like China, India and many other. Unplanned industrialization without considering use of land and water resources and environment friendly waste disposal, sustainable economic development is impossible to achieve.

Many of these same problems characterize cities in the developing world today. As part of this growth are going in quantity and becoming more varied, more toxic, and more difficult to dispose of or degrade. Densities in cities where much of the industrial production is located surpass those in developed countries, so the number of people exposed to pollutants is potentially much greater.

Challenges and Strategy for Sustainable Green Industrialization in Bangladesh. To combat the adverse effect of industrialization on the environment, India has initiated some major activities, a few of which are:

1. Policy initiatives to improve environment for reduction of pollution.

2. Notification and implementation of emission and effluent standards for air, water and noise levels.

3. Identification and Action Plans for major polluting industries.

4. Identification of critically polluted areas for pollution reduction and improving environment.

5. Action Plans for polluted river stretches to improve quality of river water.

6. Identification of clean technologies for large industries and clean technologies/processes for small scale industries.

7. Setting up of Common Effluent Treatment Plants (CETPs) for clusters of SSI units.

8. Encourage production/ consumption of environment friendly products.

9. Preparation of a Zoning Atlas, indicating status of the environment at district levels to guide environmentally sound location/ siting of industries.

10. Mandatory submission of Annual Environmental Statement which could be extended into Environmental Audit.

11. Initiation of environmental epidemiological studies in critically polluted areas to study the impact of the polluted environment on health.

12. Setting up of authorities like the Environment Pollution (Prevention & Control) Authority for the National Capital Region for protecting and improving the quality of environment and preventing, controlling and reducing environmental pollution.

13. Provision of fiscal incentives for installation of Pollution control equipment and also for shifting of industries from congested areas.

Bangladesh National Sustainable Development Strategy (NSDS) 2010-21

This National Sustainable Development Strategy (NSDS) has been formulated to guide the country to face the challenge for sustainable economic growth with environmental safety and ensuring social justice. The vision of the strategy, which has been developed through extensive consultation with the stakeholders, is "achieving a happy, prosperous enlightened Bangladesh which is free from hunger, poverty, inequality, illiteracy and corruption and belongs completely to its citizens and maintains a healthy environment". The strategy is based on the long term development vision of the government, the Sixth Five Year Plan FY 2011-FY2015, the Perspective Plan of Bangladesh 2010-2021 and other existing plans, policies and strategies of the government.

The objective of industry sector strategy is to accelerate the rate of its growth without degrading the natural capital. The key challenges to development of this sector to ensure sustainable development include narrow industrial base, low productivity, loss making SOEs, and reducing impact of industrial pollution. The strategies to attain the objective include diversifying industries and exports, reducing anti-export bias, improving investment climate, integrating environmental considerations into management practice, encouraging firms to use cleaner technology, ensuring compliance with national environmental laws, rules and regulations, raising public awareness of environment protection, enforcing proper running of Effluent Treatment Plants in the industries, and restructuring and privatizing SOEs as appropriate.

Bangladesh Industry Policy 2016. Bangladesh has formulated a strategy to develop as a Middle-income country by 2021. Massive industrialization is considered as foundation of this strategy. Environment friendly industrialization has been considered as a precondition for sustainable economic development. The government outlines vision to develop human resources in research, development and use of environment friendly technology in the progress and development of industrial sector that is sustainable. The industries policy aims to encourage and support with incentives in the development of sustainable eco-friendly industries in Bangladesh. The plan also emphasises on high standard of waste disposal, factory health and safe work environment for the

workers. Encouraging capacity building in the development of low cost eco-technology has also emphasized in the policy. The policy caters for special incentives for entrepreneurs harnessing renewable energy source for Green Industrialization. Other salient aspects of the Industries Policy 2016 includes following:

Establishment of Economic Zones, Industrial Cluster, High-Tech Park through Public-Private Partnership (PPP). The work plan includes followings:

1. Resource allocation for PPP for the development infrastructure for Industry Cluster and Parks in establishing labour intensive industries in backward areas. For the Land ministry to develop Land Bank on govt. land and Chars areas and Industries ministries will allocate land for entrepreneurs.

2. PPP to be given priority to establish industrial park in available lands within existing public industrial complexes and on govt. lands or by developing the Chars/ islands with due environmental considerations.

3. Discourage unplanned setting up of factories here and there.

4. Pollution prone factories in the metropolitan areas and unplanned industrial establishments to be gradually shifted to economic zones or industrial parks.

Eco-Friendly Industrialization Management. Key steps initiated in Industries Policy- 2016 are as follows:

1. Allotment of land and water resources for industrialization, decisions will be based on environmental effects. Public awareness program to be conducted on harmful effects of air and water pollution from industrial smoke, waste etc.

2. Incentives for setting up of ETP and CETP. In that the Environmental Policy of 1995, Water Resources Act 2013 and related other laws and Acts will be enforced.

3. Efforts to support factories adopting Climate Change and Green House Gas management within the purview of Clean Development Mechanism (CDM).

4. Setting up of factories to get priority with due consideration of risk of natural calamities and surrounding environments.

5. Industrial units involved in waste disposal from home and abroad to receive all kind of assistance including financial incentives.

6. Encourage industries that adopt principles and practices of Green Industrialization and mitigation of Climate Change impacts.

7. Discourage use of fertile farmlands for industrial units.

8. Encourage investment in eco-friendly industrialization through PPP.

9. Encourage entrepreneurs in setting up and operation of factories with the strategy of 3R (Reduce, Reuse and Recycle).

Impact of Unplanned Urbanization on Environment - Challenges and Strategy tor Sustainable Green Urbanization in Bangladesh

Impact of Unplanned Urbanization on Environment

Impacts of unplanned urbanization are many. In unplanned urbanization, large number of poor people live in slums. These slums are normally grow on low lying areas or indiscriminately filling up of water bodies and in some areas cutting of hills. Majority of slums don't have any sanitary facilities and no waste disposal system. They release and dump human excreta and wastes in open ground.

In all the major urban areas, including in Bangladesh industries like chemical, tanneries, dying, etc grow up unplanned within urban area. These industries also produce a lot of solid and liquid wastes and smoke which are normally dumped and released without any treatment. The brick kilns at the outskirt of the cities

are also culprit of smoke. The total amount of solid waste generated every day in Dhaka city area is about 4,500 to 5,000 tons. The total waste collection rate is only 37%. A large proportion of the population has zero access to proper waste disposal services which leads to the problem of waste management.

Unplanned urban areas especially in developing countries don't have planned mass transit network. Urbanites have to depend on a large number of unfit vehicles which produces toxic smoke, solid and liquid wastes like old battery, tires, lubricants, etc which are also not disposed of properly. Due to congestion of traffic in city roads the emission from vehicles are more with toxic gases like carbon monoxide.

In many urban areas including Bangladesh cities, medical wastes are also a big concern. According to different estimates, 36,000 tons of medical waste are generated every year in Bangladesh, out of this approximately 7,200 tons are hazardous. In addition, other wastes are generated which are toxic in nature and not bio degradable.

The environmental degradation due to unplanned urbanization includes air, water, soil and noisepollution, floods and water logging, decreasing number of wetlands, deforestation, heatisland effects, health hazards, and loss of biodiversity. Impact of unplanned urbanization on environment is discussed under following headings in details in the subsequent paragraphs:

1. Impact on Rivers, Canals, Water Bodies.
2. Impact on Land and Soil.
3. Impact on Water.
4. Impact on Air.
5. Impact on Ambient Heat.

Impact on Rivers, Canals, Water Bodies

With the encroachment and filling up of rivers, canals, khals and water bodies, the bio-diversity of the environment is destroyed. In addition, the water catchment areas is also reduced significantly, thereby not allowing rain water run-off. Figure 3shows the gradual encroachment and filling up of rivers and water bodies. This cases water stagnation in the urban areas. Industrial and household wastes and sewage lines are normally drained to rivers and water bodies without treatments. This results in grave pollution of the rivers, canals and water bodies. For example according to Poribesh Andalon (POBA) about 90,000 cubic metres of untreated industrial waste is dumped into the country's rivers each day destroying the major sources of surface water and about 21,000 cubic metres of untreated toxic waste from tanneries in the city's Hazaribagh is released into Buriganga River daily. The oxygen level of the river becomes zero during dry season where no aquatic animal like fish can survive. The same with other rivers of Dhaka.

Figure 2: Polluted Water of Buriganga River

Source: The Daily Star (online), 90K Cubic Meters Untreated Waste Dumped into Rivers Daily: Poba, 21 March 2014, accessed on 04 Jun 16, http://www.thedailystar.net.

In Chittagong, about 400 tonnes of solid and liquid untreated wastes are drained to Karnaphuli River every day from household and about 800 industries. In a 2009 survey, Manzoorul Kibria, associate professor at Chittagong University,

found only 50 types of fish in the river whereas the number was 140 in 1986. Unlike in the past, Hilsa can hardly be found in the Karnaphuli now. Dolphins were seen in large numbers in the river a decade ago, but now they have become a rare sight, say locals. These polluted rivers are degrading the environment in the area and are hazard to human health. Similarly lakes, khals and water bodies are polluted in the similar way.

Impact on Land and Soil

The solid and liquid wastes from household, commercial and industries finds their way in the land. These wastes are mixed with toxic chemicals like lead, cadmium, medical wastes, human excreta, etc. City Corporations and Municipalities of the cities also dumps untreated wastes on open areas for landfill. Theses wastes contaminates soils in the area as well as in the surrounding areas and especially during rainy season the pollutants seep into deep ground and contaminates ground water also. It also a hazard for human being.

Figure 3: Dumping of Untreated Wastes on Open Areas for Landfill

Source: ParanMd Shah, Waste Management in Dhaka City: Civic Life Concerns, (online) 04 March 2016, accessed on 04 Jun 16,http://www.campuslive24.com.

Impact on Water

The untreated wastes, open drains, sewage lines, liquid wastes and polluted water bodies contaminate water used by urban people like piped water, tube-

well and ponds. Water supply authorities also find difficult to treat surface waters from rivers like Buriganga, Sitalkhaya and Karnaphuli for household supplies. During the rainy season and flood, the situation gets worse as the water treatment plants, supply pipe and tube-well are submerged. The polluted waters from rivers, canals and water bodies also inundate urban areas posing environment hazard. Ground water is also contaminated in long term. Contaminated water is the main reason for water borne disease in the urban areas. For such reason safe drinking water is a scarce commodity.

Figure 4: Scarcity of Drinking Water in Dry Season in Dhaka

Source: Helemul Alam, Water crisis grips Dhaka, The Daily Star (online), 26 May 2012, accessed on 05 Jun 16, http://www.thedailystar.net/news-detail-235722.

Impact on Air

Industrial smog, smoke from vehicles and brick kilns, and dust from construction sites are the main source of pollution in the cities. The presence of pollutant particles in Dhaka city air even on a normal day is more than six times the healthy limit. The level of pollution in Dhaka, Narayangonj and Gazipur has gone so high that the World Health Organisation has placed them among the 25 cities with the most polluted air in the world. Shockingly, 300 is the minimum AQI value found in Dhaka, Narayanganj, Gazipur and Khulna cities for most part of the year, especially in the winter. Bangladesh was ranked fourth among 91 countries with worst urban air quality. Among 1,600 cities

of the world, Narayanganj was identified as the 17th city with worst air quality while Gazipur and Dhaka took 21st and 23rd spots.

Figure 5: Air Pollution in Dhaka City

Source: http://www.abc.net.au/news/2014-05-08/10-countries-with-the-world's-dirtiest-air/5438872

The level of pollution is particularly high in winter as rain washes pollutants in rainy season. As urban air quality declines, the risk of stroke, heart disease, lung cancer, and chronic and acute respiratory diseases, including asthma, increases for the people who live in them.

Impact on Ambient Heat

As urban areas develop, changes occur in the landscape. Buildings, roads and other infrastructures replace open land and vegetation. Surfaces that were once permeable and moist generally become impermeable and dry. This leads to formation of urban heat island-the phenomenon whereby urban regions experience warmer temperatures than surrounding rural area. It is observed that the average temperature of urban areas are increasing day by day. Warmer urban areas require more energy and water. On average, Dhaka city is hotter by 5 degree Celsius than the surrounding areas.

Challenges for Sustainable Green Urbanization in Bangladesh

Urbanization is a must for economic development of a country. Urban areas are the economic power house of a country as it produces major part of the GDP. Sustainable development of the country depends intricately on sustainable green urban development. Green urbanism has been defined as the practice of creating communities beneficial to human and the environment. According to Beatley, it is an attempt to shape more sustainable places, communities and lifestyles, and consume less of the world's resources. Green urbanism is interdisciplinary, combining the collaboration of landscape architects, engineers, urban planners, ecologists, transport planners, physicists, psychologists, sociologists, economists and other specialists in addition to architects and urban designers. However, urbanization presents few challenges as well as opportunities for a country. The challenges are urban housing, services, environmental, transportation, urban risk reduction and urban governance.

Urban Housing Challenges. Housing is one of the greatest challenge for an urban area especially for a developing country. In Bangladesh, demand for urban housing increasing areas as a result of faster growth of urban population, growth of income and remittance growth. While housing development has served growing urban population, loss of wetland, open spaces, public parks, and land with tree cover has strong negative impact on environmental sustainability. It also affects social sustainability through its effects on growth of children and health of people including children. While urban slums and squatter settlements are part of urbanization, they cannot be allowed to continue to have their negative impact on living environment and poverty and lack of dynamic contribution to the economy.

Services for Urban Population Challenges. Providing services like clean water and electricity supply, sanitation and waste management to a huge number of urban population is a big challenge. For water supply and sanitation, the challenge is to reduce pressure on ground water, and providing sanitation at an affordable cost to all the urban dwellers.

Environmental Challenges. The greatest challenge of rapid urbanization is in the form of degradation of the urban environment. The air, water, and soil

of all the major cities like Dhaka have already been polluted to a dangerous level. In absence of catchment area and channel for free flow of rain waters, cities are inundated in rain and people are killed in localized landslides in hill towns. The other grave challenge is the waste management.

Transportation Challenges. The key challenge in urban transport sector is developing an integrated and balanced system in which all modes can perform efficiently and move mass people quickly, safely and affordably.

Urban Risk Reduction Challenges. Dense population, location of hazardous industries in residential areas, inaccessible roads and lanes, fragile buildings and natural disasters have increasing disaster risks in urban areas. Challenge in this regard to relocate industries from residential areas, broaden roads for access and demolish risky buildings. In addition, preparedness and resources for emergency services are also a challenge.

Urban Governance Challenges. The main challenge of urban governance is to follow the fundamentals of governance that is participatory, democratic and pluralistic and application of rules and regulations because of the lack of proper institutions, legal systems, political will and competent governance.

Strategy for Sustainable Green Urbanization in Bangladesh

The growing size and number of megacities will be difficult to manage and high density makes cities more vulnerable to catastrophic events and disease. Green policies need to be at the core of sustainable urban development in Bangladesh in the 21st century if the challenges are to be properly managed.

Sustainable Green Urban Housing Strategy

Some of the strategies that have been suggested for sustainable green urban development include creation of satellite towns with green spaces and urban forests, improved public commuting system to spread cities, energy saving green building design, land zoning and adherence to National Building Code, and preservation of flood flow zones. The key strategies for urban slum may be to grant formal property and land ownership to urban slum dwellers, relocation/resettlements of slum dwellers, and providing better water,

sewage and electricity infrastructure to slum areas and finally development of secondary towns and economic growth centers.

Figure 6: Sustainable Green Urban Housing

Source: Vince Gaia, China's Eco-Cities-Sustainable Urban Living in Tianjin, BBC (online) 03 Mar 12, accessed on 06 Jun 16, http://www.bbc.com/future/story/20120503-sustainable-cities-on-the-rise.

Sustainable Green Services for Urban Population Strategy

The key for sustainable green urbanization strategy should be conservation of resources and use of green technology. Recycling of waste water, harvesting of rain water, use of solar cell and renewable energy for production of electricity, turning sewerage into compost and diversification of source of supply from ground water to surface water as a source of water supply.

Sustainable Green Environmental Strategy

Emission of low greenhouse gases (GHG), low energy consumption, protection of water bodies, green space, urban forests, enforcement of land use rule, environmental rules and regulations, industrial zoning and water quality monitoring forms the core of the sustainable green environment strategy. Improved mass transport system is the strategy to reduce both traffic congestion

and air pollution. Community initiative and commercialized to recycling and to produce energy and fertilizers from solid waste is the preferred strategy.

Sustainable Green Transportation Strategy

Strategy for sustainable green urban transport revolves around giving prioritization to pedestrian traffic, to reduce the distance of each passenger's travel and promote use of mass public transports, such as rail based mass transit system, bus rapid transit and circular waterways. It is to be noted that high quality public transit offers a complementary avenue for reducing demand for private vehicles and their use.

Urban Risk Reduction Strategy

Strategy in this regard will be zoning of urban areas for various usages, developing Urban Risk Reduction Action Plans (URRAP), awareness raising, preparing volunteers for emergency response. It also includes, safety compliance and provision of incentives for risk reduction behaviour and investments by urban dwellers who are able to undertake construction to comply with the building standards.

Urban Governance Strategy

For sustainable green urbanization will be to have a proper vision, increasing transparency and accountability of policy formulation and decision making processes. Reform of the existing bureaucratic structure and integration with overall national policy is also to be the strategy.

Case Study for Industrialization and Urbanization - Special Emphasis on Environment

A Case Study on Kitakyushu, Japan: A 'Green City' from a 'Gray City'.

Figure 7: Kitakyushu, Japan

In the 1960s, Japan achieved rapid economic progress, in which Kitakyushu developed into one of the four largest industrial zones in Japan. However, the air and water were polluted; Dokai Bay was highly contaminated by industrial and domestic wastewater. This environmental pollution progressing to such an extent that the bay was called the 'Sea of Death.' However, residents, enterprises, research institutes and governmental agencies were united in the task of overcoming the pollution.

In 1971, prior to establishment of the Environmental Agency by the national government, the city of Kitakyushu founded the Environmental Pollution Control Bureau (currently the Environmental Bureau). The City established 'The City of Kitakyushu Pollution Control Ordinance,' which was more stringent than the national laws - in addition to other regulations - and enforced a series of effective measures against major companies in the city, including the execution of agreements to prevent pollution. In addition, we drove forward a large-scale urban greening movement in accordance with the 'Green Kitakyushu Plan.'

Japan announced various initiatives, including "Cool Earth-Innovative Energy Technology Program" (May, 2007), "Fukuda Vision" (June, 2008), "Action Plan for Achieving Low-Carbon Society" (July, 2008), and "Green Economy and Social Reform" (April, 2009), etc. And it announced "Legislation of the Framework Act on Global Warming (draft)" in March, 2010.These measures introduced Kitakyushu's improved environment to the world as the example of city transformed from a 'Gray city' to a 'Green city'.

Figure 8: Kitakyushu- Green city from a Gray city

Smoggy sky (1960s)

Blue sky restored (present day)

Dokai Bay once called the 'Sea of Death' (1960s)

Dokai Bay regained its original beauty (present day)

Environmental Preservation Technologies. The City of Kitakyushu is engaged in diverse activities to improve the environment by making use of the City's experience and technologies in pollution control, energy efficiency improvement, knowledge accumulated through the process of overcoming past severe environmental contamination. Moreover, through international cooperation, the City has accepted 4,052 international trainees in total (as of March 2005) from 143 countries, and has dispatched specialists to other countries. Kitakyushu City received the 'Global 500 Award' from the United Nations Environment Programme (UNEP) in 1990. In 1992, it received the 'UN Local Government Honours' during the 'United Nations Conference on Environment and Development' (UNCED: Earth Summit) held in Brazil.

Aiming to Become the World Capital of Sustainable Development. In September 2000, the 4th Ministerial Conference on Environment and Development of United Nations Economic and Social Commission for Asia and the Pacific (ESCAP/MCED4) was held in Kitakyushu. The 'Kitakyushu Initiative for a Clean Environment' was adopted at that MCED, and in 2001 the Kitakyushu Initiative Network was founded. By January 2006, 61 cities from 18 countries in Asia and the Pacific Region had joined the network and are exchanging information and carrying out pilot projects.'World Summit on Sustainable Development' (WSSD: Johannesburg Summit), which was held in Johannesburg in the Republic of South Africa in 2002 to advocate the importance of international cooperation. 'Kitakyushu Initiative' was incorporated in the 'Plan of Implementation' of the Johannesburg Summit as a leading-edge initiative.

Fostering Environmental Industries. The tremendous increase in wastes due to mass production, heavy consumption and mass disposal has become a worldwide problem. In view of this situation, the City of Kitakyushu has drawn up the 'Kitakyushu Ecotown Plan', which was approved by the national government in July 1997.The Kitakyushu Ecotown Program implements specific projects such as the recycling of electric appliances, automobiles, plastic bottles and other recyclable wastes, mainly in the Hibikinada Area in northwestern Kitakyushu.

Figure 9: Kitakyushu Eco town and recycling electric appliances

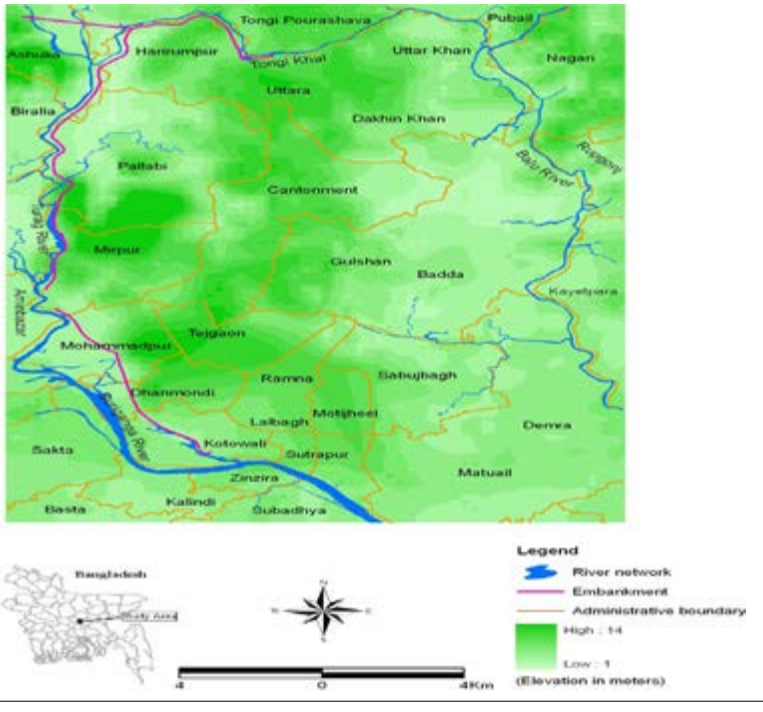
Kitakyushu Eco town

Recycling electric appliances

Unplanned Industrialization and Urbanization affecting Environment-A Case Study on Dhaka, Bangladesh

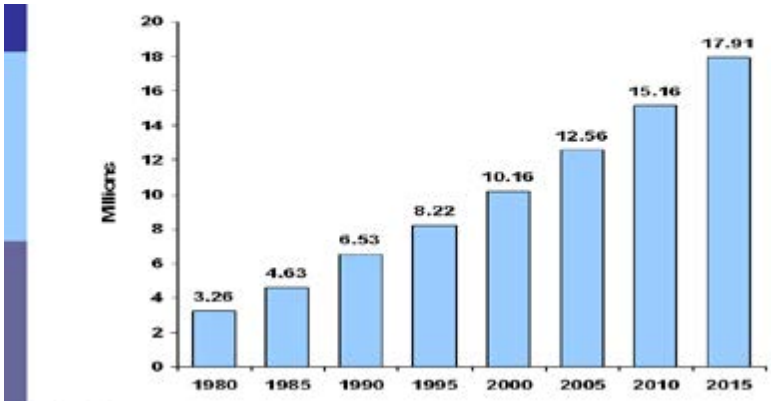
Dhaka is the largest city in Bangladesh, its capital, and also the financial, cultural, and business center of the country. The total urban area of Dhaka spans about 1530 square kilometers.

Figure 10: Greater Dhaka City



About 80% of the garments industry in Bangladesh, accounting for the overwhelming majority of the country's exports, is located in Dhaka city. Dhaka city contributes to about 13% of the country's GDP. Per capita income and literacy rate are higher in Dhaka than in the rest of the country, and the poverty incidence is also lower. From 1906 to 1991, Dhaka city's area grew by 58 fold and its population grew by over 35 fold. More recently, Dhaka's population grew from 3.26 million in 1980 to a staggering 10.16 million in 2000. In 2015, its population was estimated to have swollen to 17.91 million (Figure 13).

Figure 11: Population growth of Dhaka megacity, 1980 - 2015



With a population now exceeding 17 million, Dhaka mega city currently ranks as the world's 9th largest city (Figure 14). Dhaka is also the fastest growing mega city in the world along with Lagos, Nigeria.

Figure 12: World's fastest growing megacities

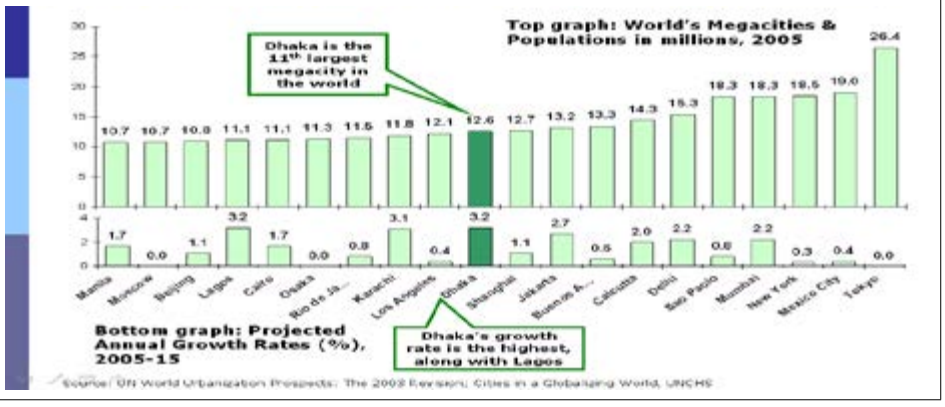


Figure 13: Spatiotemporal changes in green spaces in Greater Dhaka

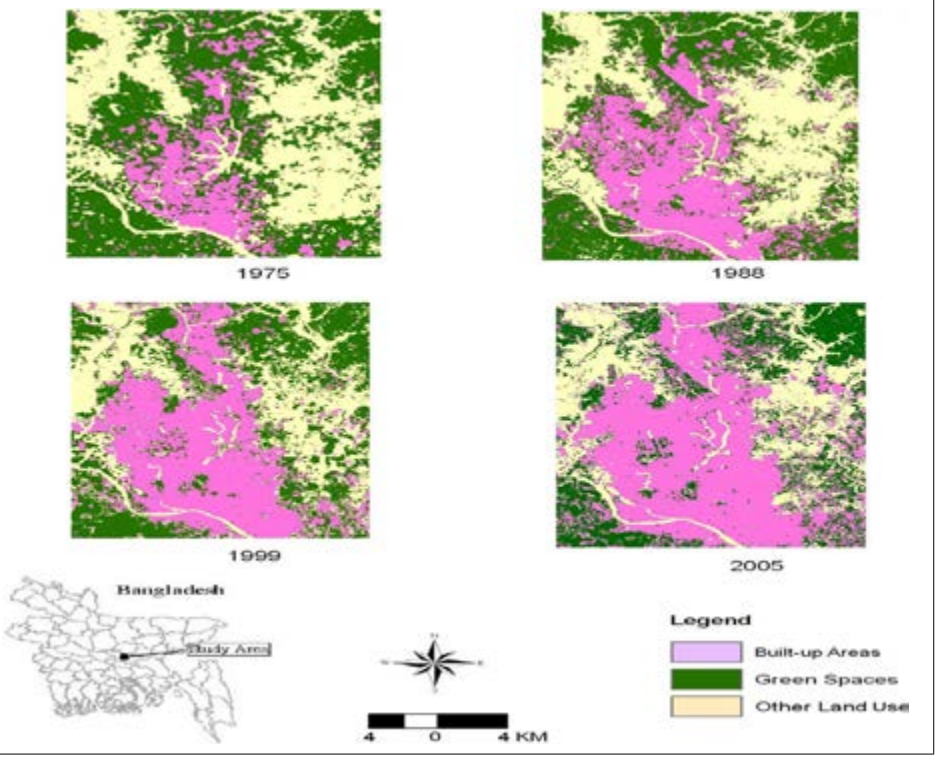
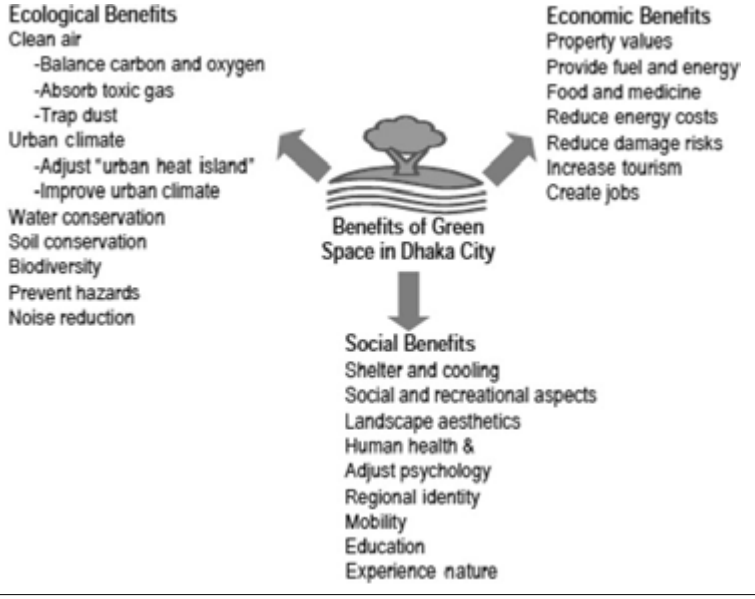
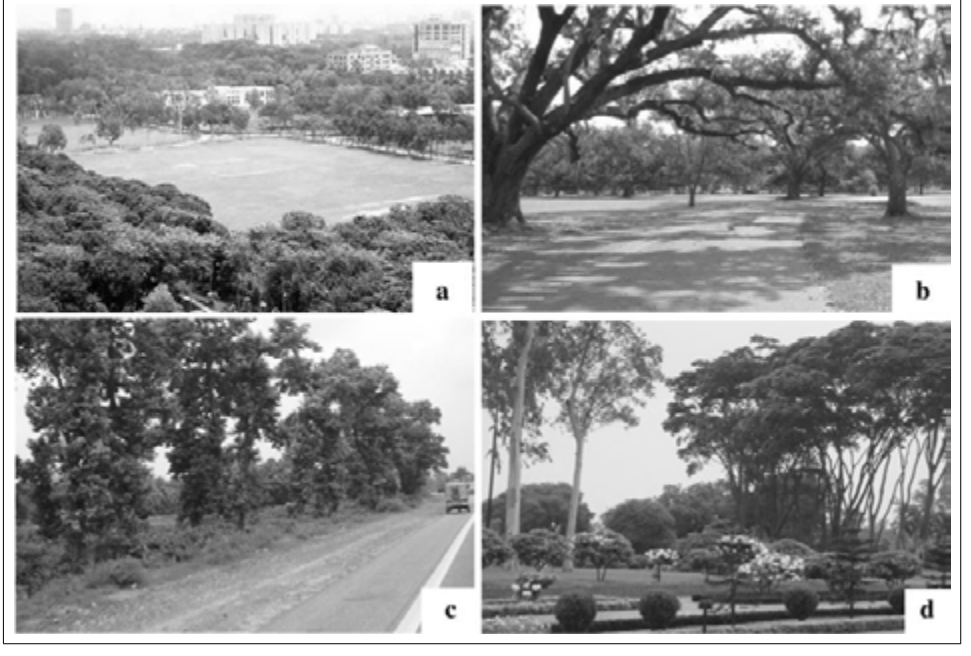


Figure 14: Conceptualization of the benefits of green spaces



Among the world's major cities, Greater Dhaka probably has the lowest number of playgrounds, parks, open spaces and swimming pools per capita. Since the environment of the city constitutes sharp physical and social divisions, provisions for preserving existing green spaces and/or the creation of new green areas have not been considered in any of the Master Plans devised earlier. It is, however, surprising that there are no set rules/policies devised by the authority concerned that are intended to save the green spaces of Greater Dhaka in order to promote a sustainable urban environment. It is important to mention that according to the Chief Town Planner of DCC, the study area has only 8% tree coverage, while an ideal city needs at least 20% green spaces to attain a healthy urban environment. Currently, the Botanical Garden, Suhrawardy Udyan and Ramna Park are the three major green patches in the city. Local governments also do not have good logistics to manage them effectively. Hence, there is an urgent need to develop suitable policies and counter measures for the management of existing green spaces.

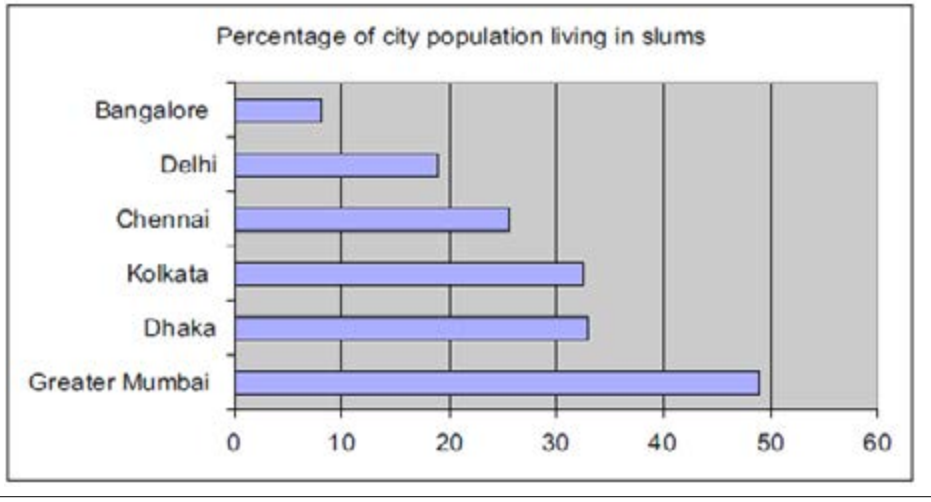
Figure 15: Green spaces in Greater Dhaka (clockwise: a. park near the National Parliament, b. Ramna Park, c. new trees planted along the roadside, d. new trees in National Monument Park)



Impact of Unplanned Urbanization and Industrialization in Dhaka - The Realities

Human settlement in Dhaka. It has been mentioned that the natural population growth rate is high in Dhaka city area with continuous rural-urban migration. As a result human settlement is very much critical. A report stated that 3007 informal settlements housed 30% of total inhabitants in Dhaka city. And 30 to 35% of total inhabitants live in slum areas where the number of people living per hectare range from 1700 to 10400 persons. This statistics clearly indicated overcrowding and unhygienic situation. Many of slum areas are out of utility services coverage. Inhabitants in slum areas keep waste in open places, cook food also in open places near to living spaces, which sometimes become the sources of fire incident in the slum areas. It was found in this study that rapid urbanization resulted in huge number of slum areas and squatter settlement in all developing cities. However, Dhaka city is among the highest for slum.

Figure 16: Estimated proportion of population living in slum areas in some Indian cities and Dhaka city



Economic Development. Researchers indicated economic development as one of the factors towards rapid urbanization in Dhaka city. Statistics on Dhaka's GDP share to national income prove this argument. 80% of the country's garments industries are located around Dhaka City where more

than two million people are working. Due to massive development activities associated with garment industries and its subsidiary factories, huge number of rural urban migration occurred for this purpose. Ultimately overall economic and industrial development in the city has a decent impact regarding higher rate of urban growth.

Land Use. Rapid and unplanned urbanization eventually encouraged the transformation of rural land into urban areas through a range of development activities. It is estimated that 809 km2 of agricultural and is converted to cities, roads and infrastructure every year. Regular use of agricultural land into urban development work discouraged agricultural activities whereas agriculture is still the largest economic sector of Bangladesh. The ultimate result is concomitant loss of cultivated land, which contributes to the increasing problem of landlessness. Agricultural land use for urbanization usually occurred by the name of land development in Dhaka city. All sectors like private, public and individual-household are mainly responsible for unplanned land development in the cities.

Housing and Living Conditions. Housing conditions in Dhaka city look more problematic than other issues. It is a challenge for the poor migrant people to secure a shelter. Due to the continuing migration, poor people often end up in illegal settlements on insecure lands with major environmental concerns. Creation of slum areas are common in Dhaka city and the slum areas are located throughout the city, but the services or facilities for the slum areas are very inadequate (World Bank, 2007). Slum areas in the city reflect negative impact on environment with excessive numbers of people and limited. Vulnerability to flooding and the growth of slum areas have been the main negative outcomes associated with the rapid urban development. Excessive growth ultimately raised demand for required utility services and basic settlements.

Problems of Poverty, Inequality and Insecurity

1. Rapid urbanization also increases rapid poverty in the city and it is now considered one of the major urban problems. The city needs a clear policy and mandated agency to address the challenges of urban development, urban poverty and service delivery. Urban poor increase more than the population increases as a whole so the poverty reduction also measured lower than average pace. It is a general estimation that poverty levels are higher in rural than urban areas but absolute number of poor people are increasing in the urban areas and especially in developing cities. In Bangladesh, urban areas are the center place for hijackers, murders and drug suppliers.

2. Social inequality in urban Bangladesh is going to be one of the dangerous elements on the path of urban development. Needless to say, most cities and urban center in Bangladesh are either indifferent to the needs of great majority of its people, or at best are focused to the demands of the rich and the powerful, at the cost of majority. Social inequality makes inhabitants desperate to earn money illegally and even in violent ways, which also increases insecurity. All these insecurity makes city life complicated and unhappy.

3. Dhaka city ranked 127thout of 130 cities in the world in the categories of "livable city". Inhabitants in Dhaka city are always under threat of property, person and life whatever he or she holds his position in the society. Most of dangerous crimes like murder, mugging, hijacking, extortion and ombblasting go unpunished. Law enforcing agencies are very much inactive or corrupted which makes for poor law-and-order and social-insecurity situation. Density of people with limited or no facilities indicates a violation of human rights. People do not trust each other and social behavior and community actions are rare in society. All these short comings make Dhaka city a place of low quality of living condition.

Environmental Issues. Dhaka city already has a number of environmental problems associated with risk related natural disaster and most of them are human induced. For example flooding all most every year, bad air quality

both indoors and outdoors, surface water contamination, decrease in ground water, inadequate solid waste and sewage management. Some other important environmental problems are transport congestion due to the density of people and vehicles, draining congestion because of extreme rainfall and flooding rivers. All of these environmental problems bring serious damage to human health and livelihoods in Dhaka.

Natural Disasters. Flooding in Dhaka also frequent in numbers. Flood comes often in Bangladesh and cities are become hazardous through severe out come of it. There is always a natural cause of flood but some other fundamental problems like insufficient drainage, unplanned infrastructure development and natural flows of river interrupted with decreasing water bodies. Another problem is that Dhaka city is in a risk of damaging earthquake. Fire occurrence comes quite often in the city in this time period. Shopping malls, office buildings, garment factories are the major places experienced with huge fire damage of people and property in Dhaka city. The lack of alternative exit of respective building and lack of up-to-date fire control appliance lead to additional casualties.

Management of Solid Waste. In Dhaka city, the high population density means excessive levels of consumption, which deliver abundant quantities of waste. It is not only the case for Dhaka city but rapid urbanization with increasing level of population and their raising consumption resulted in huge quantity of solid waste. In the south Asian developing cities, open dumping is a common way of solid waste disposal. With the development of all areas of life, urban inhabitants have been using paper packaging and plastic items in a substantial amount, which result in a large volume of waste and consequent expenses to disposal of this waste. Moreover, all solid waste is not collected by concerned bodies because of inadequate solid waste management and lack of sufficient budget. As most part of solid waste is remaining in the roads and open places, it becomes a source of air and other pollution.

Industrial Pollution. Unplanned industrial development in Dhaka city pollutes the environment in many ways. Around 200 tanneries have been established in city areas by the recent time. Approximately 2000garments industries also set up around Dhaka city areas. Other major industries are

jute, dying and textile, printing, metal, cement, rubber, chemicals, battery, plastics, brick manufacturing etc. All these different industries are located near the living areas of the city. As a result air, water and soil pollution is out of control. In some cases occupational health problems also occurred due to the waste outcome from tanneries, chemicals and textile industries. A report identified that the carelessness on the condition of cities environment made the emissions of carbon monoxide, nitrogen oxides, Sulphur oxides some times go beyond the safety level of Bangladesh. Dhaka is surrounded by four rivers Buriganga, Turag, Shitalakshya and Balu River(see map in the appendix). All these rivers are extremely polluted by chemical and microbial contamination from different industries located on the banks of the rivers.

Infrastructure and Transports. From the very beginning of Bangladesh's independence, the expansion of urban areas and urban inhabitants in Dhaka increased much faster than the infrastructure facilities and respective utility services. Most of city's population is out of access to basic utility services and infrastructure in every time of city's development steps. It is difficult to live without or with minimum services like housing, electricity, gas, water, sanitation etc. Housing problem is indicated as the most demanded infrastructural problem in Dhaka city according to the various studies. Roads for inhabitant's transportation in Dhaka occupy only 8 % (2,230 km) to the total surface area, but to maintain minimum standard to provide a transport service at least 25% space is required from surface area. Man ride rickshaws accounted 300,000 which constitute 56% of total vehicles and engage 73% road surface in Dhaka city. The city failed to facilitate and improve road facilities due to excessive population growth and unplanned settlements.

Water and Air Quality. Water supply authority WASA can supply only 1300 - 1500 million liter every day to the inhabitants of Dhaka city but the actual requirement is more than 2000 million liters per day. Same scenario is found in sanitation also where inhabitants of Dhaka city generate around 1.3million of m3 sewage per day and sewage treatment plant can treat only 40,000 m3. Remaining sewage goes directly to the rivers around the city by open drains and canals. Dhaka's surface water quality has been remaining another serious issue. It was discussed earlier that Dhaka is surrounded by the rivers Buriganga, Balu, Turag and Shitalakshya and all of these rivers are the place now to receive bulk

amount of untreated sewage, industrial liquid waste and uncollected municipal waste. All these waste goes to the rivers through canal and by direct disposal. As a result water quality of surrounding rivers now reached an alarming situation. Industrial and vehicular emissions are major sources of air pollution in the city which makes Dhaka city one of poorest air quality regions in the world. There are many industries within the city areas like brick kilns, spinning mills, fertilizers factories, tanneries, chemical and pharmaceuticals which are major industrial sources of air pollution. On the other hand, out dated old buses, trucks and other old vehicles which are not running properly are other sources of air pollution. According to Bangladesh Atomic Energy Commission, "50 tons of lead is emitted into Dhaka's air annually, and the emission reaches its highest level in dry season". Research work identified some air pollutant ingredients like carbon monoxide, oxide of nitrogen, sulfur dioxide, ozone, lead, Volatile Organic Compound (VOCs), Suspended Particulate Matter (SPM) etc. in Dhaka's air which makes both indoor and ambient air quality below standard.

Recommendations

Strategy for Sustainable Green Industrialization

1. Policy initiatives to improve environment for reduction of pollution.
2. Notification and implementation of emission and effluent standards for air, water and noise levels.
3. Identification and Action Plans for major polluting industries.
4. Identification of critically polluted areas for pollution reduction and improving environment.
5. Action Plans for polluted river systems to improve quality of river water.
6. Setting up of Common Effluent Treatment Plants (CETPs) for clusters of SSI units.
7. Encourage production/ consumption of environment friendly products.

8. Preparation of a Zoning Atlas, indicating status of the environment at district levels to guide environmentally sound location/ siting of industries.

9. Mandatory submission of Annual Environmental Statement which could be extended into Environmental Audit.

10. Initiation of environmental epidemiological studies in critically polluted areas to study the impact of the polluted environment on health.

11. Setting up of authorities like the Environment Pollution (Prevention & Control) Authority for the National Capital Region for protecting and improving the quality of environment and preventing, controlling and reducing environmental pollution.

12. Provision of fiscal incentives for installation of Pollution control equipment and also for shifting of industries from congested areas.

Strategy for Sustainable Green Urbanization

Green Urban Housing. Sustainable green urban development include creation of satellite towns with green spaces and urban forests, improved public commuting system to spread cities, energy saving green building design, land zoning, adherence to National Building Code and preservation of flood flow zones. This may also include relocation/resettlements of slum dwellers, and providing better water, sewage and electricity infrastructure to slum areas.

Green Services for Urban Population. This should include conservation of resources and use of green technology, recycling of waste water, harvesting of rain water, use of solar cell and renewable energy for production of electricity, turning sewerage into compost and diversification of source of supply from ground water to surface water as a source of water supply.

Green Environmental Strategy. These are emission of low Greenhouse Gases (GHG), low energy consumption, protection of water bodies, green space, urban forests, enforcement of land use rule, environmental rules and regulations and improved mass transport system is the strategy to reduce both traffic congestion and air pollution.

Green Transportation Strategy. Strategy for sustainable green urban transport revolves around giving priority to pedestrian traffic, promote use of mass public transports, such as rail based mass transit system, bus rapid transit and circular waterways. It is to be noted that high quality public transit offers a complementary avenue for reducing demand for private vehicles and their use.

Urban Risk Reduction Strategy. Strategy in this regard may be zoning of urban areas for various usages, developing Urban Risk Reduction Action Plans (URRAP), awareness raising, preparing volunteers for emergency response.

Urban Governance Strategy. For sustainable green urbanization, strategy will be to have a proper vision, increasing transparency and accountability of policy formulation and decision making processes.

Conclusion

Hon'ble Prime Minister Sheikh Hasina said that unplanned urbanization and industrialization had become a concern for the whole world as it degrades environment and becomes a threat to public health. Addressing the inaugural ceremony of the six-day 20th general assembly and conference of the Commonwealth Association of Architects, she said, the government had taken initiatives to implement the detailed area plan (DAP) to build a planned Dhaka by disciplining buildings and structures. The Prime Minister said, the capital city of Dhaka has lost its water bodies over the years and it is now full of unplanned buildings and structures. She stressed the need for preservation of water bodies and for construction of buildings with provisions for fire-fighting.

Urbanization and industrialization are the obvious realities, which can not be stopped. In fact, urban sprawl is so rapid in Bangladesh that the entire country is going to be converted into a city state in three to four decades. It is very important to introduce proper urban management to address the situation. The capital and other metropolises are growing very fast, but urban management issues still remain neglected as there is a severe knowledge gap.

It has been discussed that green space dynamics and spatial metrics analyses are imperative for understanding the landscape ecological conditions of green

urbanization and industrialization. This study revealed that the green spaces of Bangladesh are decreasing over the course of time, and are also becoming highly fragmented due to the increasing pace of human activity in this region. This activity is not only causing the destruction of landscape ecological processes and services, but is also eroding the biodiversity in urban areas. Moreover, consistent landscape fragmentation can result in a poor quality of life in the urban environment. Therefore, a comprehensive green space management strategy should be implemented for Bangladesh that could support proper functioning of the ecosystem. As reliable and updated data are greatly lacking in Bangladesh, the green space maps produced in this study can contribute to the development of sustainable urban land-use planning decisions.

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Sustainable Development of Bangladesh: Balancing Industrialisation, Urbanisation and Green Environment

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CONSOLIDATED KEYNOTE PAPER ON SUSTAINABLE DEVELOPMENT OF BANGLADESH: BALANCING INDUSTRIALISATION, URBANISATION AND GREEN ENVIRONMENT

Introduction

The Economy of Bangladesh is the 32nd largest in the world by purchasing power parity and is classified among the next eleven emerging market economies in the world. According to IMF, Bangladesh's economy is the second fastest growing major economy of 2016, with a rate of 7.1%. In recent years, Bangladesh has seen a major surge in export as the Bangladesh textile industry, the third largest in the world. Being situated in one of the most fertile regions of Earth, agriculture plays a crucial role, with the principal cash crops including rice, jute, tea, wheat, cotton and sugarcane. In recent years, Bangladesh have seen a drastic improvement in its energy infrastructure, which is required to implement and achieve the Vision 2021, a goal to provide accessible housing and healthcare to all, and Digital Bangladesh 2021, digitization of education and business sector to generate faster economic growth.

It is no secret that Bangladesh has recorded an average GDP growth rate more than 6 per cent over the past 5 years. This performance has contributed significantly to its rating as a lower middle income country. However, although the drivers of growth are diversifying, Bangladesh continues to rely heavily on agriculture and RMG industry as the main drivers of its economy. Based on the realization that industrialisation is an imperative for sustainable growth, Bangladesh is making efforts towards accelerated and profound economic structural transformation, through reallocating economic activities from less productive sectors to industrialisation for sustainable and inclusive growth of its economy.

As Bangladesh economy grows and depends more and more on manufacturing and organized services, urbanisation will grow. The challenge will be for Bangladesh to manage its transition from an agrarian economy to a modern green industrialized economy through appropriate institutions, programs and policies. Ambitious urban development programs, therefore, need to be taken up based on the policies and strategies that will cover spatial, economic, social, cultural, aesthetic

and environmental aspects of urban life. It is expected that implementation of these programs will be instrumental in achieving an urban reality that can enhance capacity to live a healthy life; ensure access to education, shelter, and basic services, and lead to a secure and livable environmentally friendly Bangladesh.

It should however be noted that Bangladesh's strive towards economic advancement is not without some cost on its ecosystem due to urbanisation and industrialisation among other factors. This is evident from natural calamities, loss of bio-diversity, deforestation, destruction of wetlands and inland fisheries, arsenic contamination in the ground water in the southern part of the country, soil nutrient depletion and inland salinity intrusion in the South West region, and creeping desertification in the Northern region. Bangladesh is also one of the most natural disaster prone areas that suffer from ravages of floods, cyclones, storm surges and drought. In urban areas, air pollution, sound pollution and waste load from industries, hospitals, and municipalities are a matter of great concern.

Equally important is the need to have an effective strategy to tackle associated challenges when natural disasters happen. Bangladesh's goal therefore should be to implement strategies to protect it from unpleasant effects of climate change and global warming that could arise as a result of increased industrialisation. The objective will be to take all necessary actions to protect the vulnerable people from natural calamities, to take actions for the prevention of industry and transport related air pollution and to ensure disposal of waste in a scientific manner. Required steps will also be taken to make Bangladesh an ecologically attractive place and to promote environment-friendly tourism.

It is in line with the above that Group X was tasked to present a keynote paper on "Sustainable Development of Bangladesh: Balancing Industrialisation, Urbanisation and Green Environment". To achieve this, Group D will start by presenting a brief overview of global initiatives, concepts and features of sustainable developments with special reference to Green Industrialisation and Urbanisation. Thereafter, it will highlight environmental costs on unplanned urbanisation and industrialisation by looking at the challenges and the state of environmental governance in Bangladesh. Furthermore, the group will round up with the conclusions and few recommendations.

Overview on the Concept and Features of Sustainable Development with Special References to Industrialisation, Urbanisation and Green Environment

Concept of Sustainable Development

General. Sustainable development is a process for meeting human development goals while sustaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend. Sustainable development has its roots in ideas about sustainable forest management which were developed in Europe during the seventeenth and eighteenth centuries. In response to a growing aware of the depletion of timber resources in England, John Evelyn, an English writer, gardener and diarist argued that "sowing and planting of trees had to be regarded as a national duty of every landowner, in order to stop the destructive over-exploitation of natural resources". As the concept developed, it has shifted to focus more on economic development, social development and environmental protection.

Definition of Sustainable Development. The most accepted definition of sustainable development was published in the report of World Commission on Environment and Development (Brundtland Commission) in 1987. The concept became one of the most successful approaches to be introduced in many years. In fact, it helped to shape the international agenda and the international community's attitude towards economic, social and environmental development. The Brundtland Commission's report defined sustainable development as **"Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs"**. The concept supports strong economic and social development, in particular for people with a low standard of living. Sustainable development ensures a harmonious process of social and economic betterment that satisfies the needs and values of all interest groups while maintaining future opportunities and conserving natural resources and biological diversity.

General. A greenhouse gas (sometimes abbreviated GHG) is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Without greenhouse gases, the average temperature of Earth's surface would be about 18 °C (0 °F), rather than present average of 15 °C (59 °F). Human activities since the beginning of the Industrial Revolution (taken as the year 1750) have produced a 40% increase in the atmospheric concentration of carbon dioxide, from 280 ppm in 1750 to 400 ppm in 2015. This increase has occurred despite the uptake of a large portion of the emissions by various natural "sinks" involved in the carbon cycle. It has been estimated that if greenhouse gas emissions continue at the present rate, Earth's surface temperature could exceed historical values as early as 2047, with potentially harmful effects on ecosystems, biodiversity and the livelihoods of people worldwide.

The United Nations Conference on the Human Environment. First summit, "The United Nations Conference on the Human Environment" was held in Stockholm, Sweden from June 5-16 in 1972. The meeting agreed upon a Declaration containing 26 principles concerning the environment and development, an Action Plan with 109 recommendations, and a Resolution. One of the decisive issues that emerged from the conference is the recognition for poverty alleviation for protecting the environment.

Rio Summit 1992. Rio Summit 1992 or Earth Summit was the second such summit with the theme "Environment and Sustainable Development" was held in Rio de Janeiro from 3 to 14 June 1992. Salient of the summit were:

1. Patterns of production - particularly the production of toxic components, such as lead in gasoline, or poisonous waste - are being scrutinized in a systematic manner by the UN and Governments alike.

2. Alternative sources of energy are being sought to replace the use of fossil fuels which are linked to global climate change.

3. New reliance on public transportation systems is being emphasized in order to reduce vehicle emissions, congestion in cities and the health problems caused by polluted air and smog.

4. There is much greater awareness of and concern over the growing scarcity of water.

5. **United Nations Framework Convention on Climate Change (UNFCCC).** The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty negotiated at the Earth Summit. The UNFCCC objective is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The framework set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms.

6. **United Nations Convention to Combat Desertification.** The United Nations Convention to Combat Desertification is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

Rio+5 (1997). In 1997, the UN General Assembly held a special session to appraise the status of Agenda 21 (Rio +5). The Assembly recognized progress as "uneven" and identified key trends, including increasing globalization, widening inequalities in income, and continued deterioration of the global environment.

Millennium Development Goals. The Millennium Development Goals (MDGs) are the eight international development goals that were established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. All 189 United Nations member states at the time (there are 193 currently), and at least 23 international organizations, committed to help achieve the following Millennium Development Goals by 2015:

1. To eradicate extreme poverty and hunger.
2. To achieve universal primary education.

3. To promote gender equality and empower women.
4. To reduce child mortality.
5. To improve maternal health.
6. To combat HIV/AIDS, malaria, and other diseases.
7. To ensure environmental sustainability.
8. To develop a global partnership for development.

Rio+10 (2002). The World Summit on Sustainable Development (WSSD) or ONG Earth Summit 2002 took place in Johannesburg, South Africa, from 26 August to 4 September 2002. It was convened to discuss sustainable development by the United Nations. WSSD gathered a number of leaders from business and non-governmental organizations, 10 years after the first Earth Summit in Rio de Janeiro. (It was therefore also informally nicknamed "Rio+10").

Rio+20 (2012). The United Nations Conference on Sustainable Development (UNCSD), also known as Rio 2012, was the third international conference on sustainable development aimed at reconciling the economic and environmental goals of the global community. It was held from 13 to 22 June 2012. Rio+20 was a 20-year follow-up to the 1992 Earth Summit / United Nations Conference on Environment and Development (UNCED) held in the same city, and the 10th anniversary of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg.

Objectives. The conference had three objectives:

1. Securing renewed political commitment for sustainable development.
2. Assessing the progress and implementation gaps in meeting previous commitments.
3. Addressing new and emerging challenges.

Conference themes. The official discussions had two main themes:

1. How to build a green economy to achieve sustainable development and lift people out of poverty, including support for developing countries that will allow them to find a green path for development.

2. How to improve international coordination for sustainable development by building an institutional framework.

Sustainable Development Goals (SDGs). SDGs were the follow up of the Millennium Development Goals (MDGs). The MDGs emphasized that each nation's policies should be tailored to that country's needs; therefore most policy suggestions were general. As with the end of target year 2015, all the goals could not be achieved, SDGs with 17 specific goals were adopted in UN Summit in September 2015. These have come into effect from 2016 to 2030. Among the 17 Goals, SDG-9, SDG-11 and SDG-13 directly relates to Industrialisation, Urbanisation and Environment respectively.

Figure 1: Sustainable Development Goals (SDGs)

Bangladesh National Sustainable Development Strategy (NSDS) 2010-21.

This National Sustainable Development Strategy (NSDS) has been formulated to guide the country to face the challenge for sustainable economic growth with environmental safety and ensuring social justice. The vision of the strategy, which has been developed through extensive consultation with the stakeholders, is "achieving a happy, prosperous enlightened Bangladesh which is free from hunger, poverty, inequality, illiteracy and corruption and belongs completely to its citizens and maintains a healthy environment". The strategy is based on the long term development vision of the government, the Sixth

Five Year Plan FY 2011-FY 2015, the Perspective Plan of Bangladesh 2010-2021 and other existing plans, policies and strategies of the government. The approaches and principles for formulation of the NSDS for Bangladesh, considering the guideline as well as country circumstances, are given below:

People Centered. The formulation process has followed People Centered approach in preparing the NSDS for Bangladesh so as to ensure long-term beneficial impacts on disadvantaged and marginalized groups. Engagements of stakeholders at different stages of access to services for the people are key elements of people centered approaches.

Develop Long-term Vision. A long term vision for Bangladesh has been developed in consultation with all relevant stakeholders. The long term vision has also identified short-term and medium term strategies and activities to help achieve long-term vision.

Comprehensive and Integrated. Formulation of the NSDS has made efforts in integrating economic, social and environmental objectives, which are known as three pillars of sustainable development.

Comprehensive and Reliable Analysis. Priorities have been identified on the basis of a comprehensive analysis of the present situation and of forecasted trends and risks, examining the links between local, national and global challenges.

High–level Government Commitments and Lead Institutions. The Ministry of Environment and Forests set up a Steering Committee to guide the entire process of preparation which helps ensure high-level involvement and commitments. The Cabinet Division formulated Ministerial Committee to guide revision and updating of the NSDS in the light of Vision of the democratic government, the Perspective Plan of Bangladesh (2010-2021) and the 6th Five Year Plan (FY2011-FY2015).

National and Local Level Linkages. During formulation of the NSDS, the ProjectManagement Office organized regional and national level consultation for active engagementboth in preparation and implementation of National Sustainable Development Strategy bynational and local government and general mass in implementing the NSDS.

Building on Existing Mechanisms and Strategies. The National Sustainable DevelopmentStrategy has been built on existing plans, policies, strategies and implementation mechanisms toensure complementarities and coherence.

Develop and Build on Existing Capacities. Existing political, institutional, human, scientificand financial capacity of Bangladesh have been assessed at the outset of the NSDS. Emphasishas been given on building requisite capacities on a continuous basis for successful preparationand implementation of the NSDS.

Incorporating Monitoring, Learning and Improvement. The NSDS has suggestedappropriate indicators to monitor and evaluate the processes, track progress, capture lessons,and signal deviation, if any.

Industrialisation in Bangladesh-Benefits and Costs

Agricultural Sector

A look at the agricultural Sector of Bangladesh, we find that the contribution of this sector is gradually decreasing. After its independence in 1971, Bangladesh used to be predominantly an agro-based economy. However, Bangladesh is a very densely populated country. As the population is increasing more and more lands are being utilized for dwellings, causing loss to arable land. It is estimated that, since independence, Bangladesh has lost almost 7% of its arable land. Given the poor land to person ratio, Bangladesh is not capable of meeting its own requirements of food and agro-based products. Currently, agricultural sector contributes only 15.3% of Bangladesh's GDP. Despite the tremendous success in growth agriculture is unlikely to deliver rapid growth in Bangladesh because of the difficulty of setting up large-scale farms that can compete with countries that specialize in agriculture like Australia and Argentina.

Service Sector

In the service sector, it is only the unskilled labor market abroad that Bangladesh could exploit so far. Since the 80s, thousands of unskilled labors have migrated to different countries, especially in the middle-east. The remittances from those unskilled labors working abroad has become another major source of

foreign exchange for Bangladesh. Currently, almost 9 million Bangladesh migrant workers are contributing about 11% of Bangladesh's Gross National Income. However, as we see today this labor market is also shrinking gradually. This could be attributed to other developing countries like India, Pakistan, Sri Lanka, and the Philippines taking control of this sector with more skilled manpower. Bangladesh is falling behind to produce skilled manpower and compete with those countries. Therefore, this sector is also not enough to contribute substantially towards the attainment of a sustainable economy.

Industrial Sector

In the industrial sector, Bangladesh has got good prospects just by looking at the Readymade Garments industries in Bangladesh we can have a good understanding of Bangladesh potentials in the industrial sector. Additionally, Bangladesh is endowed with natural resources such as coal, water and a huge cheap labor force that could be utilized to develop the industrial sector like leather, pharmaceuticals, jute, ceramics, food processing, tea and ship building amongst others. Usually, when we talk about industrialisation, we mostly refer to growth in the manufacturing sector, as its accounts for 70% of our industry. In the 1970s and 80s, manufacturing sector performance was not up to the mark. This was mainly due to poor performing nationalized enterprises, inward looking trade policies and inadequate private investment due to poor incentives and state controls. However, the manufacturing sector picked up pace in the 1990s and beyond, from average growth of 4.5% per annum, to 7-8% since the early 1990s. We can see this in the table below:

Table 1: Average Decadal Sectoral Growth Rates (2005-2006 base year)

	1981-1989	1990-1999	2010-2015
Agriculture	1.8	3.4	3.7
Industry	5.6	7.0	8.8
Manufacturing:	4.7	7.2	9.3
Large scale	4.6	7.3	9.7
Small scale	5.4	6.8	7.6
Services	3.8	4.3	5.9
GDP	3.5	4.8	6.3
Source: Estimated from National Accounts, BBS			

This acceleration in growth performance can be attributed to the shift in policy stance, from a predominantly import-substituting inward-looking industrial policy to a largely outward-looking export-oriented policy. It was also supported by economic reforms that included market orientation, privatization, and de-regulation of investment, greater trade openness and flexibility in exchange rate management, and a general move towards a private sector driven economy replacing the historical public sector predominance in manufacturing.

According to 'Bangladesh Bureau of Statistics (BBS) Survey of Manufacturing Industries 2012', currently, there are around 42,792 registered manufacturing industries in Bangladesh, where around 50, 15,937 workers are employed. Details are given in the following table:

Table 2: BBS Survey on Manufacturing Industries

Category	Total	Micro	Small	Medium	Large
Number of Establishments					
No of establishments	42,792	17,384	15,666	6,103	3,639
Persons Engaged					
Total	50,15,937	2,71,644	7,38,800	10,41,220	29,64,271
Male	30,62,009	2,29,407	6,15,426	6,73,821	15,43,353
Female	19,53,928	42,237	1,23,374	3,67,399	14,20,918
Gross Output (taka in million)					
Gross Output	53,94,905	2,75,818	12,03,267	14,08,342	25,07,478

Notably, most of these industries are coming up through private investments. Among all these industries, the RMG sector is the largest in Bangladesh. Apart from foreign remittance, Bangladesh's economy is predominantly dependent on export in the RMG sector. The RMG sector employs almost 5 million workers and accounts for 80% of total export and 13% of GDP. The other industries like textile, jute, fertilizer, cement, electronics, leather, plastic items, food processing, etc. are not as large as the RMG sector, and mostly meeting the domestic requirements. In total, the industry sector, at present, contributes about 31.3% of the GDP.

However, the major drawback of the industrial sector of Bangladesh is the lack of diversity. As already mentioned, it is the RMG sector alone that has contributed much to the GDP from industrial sector. Depending on one industrial field is very much vulnerable as far as the sustainability is concerned. Therefore, Bangladesh needs to look for investments in diverse industrial fields. Bangladesh also needs to take care of some other shortcomings such as, lack of adequate capital, weak investment base, insufficient infrastructure, lack of technology know-how, shortage of energy, unskilled human resources, political instability and labour unrest, etc.

Now, let us see the prospects in the industrial sector. As has been mentioned, Bangladesh, because of its access to cheap labour and resources, has a very good potential to develop its industrial sector. Around one third of Bangladesh's labour force are underutilized. We are having natural resources like gas, coal, water sources, agricultural products, fisheries, etc. The Government also believes that rapid industrialisation is a key to the country's economic development. Therefore, the Government has taken steps to develop infrastructures like industrial zones, roads, mega-bridges, port facilities, etc. and ensure utilities like gas, electricity and water, etc. for the entrepreneurs. Given the challenges of the free market economy and globalization, the government has rightly acknowledged the private ownership and management of industrial enterprises as one of the major guiding forces in achieving economic growth. Therefore, the Government has formulated the 'Industrial Policy 2010' in a manner so as to promote private and foreign investments in the industrial sector. In that, the Ministry of Industries has taken the role of a facilitator with a view to creating increased industrial activities in the country. Besides this, the government has also brought about many constructive and timely reforms in the running of businesses, and liberalized trade so that private entrepreneurs can seize opportunities of establishing and running industrial enterprises profitably and freely. Keeping in view the present challenges and shortcomings in the industrial sector, the Government has revised the 'Industrial Policy 2010' and drafted the new 'Industrial Policy 2016' that is likely to be promulgated very soon.

In order to further strengthen the country's industrialisation process, the present government has identified the Small and Medium Enterprises (SMEs) as a priority sector and as the driving force for industrialisation. A national task

force led by the Principal Secretary of the Prime Minister's Office has been formed so that proper policies and planning are followed in establishing SMEs. At the same time, with a view to providing entrepreneurs with assistance in the establishment of SMEs, a cell has been created under the supervision of the Ministry of Industries comprising officials experienced in SMEs from the Ministry of Industries, Bangladesh Small and Cottage Industries Corporation (BSCIC), National Productivity Organization (NPO), Asian Development Bank (ADB), National Association of Small and Cottage Industries, Bangladesh (NASCIB) and women entrepreneurs.

The provisions of all facilities for attracting foreign investments have been envisaged in the Industrial Policy. The government has taken an initiative to formulate a separate SME policy to provide entrepreneurs with necessary guidance and strategic support in respect of the establishment of SME industries all over the country. These strategic guidelines will be followed in establishing SMEs across the country.

With all these, a sustainable industrial sector is not a difficult proposition for Bangladesh. Given the policy reforms in the upcoming Industrial Policy 2016, it is expected that there will be acceleration in the industrial sector of Bangladesh. For example, the manufacturing sector has been growing at an annual average rate of about 8% from 2010 to 2014. The sector is projected to grow at a higher rate reaching 11.7% in fiscal year (FY) 2015-16 and accelerating to 14.0% by the end of FY 2021, when it will contribute 28% of Bangladesh's GDP (present contribution is around 19.01%). The vision of the Ministry of industries is to promote the contribution of the industrial sector in indigenous production from 25 to 40 percent and to provide all sorts of assistance in up lifting the labor force in the industrial sector to increase from 16 to 25 percent by 2021.

Lessons of Industrialisation from Industrially Developed Countries

We have carried out detail analysis about the benefits and cost of industrial development in many industrially developed countries like Malyasia, North korea,China, Singapore etc.The lessons derived are appended below in the subsequent paragraphs.

There are two fundamental truths about the industrial revolution, which are so relevant in the context of a country like Bangladesh:

It is not possible to move forward wihg industrial revolution without knowledge. A transition to industrial society is dependent on universal basic education and advance in science and learning. Education contributed to the productivity of labour and the sucesss of management.

Economic growth and political development are two strains of an integral process and unless there is parallel development in the two strains industrial maturity is not likely to take place.

For a transition to industrial civilization, establishment of political rights of people must accompany efficiency and growth in production. The main element in political development is the process of inclusion by which the participation of people in governance is expanded and ensured.

Free market policy supposedly helps open and free trade provides a free environment for investment, assists individual capacity for work and promotes learning and inquiry.

It is said that relying on free and open market policy and export oriented strategy East Asian countries such as, Japan, South Korea, Taiwan, Singapore and Hongkong established records in sustained high economic growth rates.

A close public private partnership, verging on to an incestuous relationship flourished in these countries. Rule of law prevailed in the business world facilitating and encouraging private enterprise. Export promotion received priority but domestic production was protected. These countries are credited with economic miracles

With the exception of Japan all of them started the industrial revolution only after the War and in course of less than half a century have succeeded in establishing industrial civilization in their territories.

It has been speculated in the London Economist that China would be the largest economy in the world in the next twenty years.

Benefits of Industrialisation

Employment Opportunity. Establishment of new industries will open the door of job opportunities for the unemployed youths of Bangladesh. With more and more employment opportunities, we can reduce poverty, hunger, economic inequality; which are, otherwise, some of the goals of SDGs

Affordable Price. An industry produces goods in large quantities. So the production cost is reduced and the price becomes affordable

Development of Skills. An industry develops skills and ability in an individual, so we can say industry is a factor which is responsible to build up a country's manpower.

Utilization of Resources. Industry utilizes the resources present in country, and produce finished products which are of affordable and best quality. For example there is sufficient sugar cane present in many parts of Bangladesh so it can be used to produce sugar in the sugar industry.

Earning Foreign Currency. If we can produce different kinds of goods in various industries, then we can sell these products outside and earn huge amount of foreign currency to contribute significant development in national economy.

Rapid Development of Technology. With the development in the industrial sector, the society will also experience technological progress. To make each product cost-effective and cheaper, the entrepreneurs always seek for newer and advance technologies to be adopted in their enterprises.

Development of Wealth. The most evident advantage of industrialisation would be the development of wealth or capital. Factory owners will experience more of a wealth bounce from industrialisation.

Movement to Urbanized Setting. With most of the factories being located in the cities, individuals will move to these areas and become closer to one another with greater physical examples of community being formed.

Improvement in Transportation. The development of roads, canals, as well as the improvements in transportation will end up being a result of industrialisation because of the desire to move goods to farther reaches of the nation.

The Increased Prosperity and Standard of Living. The increased prosperity, and standard of living of people is evident in various forms such as better and more food, clothing and shelter, longer life expectancy etc. The list is almost never ending.

Rapid Economic Growth. We know that, at present, Bangladesh's economy is at "take off" stage in the growth process. Therefore, industrialisation is surely going to assist our Government in the attainment of higher GDP growth rate, which, in turn, will provide extra finance required to meet the SDGs' targets.

Increase in GDP. With industrialisation, we expect to see a growing economic cycle in Bangladesh that would boost our GDP growth. When we have growth in the economy, we can spend money for healthcare, sanitation, sustainable cities and communities and even, better environment.

Consumer Goods with Lesser Price. Extensive industrialisation will also allow to produce many consumer goods in much cheaper costs.

Reduce Dependancy on Foreign Aids. industrialisation will assist the country to reduce its dependency on foreign resources. This, in turn, will help the Government to pursue independent foreign policy, development strategy and economic reforms. Thus, it will be easier for the Government to look after the people.

Impacts of Industrialisation on Environment

Although industrialisation is important to our economic growth, especially towards the attainment of 169 targets of the SDGs, growth in the industrial sector is not without any cost. Perhaps the biggest cost is the degradation of our green environment. Industrialisation and technological progress have always been accompanied by a growing negative impact on the environment in terms of its pollution and degradation.

The productivity of the industries depends on the supply and quality of natural and environmental resources. While water, soil, air, forest and fishery resources are productive assets, the pollution of water, air, atmosphere and noise are the by-products of economic development, particularly industrialisation. In global context, 'Green House Effects', 'Global Warming and Climate Change' and 'Acid Precipitation' are the major ill effects of industrialisation.

If we look at other pollutions in Bangladesh, the present environmental condition of Bangladesh is not at all equilibrium. One of the major reasons for air pollution in Bangladesh is industrialisation and associated burning of fossil fuels, and motorization.

If we see the air pollution, we find that industrial emissions are the principal source of outdoor air pollution. The national ambient air quality standards of Bangladesh and amount of pollutants in the air of Dhaka city is shown in the following table:

Table 3: Bangladesh National Ambient Air Quality Standards

Category	8 hours' average concentration in μg/m3			
	CO	NO2	SPM	SO2
Industrial use	5000	100	500	120
Commercial use	5000	100	400	100
Residential use	2000	80	200	80
Other use	1000	30	100	30
Source: Department of Environment				

Table 4: Pollutants in the Air of Dhaka City

Location at Dhaka City	Sulfur Dioxide (SO2)		Nitrogen Dioxide (NO2)		Carbon Monoxide (CO)		Suspended Particulate Matter (SPM)	
	Concentration (μg/m3)	Permissible (μg/m3)	Concentration (μg/m3)	Permissible (μg/m3)	Concentration (μg/m3)	Permissible (μg/m3)	Concentration (μg/m3)	Permissible (μg/m3)
Gulistan	800	100	500	100	33200	5000	1332	400
Jatrabari	1300		500		67000		4667	
Pantho Path	900		500		85100		2666	
Mohakhali	1200		500		69300		2111	
Source: Proceedings of the International Conference on Mechanical Engineering 2009								

Air pollution mainly occurs due to burning of fossil fuels like coal, petroleum etc and associated black smoke. Over 99% of the brick kilns use fossil fuel but do not comply with the "Brick Kiln Ordinance" and pollute enormous air. Other manufacturing industries cause air pollution through smoke emission. Agro based industries like sugar, pulp, paper, tanneries and value added industries like textile, garments, pharmaceutics, oil refineries, fertilizer, and chemical industries are the major contributors for air pollution. The air pollution percentage of most five industrial sectors of Bangladesh in the year 2001 is shown below:

Table 5: Air Pollution Percentage of most Five Industrial Sectors of Bangladesh:

Industry	Emission (tons/year)	Pollution (%)
Food	1,46,356.06	38.7
Cement/Clay	62,725.88 16.6	16.6
Pulp and Paper	51,963.92	13.7
Textile	39,831.01	10.5
Tobacco	16,992.22	4.5
Source: Research Work by Islam Faisal on 'Industrial Pollution in Bangladesh'		

Another threat to environment is water pollution. Water pollution creates serious health hazard for Bangladesh. The dumping of municipal wastes, hospital wastes and toxic environmental discharges from mostly industries pollute both surface and ground water sources. The most dangerous threat emanating from environmental degradation is the arsenic contamination of ground water.

The main industrial areas of Bangladesh are at Dhaka, Chittagong, Khulna, and Bogra districts. The mostly contributing industries for water pollution are pulp and paper, pharmaceuticals, metal processing, food industry, fertilizer, pesticides, dyeing and painting, textile, tannery etc. More than 200 rivers of Bangladesh directly or indirectly receive a large quantity of untreated industrial wastes and effluent. Everyday approximately 700 tanneries of Dhaka city are discharging about 16,000 cubic meters of toxic wastes. The Department of Environment (DOE) has listed 1,176 factories that cause pollution throughout the country30. Water pollution percentage of most five industrial sectors of Bangladesh in the year 2001 is shown below:

Table 6: Water Pollution Percentage of most Five Industrial Sectors of Bangladesh in the Year 2001		
Industry	Emission (tons/year)	Pollution (%)
Pulp and Paper	91,768.10	47.4
Pharmaceuticals	30,866.72	15.9
Metal	27,174.61	14.0
Food Industry	23,403.39	12.1
Fertilizers/Pesticides	12,715.00	6.6
Source: Research Work by Islam Faisal on 'Industrial Pollution in Bangladesh		

Industries are one of the main sources of noise pollution as well. According to the Department of Environment (DOE), the perfect sound condition for Bangladesh is 45 dB for the daytime and 35 dB for the night in peaceful areas and 50 dB for the daytime and 40 dB for the night in residential areas. At present noise level in Dhaka city are estimated ranging from 60 to 100 decibel. If present situation continues then by the year 2017, 50% people of Dhaka city will loss decibel of hearing power.

All these severe environmental pollution is threatening human health and economic growth of Bangladesh. Air pollution mostly affects the urban children. Immediate effect of smoke inhalation causes headache, vertigo, burning sensation of the eyes, sneezing, nausea, tiredness, cough etc. Its long term effect may cause asthma and bronchitis. Lead affects the circulatory, nervous and reproductive systems as well as affects kidney and liver including liver cancer or cirrhosis.

Noise pollution causes mental and physical illness among the people. Sound pollution causes deafness to heart attack. Any sort of noise pollution seriously affectsexpecting mothers. It also causes high blood pressure, tachycardia, headache, indigestion, and peptic ulcer. Thus, many people die every year in many diseases due to environmental pollution.

So, at the end, although industrialisation is the most important factor for the attainment of SDGs, it is also a major impediment to the attainment of many of the SDGs like, 'Good Health and Well-being', 'Clean Water', 'Sustainable Cities and Communities', 'Climate Action', 'Life below Water', and 'Life on Land', etc.

Environmental Costs of Unplanned Urbanization

Environment

"Environment" can be defined as the surroundings of human life. It is an ever-changing phenomenon due to the cycle of life and interdependence of living organism. Due to the advancement of human civilization in the form of technological and industrial development, the dependency on natural resources like fossil-fuel, wood, coal- burning gas, vehicular exhaust gas has been increased tremendously. Over the past few years, Scientists, Politicians and the public have become increasingly aware that human activities are profoundly changing the global environment. The consequences of which causes rise of mean temperature, changed weather pattern, melting of polar ice cap, rise of sea level, depletion of Ozone layer, water and air pollution, desertification, soil erosion, acid deposition, species-extinction, or other changes in the earth system.

Urbanization

"Urbanization" is a population shift from rural to urban areas, It refers to "a broad-based rural-to-urban transition involving population, land use, economic activity and culture, or indeed any one of these." It is estimated that by 2050 more than two thirds of the world's population will live in cities, up from about 54 percent today. It needs to be recognized that this fast, yet often unplanned urbanization, brings profound threats to social stability, risk of critical infrastructure, impending water crises, triggering potentials for devastating spread of diseases and other environmental hazards. Cumulatively, these risks likely to be further exacerbated as this unprecedented transition from rural to urban areas continues. As such, there is an increased concern that unplanned urbanization is critically detrimental to sustainable development.

Reasons for Urbanization

Urbanization could be caused by a host of factors; the main one being migration, which is a form of geographical or spatial motion between one geographical unit to another. Other main reasons are poverty, transformation of agriculture to Industrialisation and Centralized System. Whatever the form, migration is caused by two main reasons; one is the push factor; which implies unfavorable conditions in an area that pushes the individual away and the pull factor; which implies a perceived presence of favorable conditions that pulls the individual towards the area (destination). These factors could be categorized under social, economic and environment issues as shown below:

Push and Pull Factors. Push and Pull Factors Migration as under:

Push Factor	Pull Factor
Economic Factors: Lack of Employment. Natural disasters (earthquakes, floods). Lack of food or shelter. Lower standard of living.	Economic Factors: Hope for better employment. More money and food. Better shelter. Hope for family to have a higher standard of living.
Social Factors: Lack of health care. Lack of educational opportunities. Lack of religious tolerance.	Social Factors: Encouragement from family and friends. Better health care. Better educational opportunities. Religious tolerance.
Political Factors: Unfair legal system. Disenfranchisement (Not being able to vote) or lack of governmental tolerance. War and terrorism.	Political Factors: To gain protection under the law. Right to vote and freedom from persecution. Safety.

Consequences Due to Migration and Urbanization

Urbanization and urban growth occurring due to migration have both positive and negative consequences and impact. These are:

Positive Consequences of Urbanization are the following:

1. Economic benefits: higher productivity, better income etc.
2. Demographic benefits: lowering of age at marriage, reduction of fertility rate etc.
3. Socio-cultural benefits: modernization.
4. Political benefits: empowerment, democracy etc.
5. Improved access to information technology.

The Negative Consequences can be grouped as the following:

1. Environmental consequences.
2. Encroachment on productive agricultural land and forests.
3. Extreme pressure on housing, growth of slums and the pressure on and urban services.
4. Economic consequences, leading to income inequality and poverty, ill effects of globalization.
5. Social consequences, resulting in increased violence and crime, social degradation.
6. Cultural consequences: entry of alien culture, loss of national cultural identity.
7. Political consequences: criminalization of politics.

7th FYP Related to Environment and Urbanization. General Economics Division (GED) of the Planning Commission is in the process of preparing the 7th Five Year Plan (2015-16 to 2019-20). In line with that the commission conducted a serious of Background. Studies relates to environmental degradation. These are:

1. Improving Access of the Poor to Financial Services.
2. Strategy for Education and Training.
3. Improving Land Administration and Management.
4. Strategy for Infrastructure Development.
5. Climate Change and Disaster Management.
6. Environment, Forestry and Biodiversity Conservation.
7. Health Strategy for 7th FYP.

Causes of Unplanned Urbanization. The prime causes of rapid and unplanned urbanization is focused below:

1. Population pressure, adverse person-land ratio, landlessness and poverty.
2. Frequent and severe natural disasters.
3. Lack of social and cultural opportunities (applicable for rural rich).
4. A large proportion of rural-urban migrations are due to marriage and other familial reasons.
5. Imbalance administrative development.
6. Neglected urban issues, e.g law and order issue.
7. Housing scarcity.

Effect on Environment Due to Unplanned Urbanization

Air Pollution and Public Health. In Bangladesh, air pollution typically originates from the high content of lead in gasoline, the large number of polluting vehicles on the road, the use of impure fuel, and poor traffic management. In addition to vehicular pollution, manufacturing industries located in and around cities contribute considerable pollutants to the air.

Water Pollution. Uncontrolled rapid urbanization poses a threat to the drainage system and causes water logging to the cities. In absence of adequate sanitation services, human waste has been identified as the major contributor to water pollution. Surface water of cities becomes polluted as it mixes with solid waste, clinical waste, silt, contaminants, domestic wastewater and other

human activities. Industrial wastes are often giving rise to contamination with heavy metals (lead, mercury, arsenic and cadmium) and persistent organic compounds.

Surface Water Contamination. Surface water contamination is also tremendously impacting the aquatic diversity of floral and faunal species. The increasing concentration of chromium, lead and zinc in the peripheral rivers threatening the ecological processes of rivers. The chromium concentration in the Buriganga River was found to be extremely high, more than 90% of which come from the Hazaribagh area, which houses approximately 160 tanneries (Karn and Harada, 2001).

Salinity. Salinity of water is mainly caused by poor irrigation practice. Water logging followed by evaporation will deposit salt in the soil. A constant flow of irrigation water will strip salt from the soil and deposit it when the water evaporates. Which is a very big problem for agriculture and food production now and in the future.

Noise Pollution. The noise pollution of different cities has been seen as a matter of concern, posing a considerable threat to public health. Noise measurement revealed that the average level of noise excelled the allowable limit during day and night-time. The frequent use of high-pitched horns, motor vehicles are found to be the major cause of noise pollution. The use of microphones at public meeting, waz, kawalietc contribute to serious noise pollution.

Soil Pollution. Like all other forms of nature, soil also suffers from pollution. The main reason why the soil becomes contaminated is due to the presence of manmade waste. The waste produced from nature adds to the fertility of the soil but other waste products, specially from industry are full of chemicals and this lead to soil pollution

Solid Waste Management. Three primary sources of municipal solid waste in DMA are residential, commercial, and street sweeping. Besides, medical waste also contributes a small portion of the total solid waste, estimates are that approximately 10% to 25% of medical wastes are hazardous, and hence present a potential threat to public health.

Growth of Slums and Squatters. Unfortunately in different cities the growth of slums and squatters is distinctive and pervasive. Thinking the cities will provide better job opportunities, wages, infrastructure, and other public services, encourages people to migrate. The large influx from rural- urban migration, particularly by marginalized and landless rural people has caused a rapid increase in the number of slum dwellers.

Traffic Congestion. Effective reasons for traffic congestion are:

1. Significant increase in population and all types of vehicles.
2. Simultaneous presence of motorized and non-motorized vehicles on the same street.
3. Traffic mismanagement: Violation of Traffic rules and regulations.
4. Poor transportation and infrastructure planning.
5. Inadequate roads and lanes.
6. Dependency on only motorway, no sub way or elevated expressway.
7. Disproportion between populations versus transportation.

Effects on Nature Due to Unplanned Urbanization

Flood. The unplanned urbanization brings vulnerability to natural hazards, particularly to flooding and water logging during monsoon. At present, flooding has become the most pervasive and damaging phenomenon, especially in Dhaka city. Assessment indicates that flood damage is on the rise due to the progressive construction of additional infrastructure. Inappropriate physical planning of the city further aggravates the risk.

Earthquake. Apart from flooding, vulnerability to earthquake is also a matter of tremendous apprehension. Since the residents of DMA have no recent experience dealing with earthquake hazards, any tremor with a 7.0 magnitude would bring major human tragedy (Paul and Bhuiyan, 2010). Moreover, the construction of buildings and other urban infrastructures, which are now mainly through earth-filling on alluvial deposits, is elevating the potential of earthquake and soil liquefaction related risk.

Drought. Since urbanization replaces natural land with metallic and concrete infrastructures, rising temperatures during the summer is directly responsible for inviting drought situation in the country.

Other Hazards. Other common hazards include severe local storms such as tornados and Nor'westers, which creates due to rise in the global temperature. Time series analysis of Nor'wester occurrences (1954–2000) in Bangladesh revealed that Dhaka is highly exposed to damaging storms, resulting in severe property damage (Dewan and Peterson, 2003).

Water Logging due to Surface Runoff. Management of drainage system of cities is presently a challenge for the urban authorities. Rapid growth of population and unplanned development activities are causing encroachment on retention areas and natural drainage paths with little or no care of natural drainage system, thereby creating obstacles in draining out the urban runoff.

Impact on National Security. Environmental degradation affects every mankind of the planet the consequences of which causes more devastation than the military threats. The economic declination, poverty, displacement of people, disruption of political institutes is the outcome of the global environmental problems which seems to be threatening all the city dwellers. The rapid urban growth in cities creates development of huge number of slums and squatters in and around cities. With low-income ability, having no access to the affordable urban shelters, most of the rural to urban migrants end up to the slums and squatters. These peoples are deprived from various services and amenities like electricity, gas, water, living conditions, security and environment. These deprivations induce them to indulge into the illegal activities like drug trading, arms trafficking and young peoples are susceptible to violent activities. It also contributes to political instability or violent conflicts. The political God fathers used to exploit this group with minimum amenities and utilize them in violent actions for achieving their own political aim.

Few Remedial Measures

Carefully Considered Urban Planning and Good Governance. To protect rapid and unplanned urbanization and to provide opportunities of economic

emancipation, carefully considered urban planning and good governance with effective regulatory frameworks in line with available Acts and Rules, is a necessity.

Formulation of Proportionate Development Plan. The principal way to mitigate the impact of urbanization on environment is the formulation of a proportionate development plan. This approach will utilize the available resources to the optimum level in each region.

Ensuring Basic Amenities in Rural Areas. Rural communities should be facilitated with basic amenities such as road network, electricity, communication, health services and education to discourage mass migration to urban areas.

De-centralization and Re-location of Public and Private Sector. Business, industry, construction works, RMG, tannery and other related services sector should be re-located outside urban areas which will help to generate employment opportunities, reduce health hazard and discourage undue migration.

Formulation of Strategic Master Plan. Appropriate city reform strategy and long term master plan to be developed to improve the urban environment in line with the SDG and Perspective Plan of the Government.

Reviving Dead Water-bodies. Recovery of dead canals, khals and their integration with the surface drainage system. This would have multi-faceted dividend in the economic, social and environmental domain.

Developing a Planned and Sound Real Estate Market. The principal idea of sustainable real estate market to develop cities keeping focus on the environment, in particular giving importance to the concept of green city.

Political Commitment. The national and local city government must have strong political commitment to ensure a planned urban center with sustainable environment.

Taking Care of the Slums. Slums are the breeding places of all sorts of anti-social activities and the communicable diseases, which has to be taken care of.

Public Awareness. Another important aspect is the public or self-awareness. People themselves should realize the importance of environmental sustainability and their responsibilities to carry out urbanization and industrialisation without breaching established rules and regulations.

Traffic Management and Alternative to be sought. Equivalent and efficient alternative mode of transport like Double Decker and large buses, Sub-Way, Elevated express way and MRT should be introduced in cities.

A Holistic Yet Focused Approach Towards Correct Management. In order to overcome the environmental impact of unplanned urbanization, and to strengthen human security within the broader ambit of national security, a holistic and focused approach cannot sufficiently be emphasized.

The State of Environmental Governance in Bangladesh

"Environmental Governance" is referred to the set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes. It includes the actions of the state and, in addition, encompasses actors such as communities, businesses, and NGOs. International accords, national policies and legislation, local decision-making structures, transnational institutions, and environmental NGOs are all examples of the forms through which environmental governance takes place. Key to different forms of environmental governance are the political-economic relationships that institutions embody and how these relationships shape identities, actions, and outcomes.

Overview of Environmental Law and Institutional Arrangement

Environmental Policy, Law and other Legal Instruments. The first official regulatory legislation for the control, preservation and mitigation of pollution in Bangladesh was the Environment Pollution Control Ordinance 1977. This was a general ordinance which repealed the pre-existing Water Pollution Control Ordinance, 1970. The Environmental Pollution Control Ordinance 1977 was repealed with the enactment of the Environment Protection Act

1995. This Act provides for the conservation, improvement of environmental standard and control and mitigation of the pollution of the environment. The Act led to the creation of the Bangladesh Department of Environment (DoE). The Act centres on two issues:

1. Environmental clearance requirement for establishing or undertaking industrial units or projects.
2. Formulation of environmental guidelines and standards for the control and mitigation of environmental pollution and the conservation and improvement of environment.

From ECA 1995, Environment Conservation rules 1997 (ECR 1997) were made that encompasses the following:

1. Declaration of ecologically critical areas.
2. Procedure for granting environmental clearance.
3. Setting environmental standards for air, water, noise, odour and other environmental components.
4. Setting waste discharge and emission standards.

Bangladesh has adopted various policies and laws to address different environmental problems. It is estimated that there are about 200 environmental laws in the country. The sectoral policies like Energy, Industry, and Agriculture Policies also involve environment.

Institutional Arrangements

The National Environment Council. High level committee headed by the Prime Minister & includes 29 members, and the Executive committee headed by the Minister, MoEF and 24 members formed to provide policy guidelines and directions to ensure environment friendly development in the country.

Ministry of Environment and Forests (MoEF). The nodal agency in the administrative structure of government for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. 6 departments are working under it. These are:

1. Department of Environment
2. Department of Forest.

3. Bangladesh Forest Research Institute.
4. Bangladesh Forest Industry Development Corporation.
5. Bangladesh National Herbarium.
6. Bangladesh Climate Change Trust.

Department of Environment (DoE). Functions under MoEF. Major functions: environmental impact assessment, issuing of environmental clearance to industries and projects, operating enforcement activities and environmental damage assessment, continuous monitoring of air and water quality, increase public awareness for environmental conservation, declaration and management of Ecologically Critical areas and conservation of biodiversity and so on.

Field Office of DoE. in 21 Districts including 6 divisional offices. Required strength: 735 but 436 working, rest of the posts are vacant.

Bangladesh Climate Change Trust. Bangladesh Climate Change Trust Act, 2010 was enacted for establishment of an organization called Bangladesh Climate Change Trust under Ministry of Environment & Forests for proper management of climate change trust fund. Its functions are governed by a 17-membered Trustee Board.

Enforcement Method

1. Enforcement operation by DoE's Monitoring & Enforcement Team of Head Office and Divisional Team – resulting in damage assessment or court case.
2. Issuing Situational & Environmental Clearance, i.e. Licensing of industries and yearly renewal of Clearance.
3. Mobile Court Operation specially for the case of air pollution, usage of polythene, hill cutting etc.
4. Special trial by the Environment Courts

Enforcement & Implementation of Environmental Legislation: Experience at National Level

Review of Key Policies and Plans. Environment is a complicated and cross-sectoral issue. Degradation of environment indicates the ineffectiveness of the policy or its implementation. Therefore, it is needed to review an Environment Policy very frequently to anticipate latest environmental instruments and global initiatives. As such DoE has revised the Environment Policy 1992 time to time to make it updated and compatible with the current national and international situation. The Govt. has enacted Environment Conservation Act 1995 (ECA 1995) and subsequently amended in 2000, 2002 and 2010. Besides, the Govt. has enacted the Environment Court Act, 2000, formulated National Environmental Management Action Plan (NEMAP),National Biodiversity Strategy and Action Plan for Bangladesh (NBSAP), Perspective Plan (2010-2021), the National Sustainable Development Strategy (NSDS) (2010-21).

Notable Project Implementations

Air Quality Management and Standards. Ambient air quality standards were first introduced in Bangladesh in 1997 under the ECR 1997. The Air Quality Management Project (AQMP) implemented by the DoE during 2000-2007 with support from the WB was the first major project aimed at air quality management in Bangladesh. To control air pollution following measures have been taken:

1. Banning of two stroke three wheelers since 2003.
2. Incorporation of air quality standards in ECR.
3. Introduction of air quality index and vehicular emission standards.
4. Enactment of Brick Making and Brick Field Establishment (Control) Act 2013.
5. Introduction of clean technology of Vertical Shaft Brick Kiln (VSBK) which emit around 60%-70% less particulate matter than the traditional fixed kilns. In 2014-15 the national coverage of modernized brick fields was 57%.

ETP Coverage. Installation of Effluent Treatment Plant (ETP) is 812 (as of May, 2014). The coverage of ETP in Bangladesh in 2014-15 was 72%.

Ban of Polythene Shopping Bag. Bangladesh was the first country to ban plastic bags. Restriction has been imposed in the production and uses of polythene shopping bag. Accordingly, the penalty and punishment are:

1. For production, import and marketing – 10 years sentence of vigorous prison, or 1 million taka fine, or both punishment together.

2. For sale, exhibition for sale, store, distribution, transportation or use for commercial purpose – 6 months sentence of rigorous prison or 10 thousand taka fine, or both punishments together.

Declaration of Forest Protected Areas. 37 protected forest areas including dolphin sanctuaries, 10 other conservation sites including botanical garden and eco- parks have been declared under Forest Act 1927. The first Marine Park of the country has been declared in 1738 km area of the Bay of Bengal.

Declaration of Ecologically Critical Areas (October 2009). As per provision of Bangladesh Environment Conservation Act, 12 areas of the country have been declared as Ecologically Critical Areas (ECA). Restrictions have been imposed on all activities that could result in the destruction of floral or faunal habitats, or destroy natural characteristics of water and soil. Local community has been involved in the management of ECAs and community based approach is being used in the environment conservation activities.

Green Tax. 1% Surcharge has been imposed on the products of environment polluting industries that has come in effect from July 2014.

Social Forestry. Notable achievement has been done in social forestry including plantation of 24,184 Ha and 10,944 km benefiting 109,400 participants with BDT 2372.6 million and generating BDT 2203.6 million BDT for the GoB.

Implementation of Multilateral Environmental Agreements (MEA): Progress in Bangladesh

Multilateral Environmental Agreements (MEA). MEAs play a critical role in the overall framework of environmental laws and conventions. Complementing national legislation and bilateral or regional agreements, MEAs form the overarching international legal basis for global efforts to address particular environmental issues. Some MEAs focus on particular themes. These are:

1. The biodiversity-related multilateral environmental agreements.
2. The chemicals-related multilateral environmental agreements.

Progress and Success in Implementation of Environmental Legislations & MEAs in Bangladesh

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989: Bangladesh has imposed ban on the import of all sorts of hazardous wastes in the Import Policy Order 2012-2015. Restrictions have also been imposed by the "Hazardous waste and Ship Breaking Waste Management Rules 2011" promulgated under "Bangladesh Environment Conservation Act 1995 (amended 2010)". Hazardous wastes have also been defined.

Following the commitments made under Agenda 21 in 1995, the National Environment Management Action Plan (NEMAP) was developed by the government after consultation of all stakeholders, NGOs, civil society, lobbyists. NEMAP aimed at integration of environment and development decision making.

Constitutional recognition to protect and improve environment and biodiversity in Bangladesh was given in its fifteenth amendment in year 2011 where a special article was inserted as Article 18A.

Phasing out of HCFC and ODS in some sector under Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 : In order to reduce the use of

Ozone Depleting Substances (ODS) Bangladesh has phased out use of CFC 100% from refrigerator, aerosol and pharmaceuticals by 2014. Besides, Carbon Tetra Chloride and Methyl Chloroform was totally phased out in 2010. Also the use of CFC-11, CFC-12 in pharmaceuticals industry have been phased out particularly in manufacturing inhalers. In 2013, Bangladesh started and become successful in total phasing out HCFC-141b from foam sector. As a result, 60 percent use of ODS has been reduced in the country.

Key Issues and Challenges in Implementation of Environmental Legislations & MEAs in Bangladesh

Inadequate Manpower and Organizational Setup of DoE. It is the biggest concern; the organization set up of DoE exists only in 21 districts out of 64 districts of the country.

Coordination Gap. Notable gap in coordination among other ministries/ departments closely related to environment issues, i.e. Ministry of agriculture, land, water resources, fisheries and livestock, industries, health and family welfare as well as lack of coordination among different other stakeholders (governments, NGOs, private sector and civil society).

Lack of Integration. Environmental issues are interdependent, not only with development and sustainable economic growth, but also with trade, agriculture, health, peace and security. Hence, lack of integration of environmental concerns in development initiatives is a major problem in Bangladesh.

Lack of Public Awareness. Lack of education and awareness on environment protection among people and industrialists, businessmen, importers hinders the enforcement and implementation of environmental instruments to a great extent. It creates major challenge in implementing MEAs.

Lack of Database. Absence of environmental database on licensing, industries as well as database of flora, fauna, air, water and soil quality is critical challenge for the country.

Absence of SEA System. The Strategic Environmental Assessment (SEA) is an analytical and participatory approaches aiming to integrate environmental

considerations into policies, plans and programs and evaluate their inter-linkages with economic and social considerations. But except very few cases, SEA has neither become formally institutionalized nor being practised.

Lack of Political Will. Lack of political will for solving environmental problems and political persuasion in favour of business establishments to avoid damage assessment under polluters pay principle sometimes hampers the enforcement activities.

Limited Resources. Limited financial resources and insufficient direct investment in the environment are responsible for promotion of environmental governance.

Poverty. The presence of severe pockets of poverty, social exclusion, deprivations, slums and scattered settlements within urban areas.

Migration. The rural-urban migration process and the pattern of economic activity, driven by industrialization and exposure to environmental risks.

Contributions of Civil Society

Contribution of Non-Government Organisations. A number of national and international organisations look after the environmental aspect of the country. Some of the prominent ones are given below:

BELA. Bangladesh Environment Lawyers Association (BELA), an advocacy group of lawyers, was established in 1992 with the broad objective of promoting environmental justice and contributing to the development of sound environmental jurisprudence.The broad objective of BELA is to promote environmental justice and contribute towards the development of a sound environmental jurisprudence.

Proshika. Proshika's one of the major activities is social forestry programme. It is a systematic intervention to enhance the plantation, protection and regeneration of the forest resources.

WTB. Wildlife Trust of Bangladesh (WTB) is a non-profit organization whose aim is to conserve the country's biological diversity. WTB's activities include: Research and monitoring Institutional and policy development Communication and education Wildlife-human conflict mitigation Legislation and law enforcement

BAPA. Bangladesh PoribeshAndolon is a common forum of citizens and organizations concerned with the environment of Bangladesh. BAPA, acting as a pressure group against any kind of environment degradation, is trying to create a broad-based citizen's movement for protection and betterment of environment in Bangladesh.

Role of NGOs. Working on environmental issues in Bangladesh can be synthesized in the following form: Programme implementation (social forestry, crop diversification) Policy initiation or providing policy inputs (NEMAP) Assistance in international negotiation (Research) Environmental movement (GM food) Watchdog role (ship breaking)

Media. Last but not the least, the role of media, both electronic and print is praiseworthy in raising awareness for environmental protection. Drawing public attention time to time the media has been vocal for the cause of environmental protection. Without the support of the media it would be difficult for the government and NGOs to raise public awareness and draw support for the cause of environmental governance.

Addressing Climate Change under the Seventh Five Year Plan (FYP)-Part 2 Sector 8

General. The primary challenge for Bangladesh is to scale up investments to create a suitable environment for the economic and social development of the country and to secure the well-being of people, especially the poorest and most vulnerable groups, including women and children. This will be achieved through a pro-poor Climate Change Management Strategy, which prioritizes adaptation and disaster risk reduction, and also follow the path of low carbon development, mitigation, technology transfer and the mobilization and international provision for investments in coping mechanisms and green

technology.As in the Sixth Plan, Climate Change Management under the Seventh Plan will be addressed on two fronts: Adaptation and Mitigation. The Adaptation strategy will encompass various measures we can take to adequately prepare for the inevitable consequences of climate change, whereas mitigation efforts will cover activities aimed at reducing our carbon footprint.

Climate Change Adaptation (CCA) Context for Bangladesh. Climate change leads to environmental impacts such as sea surface warming, natural disasters and disruptions in rain pattern. Food security is threatened along with the livelihood of people affected by climate change. The consequences of climate change are elaborated below:

Food Insecurity. Changes in rainfall patterns increase the likelihood of a drought, and an increase in peak monsoon may lead to frequent floods as well. Greater tidal interaction can also cause frequent embankment failures, which will increase salinity in coastal areas. This will create significant difficulties in maintenance of food security amongst poor smallholders and women. Production potential, despite advancement of new varieties and other inputs, will tend to be diminished with increasing temperature, particularly beyond a threshold of 2°C.

Human Health. Higher temperature might cause propagation of new pests and disease vectors, while common diseases such as dengue, malaria and water borne diseases (such as cholera) will take significant toll on human health conditions. Children and elderly people are also likely to be affected by heat stress.

Damage to Infrastructure. Climate induced outcomes like cyclonic storm surges and high intensity floods damage coastal infrastructure including homes, road networks, water supply and sanitation systems. Coastal erosion damages agricultural potential and further worsens the condition of the affected people.

Stress to Urbanisation. Climate change outcomes such as increased flood will aggravate the existing problems and complicate urban based livelihoods. Highly congested areas and slums, where the urban poor tend to concentrate, will be the worst sufferers. Increased migration to urban areas for economic opportunities put more strain on limited services and facilities.

Damage to Industries. Maintaining industrial activities in regions of climate change hot spots will be an added challenge. Unless proper designing is followed, many of these industries will not be viable. This will result in people losing their jobs as well as hampering productivity.

Loss of Livelihoods Leading to Migration. In many remote areas affected by climate change, the inhabitants, especially the poor and the marginalized will find it extremely difficult to maintain livelihoods, especially those based on fragile natural ecosystems. This may lead to migration into dense urban regions, worsening living conditions in the process.

Poverty and Inequity. The extreme poor and women will be faced with the most serious challenges due to adverse impacts of climate change. Poverty eradication for the poor will be hindered as they are disproportionately affected by events of climate change.

Implementation Challenges of Existing Activities. There are a number of limitations faced by GoB institutions regarding implementation of CCA.

Weak Capacity. Government officials, especially at local institutions (Upazila, Union Parishads, Municipal corporations, etc.) do not have adequate management skills in order to respond to various impacts of climate change. GoB institutions are not adequate to improve performance of officials or to hold them accountable for delivery of results.

Understanding, Knowledge and Capacity. Even at the central Government level, understanding and knowledge is limited to few officials working in technical institutions. Most of the officials need immediate capacity enhancement trainings in order to equip themselves to act as per mandate.

Priorities are not Set. So far, no effort has been made to elaborate financial requirements for each of the prioritized programs/projects. Without proper prioritization, concerned authorities will find it difficult to identify projects that might be more useful towards CCA.

Weakness in Implementation, Monitoring and Shared Learning. CCA is a process that requires participation from all stakeholders. CCA sensitive

projects should be designed through a proper participatory process, where the concerns of local people, especially women and the marginalized population, will be duly addressed. There should also be a project monitoring system which allows people's voice to be incorporated and evaluated.

Lack of Financing. The Bangladesh Climate Change Strategy and Action Plan (BCCSAP)requires an outlay of $10 billion for the 10 year period. Lack of financing has been a crippling factor for the government in implementing BCCSAP, especially its priority projects and programs. Furthermore, release of funding, especially by development partners and lack of fund management capacity is additional limitations.

Key Challenges to Adopting a Green Growth Strategy. While green growth is necessary, efficient and affordable, GoB accepts that there are a number of challenges impeding proper implementation of a green growth strategy. These are:

Planning and coordination. A green growth strategy will cut across many different sectors and institutions. Coordination among institutions is rather weak, as seen in the case of climate change, mitigation and environment management.

Limited Capacity of Officials. Opportunities for synergies between development outcomes have to be maximized, while managing the costs, trade-offs and uncertainties. However, the capacity of officials is certainly limited, preventing robust analysis of benefits and opportunities.

Existing Market Inefficiencies. A large part of a good green growth strategy involves addressing issues like market failures, setting the right price through environmental taxation and pricing mechanisms, creating tradable property rights, and reducing inappropriate subsidies. Policy recommendations must be applied with insights into behaviour, political economy, and governance and market failures.

Lack of Mutually Reinforcing Actions Across Local and National Levels of Government. There exist a gap both in terms of capacity and implementation between local and national levels of government. Top-down approaches to green growth analysis and planning need to be supported by

bottom-up analysis of concrete options and actions. The local levels of the government must be empowered with mandates, manpower, capacity, financial and technical support.

Inadequate financing. Most green growth projects require significant up-front costs. High risks and insufficient rates of returns for green technologies will deter investment towards green growth. Private investment is held back due to a scarcity of resources to prepare projects to bring them to a lucrative stage. The challenge of cost recovery is also a deterrent. Allocation of public budgets and investment through dedicated funds is difficult to achieve with limited finances.

Green Accounting. Most companies in Bangladesh fail to disclose any financial information on environmental issues. Although the Institute of Chartered Accountants of Bangladesh has enunciated how to deal with the environmental impact of business activities, the concept of green accounting has not yet been fully established or practiced. This is a drawback as useful information that can be used for decision-making on the level and structure of production, value of investment, energy and environment costs is lost out.

Recommendations

Sustainable Green Industrialisation

1. Policy initiatives to improve environment for reduction of pollution.
2. Notification and implementation of emission and effluent standards for air, water and noise levels.
3. Identification and Action Plans for major polluting industries.
4. Identification of critically polluted areas for pollution reduction and improving environment.
5. Action Plans for polluted river systems to improve quality of river water.
6. Setting up of Common Effluent Treatment Plants (CETPs) for clusters of SSI units.

7. Encourage production/ consumption of environment friendly products.
8. Preparation of a Zoning Atlas, indicating status of the environment at district levels to guide environmentally sound location/ siting of industries.
9. Mandatory submission of Annual Environmental Statement which could be extended into Environmental Audit.
10. Initiation of environmental epidemiological studies in critically polluted areas tostudy the impact of the polluted environment on health.
11. Setting up of authorities like the Environment Pollution (Prevention & Control)Authority for the National Capital Region for protecting and improving the quality of environment and preventing, controlling and reducing environmental pollution.
12. Provision of fiscal incentives for installation of Pollution control equipment andalso for shifting of industries from congested areas.
13. Appropriate budgetary allotments to the local government and community services.
14. In Bangladesh, around 2 million people is entering labour market each year. Creating additional productive opportunities for youth bulge, particularly training them in skilled jobs, both at home and abroad would convert the "demographic window" into "demographic dividend".
15. Appropriate budgetary allotments to the local government and community services.

Sustainable Green Urbanisation

Green Urban Housing. Sustainable green urban development include creation of satellite towns with green spaces and urban forests, improved public commuting system to spread cities, energy saving green building design, land zoning, adherence to National Building Code and preservation of flood flow zones. This may also include relocation/resettlements of slum dwellers, and providing better water, sewage and electricity infrastructure to slum areas.

Green Services for Urban Population. This should include conservation of resources and use of green technology, recycling of waste water, harvesting of rain water, use of solar cell and renewable energy for production of electricity, turning sewerage into compost and diversification of source of supply from ground water to surface water as a source of water supply.

Green Environmental Strategy. These are emission of low Greenhouse Gases (GHG), low energy consumption, protection of water bodies, green space, urban forests, enforcement of land use rule, environmental rules and regulations and improved mass transport system is the strategy to reduce both traffic congestion and air pollution.

Green Transportation Strategy. Strategy for sustainable green urban transport revolves around giving priority to pedestrian traffic, promote use of mass public transports, such as rail based mass transit system, bus rapid transit and circular waterways.It is to be noted that high quality public transit offers a complementary avenue for reducing demand for private vehicles and their use.

Urban Risk Reduction Strategy. Strategy in this regard may be zoning of urban areas for various usages, developing Urban Risk Reduction Action Plans (URRAP), awareness raising, preparing volunteers for emergency response.

Urban Governance Strategy. For sustainable green urbanisation, strategy will be to have a proper vision, increasing transparency and accountability of policy formulation and decision making processes.

Ensuring Basic Amenities in Rural Areas. Rural communities should be facilitated with basic amenities such as road network, electricity, communication, health services and education to discourage mass migration to urban areas.

Recovery of Dead Water-bodies. Recovery of dead canals, khals and their integration with the surface drainage system. This would have multi-faceted dividend in the economic, social and environmental domain.

Public Awareness on Environmental Issues. "Public awareness of the environment means the ability to emotionally understand the surrounding world and a sense of responsibility for the common heritage of the Earth, such as natural resources - with the aim of preserving them for future generations"

as stated by the United Nations Environment Programme. Public awareness is imperative, besides laws and regulations, to protect the nature for present and future generations.

Involvement of Bangladesh Armed Forces and Other Government Agencies. Various government organisations and forces including Armed Forces may be involved in planning, project implementation and maintaining the green environment in urban areas. This could be done with a concerted planning and zoning of areas of responsibilities.

Conclusion

Urbanization and industrialisation are the obvious realities, which cannot be ignored. In fact, urban sprawl is so rapid in Bangladesh that the entire country is likely to be converted into a city state in three to four decades. It is very important to introduce proper urban management to address the situation.

It has been discussed in our presentation that green space dynamics and spatial metrics analyses are imperative for understanding the landscape ecological conditions of green urbanization and industrialisation. This study revealed that the green spaces of Bangladesh are decreasing over the course of time, and are also becoming highly fragmented due to the increasing pace of human activities in this region. These activities are not only causing the destruction of landscape ecological processes and services, but are also eroding the biodiversity in urban areas. Therefore, a comprehensive green space management strategy should be implemented for Bangladesh that could support proper functioning of the ecosystem.

It is pertinent to mention here that According to the United Nations Environment Program (UNEP), Hon'ble Prime Minister of Bangladesh Sheikh Hasina has demonstrated "leadership and vision" in both making climate change an issue of national priority and advocating for an global response. On 14 September 2015, Hon'ble Prime Minister was announced as the winner of the United Nations "Champions of the Earth" award in recognition of her initiatives to address climate change.

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Sustainable Development of Bangladesh-Balancing Industrialization, Urbanization and Green Environment

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RAPPORTEURS' REPORT

Sustainable Development of Bangladesh- Balancing Industrialization, Urbanization and Green Environment

General

A seminar on "Sustainable Development of Bangladesh-Balancing Industrialization, Urbanization and Green Environment" was held at National Defence College (NDC) on 29 June 2016. The subject is timely and pertinent which demands thorough study and discussion for adopting appropriate development strategy for Bangladesh.

During the Interactive session few important question as well as comments came up to the panel which are appended below:

Question 1. As you mentioned huge urbanization is going on without planning, how unplanned urbanization will have negative impact on national GDP? (Brig Gen Md Abdul Wohab)

There was a link up question by Brig Gen Saleem regarding green urbanization, he mentioned "All the Cantonments and Bases under the Armed Forces are very green and environment friendly. Why not utilize the expertise of the Armed Forces in implementing the 7th five year plan and SDGs to make Bangladesh more green and environment friendly.

In response to Brig Gen Saleem's question, the panel replied that all the Cantonments and Bases are constructed based on a master plan giving maximum priority to the environment. This is not the case for other urbanizations. The development of Hatirjhil by Bangladesh Army is a very suitable example of environment friendly urban development. Then, Brig Said added by saying that Rajuk or Ministry of Environment follow strict rule and regulation before approving any plan of development. But the problem is with the root level where rules and regulations are not followed appropriately as per plan.

Question 2. What are major obstacles, which hinders the rapid industrialization? (Brig Gen Binoy Sinhe)

In response to the question, panel opined that for rapid industrialization we need to invite foreign investors. Before investment the foreign investors would investigate the feasibility of investment. Investors will demand a safe environment where desired profit return is ensured. For this, stable political situation is important. If we take the example of 2014 and 2015, especially during the strike, which directly affected the foreign investment in our country. Like in RMG sector, they could not produce desired goods and supply due to strikes. Next point is that security and image of the country. If the social security is not at the expected level, the investors will not be interested to come.

Question 3. Release of Industrial pollutions to near by rivers and wetlands is polluting the environment and we don't have enough preventive measures for that. Setting up water treatment plants is a possible solution. How this can be effectively implemented in ground levels (Brig Gen Tabrej Shams). Supplementary question asked by Jt Secy Md. Abdul Hakim Majumder that do you think that social monitoring system is needed to resolve the problem?

Panel opined that Industrial pollution is a big challenge; despite having good environmental policy, the problem is in implementation. Panel suggested that enforcement of law by raising public awareness will be most essential.

Panel also added that recently, Government is planning for zoning of industries. Factory owner of the industry should also need to be motivated. On the other hand Government may give some incentive to establish those costly Affluent Treatment Plant for the environmental protection. It would give encouragement to the entrepreneurs who would follow rules and regulation.

Question 4. Labour is cheap in Bangladesh, on the other hand every year 2.5 million people are without employment. For industrialization, considering development of Bangladesh, it's a plus point but on the other point of view it's otherwise. Can you comment on this? (Cdre Vinay Kalia)

In reply to this question panel opined that, Cheap labour is an advantage to industrialization in Bangladesh. On the other hand countries like Sri Lanka

going ahead because of skilled labour. What Bangladesh needs to do is that labours to be trained. There are labour from Bangladesh working outside the country, if skilled labour can be sent more remittance can be earned.

Question 5. Why are we shifting from MDG to SDG? Have we achieved the MDG goals before embarking on the SDG goals? Your comments Please. (Cdre M Mahbub-Ul Islam)

In reply panel commented that MDG was from 2000 to 2015 with 8 goals. Achievement of MDG goals are not similar in different parts of the world. In some parts of Africa the achievement was very meager. That is the reason SDG is more modernized; universally it has been promulgated so that all country can progress simultaneously. And more objective approach is done in SDG and it is more globalized.

Question 6. This is regarding green accounting and green growth. How green accounting can be practiced extensively and how green growth can be solved? (Addl Secy Kajal Islam)

In reply to this question panel replied that institution of Charter Accountant of Bangladesh announce about financing. Panel also opined that Bangladesh climate change strategy needs 10 million US dollar but lack of budget or capacity; it would be difficult for Government to implement that more over, private investors are also not willing to invest because of high risk and scarcity of resources. We need professional approach and awareness programmes. Private and Government organization along with the entire stakeholder should arrange awareness programme on climate change. Participation of all social body/whole society is essential to overcome these problems.

Question 7. Regarding push factor from rural to urban, unemployment and poverty and the opportunities in rural area in agriculture and agro-based industries, there is no reason why agro-based industries would not develop? This will reduce the people's attraction to the city. Even the waste of agro-based industries can be well managed and utilized. In that we can reduce pressure of industrialization in urban areas. (Col ASO Onilenla)

Panel opined that this matter has been addressed in the paper and presentation as well as they have recommended the same to go for more agro-based industries in rural areas. Panel also suggested for decentralization of services sector to rural areas so that people can not migrate. At the same time tanneries, industries should be taken outside the city as far as possible.

Question 8. We see that Chittagong Hill Tracks remained the model of good environment even few years ago. But after the signing of peace accord there are lot of development programme going on. There will be issue of reserve forest, urbanization, water pollution etc. Lot of issues are coming up. In terms of environmental governance, newly climatic issues and next 5-year plans, do you have any extensive study on Chittagong Hill tracts? What are the degradation and challenges likely to be faced? (Brig Gen Abul Mansur Md Ashraf Khan)

Panel opined that, in today's presentation the topic has not been covered much but in previous seminar it was covered. There, it was explained that there is point that sustainable environment assistant to be part of any development project. The Government has already accepted this. This is going to help us in processing the project for long term.

Question 9. We have good number of reserve forest in Chittagong hill tracks having 37 protected areas. In Chittagong hill tracts huge deforestation is going on in reserve forest. In a country we should have 25 % of forest area but on the contrary we have only 6- 8%. If we can not protect this forest areas how can we go for SDG? What effort Government is taking? (Brig Gen Naquib Ahmed)

Brig Gen Halim supplements the question that what measure to be taken in case of Sundarban area? Especially, how we can allow establishing power plant too close to Sundarban. In addition, we should also focus on what type of industrialization need to be done for Bangladesh to be developed country by 2040. Do you have any suggestion? Suggestion from resource personnel may also be appreciated.

In reply the panel opined that one of the resource personnel from energy sector explained this issue and he explained that Rampal is 70 km away from Sundarban. He explained that shipment of coal, power plant issue etc all the

measures are taken care of. Pannel also opined that the effect of power plant on Sundarban is not much effective. It was added by Brig gen Sayeed that Government has adequate rules and regulation to prevent the environment of forest in both hill tracts and Sunderban. The most alarming thing is that the people involved in illegal activities are the major problem. Govt has promulgated enough policy, the problem is in monitoring and implementation. The panel also opined the importance of social awareness to stop cutting the trees and forest.

Comments from Resource Person (Dr Barakat-e- Khoda)

Before commenting, the Resource person emphasised on two issues raised during the Question andAnswer session, one is the impediment of industrialization of the country, which was partly covered by panellist. He mentioned 3 main impediments: first Investment GDP ratio, second and very important infrastructural deficiencies like gas, electrify, land, water, roads and highway etc; and third is lack of good governance. All these three combine lack of enabling environment. It's not only effect foreign investment but also domestic investment.

The other important issue regarding youth bulge i.e demographic dividend. He summarised that benefits of youth bulge is not automatic. There are two sense of condition need to be fulfilled first is 'necessarily' which is the "supply" and it is there but partly, more than 80% of the girls get marry before the age of 18. Now we are basically concern for supply of male labour force. Second and more important is 'sufficient condition 'there are sub sets where 1st is quality of labour force. The investment in education and health in Bangladesh is around 5%, which is considered to be low which is being expended in South East Asia. East Asia has leaded the benefit of demography. South East Asia is gripping and South Asia is far behind.

Dr Barakat also emphasised that in addition to improve the quality of education, we need huge investment to create additional productive job for youth bulge so that they have decent job. Around 2 million people are entering labour market each year. Less than 1 million jobs are created but 90% of these jobs are of low quality. So getting the benefit of demographic dividend remains an allusion.

Later Dr Barakat put his specific comment on the paper and appreciated the group that they have done lot of revision, rewriting, in paper and presentation on the basis of last seminar comments and questions. Despite the resource person explained that there are potential and scope to improve further. Few comments and suggestions are:

a. SDG goal 9, 11, 13 is directly related to industrialization, urbanization, and environment. But there are other SDG goals like 6, 7, 8,14 and 15 are indirectly involved with todays topic. Provision further revision may be considered before finalizing the paper or it can be mentioned in the paper as it indirectly relates to the goals.

b. In section of industrialization it was discussed education, quality of education, and on the PPP etc. But reason of urbanization it was mentioned population growth is major factor that mentioned in the start which is not correct. When discussed about push factor there is no much evidence in the paper. Regarding migration you provided a framework but it seems that research has not been done on this aspect. Regarding religious, problems in rural areas, few factor you have mentioned but you have not provided any evidence. When it was discussed in the paper regarding rural-urban migration, no reference hass been made on some economic models of migration because push and pull factor can come from that models.

c. Regarding positive consequences of urbanization in the paper, 90% of labour force is in low productivity, low wage. Regarding climate change, you have correctly addressed the points, which was raised by Ambassador Liakot Ali, which was discussed in last seminar. Finally Dr. Barakat congratulated the seminar group for their relentless effort.

Concluding Remarks by Chief Guest (Dr. Hossain Zillur Rahman)

Dr. Hossain Zillur Rahman congratulated the team and team leader Brig Gen Asfaque for doing marvelous job and assignment on topics 'Sustainable Development of Bangladesh-Balancing Industrialization, Urbanization and Green Environment'. He also appreciated the audience regarding depth of

interest while observing question and answer session also appreciated them for providing input to the seminar group X. Saying that he again appreciated the team and panel. He appreciated SDS Air for selecting the topic as very relevant one for Bangladesh. He also appreciated the resources personnel for their support. Dr. Zillur rather discussing on paper and presentation he discussed few major issues, which are mentioned as below:

First of all, differentiation of MDG and SDG phase, why SDG phase is global context? The concepts of MDG were conceived mostly for with reference to developing countries. Now SDG is not a move from MDGs to SDGs. SDG are equally applicable to developed countries. Because, much of issues is planetary in nature. They are not in traditional way of development. When we talk about sustainable development we also talk certain phase in evolution of certain society. Planetary challenges have to face by all both developed and developing countries.

Dr. Zillur added that the era we are entering in is not just another phase of development ,it's a phase in which three quality of human ambition has to be integrated. One is prosperity, which is there all the time, which was yesterday also. Then today additional three included. One is 'sustainable' which is not only country context or level of the planet itself. Other is of course 'equitable' which itself is a part of sustainability. It was also mentioned in presentation how deprivation can cause political instability. Equity, Quest of equity itself is the element of sustainability. Third part is livability, it also implies how a good life about? What is a good live, what constitutes a good life? In visualizing a good life we now have to move beyond the individual. Now think of urbanization, you are living in beautiful environment, if you step out if there is rubbish on the street in front you are not having a good life actually. So livability also becomes very critical part. Because of these sustainability, industrialization and urbanization is a critical element.

Then Dr. Zillur highlighted little perspective issue like Chittagong Hill Tracts. Some change especially negative change is inevitable. For example, when more people need to be absorbed they need to engage in economic activities. New reality is that the countries which are developed today are facing ecological problem more. Like China economically is in fore front but ecologically they

had tremendous problem. Even Germany had also ecological problem like acid rain, which is mentioned in the paper.

Dr. Hossain Zillur mentioned that when we talk about sustainability we couldn't talk life as such. For example Barisal in terms of urban reality nice place, Rajshahi is another example. Barisal is economically stagnant place as such huge out migration taking place. From environmentally attractive Barisal people are often migrated towards environtally hellish Dhaka. Why, because there is the economic prosperity. The problem lies with unplanned urbanization. Now think of where are the preventive measures? Sometime developed country tells developing countries ' you must look after environment'. Countries like us have to involve debate about how to maximize the preventable part, planning process so that we can minimize the damage to the environment.

Therefore the critical issue often life decision-making is about addressing 5 goal, stressing real life situation. How to manage with best knowledge you have in front of you. These are critical issue you need to think of. The papers rightly focused on issues in terms of solutions some of the issues are inter sectorial. For example it was mentioned in the paper, skills, quality education is critical issue for quality industrialization. That's a inter-sectorial issue. Another issue is political. Another is sustainable issue is related to decentralization to the local level. Local solutions are best developed in local level. Local Govt is more important that you need to be highlighted more. In the issue of decentralization Bangladesh may not be in optimum. It should be highlighted more. In case of Rajshahi and Barisal, some innovative mayor did this sustainable development in case of environment. It was only by their initiative.

You have also mentioned that importance of political development as a parallel-required process for sustainable development. So political development is equally important for sustainable development. For example, if you do not locate the industry in appropriate manner, you will have negative impact. Political issue is important for investment also. Bangladesh has concurrent problem of stagnant of private investment. Recently cost of doing business is an issue. Its not a technical issue, its directly decision making of political issue. Political governance is very important. The third aspect, which is political, arranges for trade of resources, which energy to be used for industry, those have

direct impact on the sustainability of development. You can further highlight that political development has direct impact on economic sustainability. This consequence can be trace specifically, not in general terms.

In terms of solution he added their level for balancing sustainable development; one of course the 'policy'. Another one is 'behavior' that is why waste management in Dhaka city is poor. It's partly for poor governance but its mostly on behavioral problem. Reality and awareness building is equally important for changing behavioral pattern. The third is aspiration. This is something we need to address. For example wasting a food in Europe is sometime answerable and cause fine even and there are some types of law for wastage. So we have to determine how we visualize sense of good life.

Dr. Zillur also emphasised that own aspiration part is very important that means how we understand about development. For example we are building roads for 4% car owner but we never thought about rest of the people. Innovative low cost local solution for example change of automobile cannot be done locally but there is other side where innovations are needed to be addressed. Industrialization and urbanization, both are critical issues in future. Both cannot be ignored. We have to combine the common human goal.

Planning of municipality is another important factor. When master plan is high profile, waste management is not addressed. Planning paradigm has to undergo lot of change. People doing intentionally mis-governance. In conclusion he mention that we have touched all the critical sides of the issue. Finally Dr. Zillur thanked the team for tselecting such issue for the seminar. Only by collective efforts by all concerns we can make the situation better in future.

List of Abbreviations

Abbreviations	Meaning
ACC	Anti-Corruption Commission
ADR	Alternative Dispute Resolution
BADC	Bangladesh Agricultural Development Corporation
BAPEX	Bangladesh Petroleum Exploration & Production Company Limited
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BCC	Behaviour Change Communication
BCCRF	Bangladesh Climate Change Resilience Fund
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDRCS	Bangladesh Red Crescent Society
BFDC	Bangladesh Fisheries Development Corporation
BFRI	Bangladesh Fisheries Research Institute
BMET	Bureau of Manpower, Employment, and Training
BR	Bangladesh Railway
BRT	Bus Rapid Transit
BWDB	Bangladesh Water Development Board
CBOs	Community Based Organisations
CBR	Community Based Rehabilitation
CDMP	Comprehensive Disaster Management Programme
CEDAW	Committee on the Elimination of Discrimination Against Women
CEP	Coastal Embankment Project
CETP	Central Effluent Treatment Plant
CHT	Chittagong Hill Tract
CNG	Compressed Natural Gas
CPP	Cyclone Preparedness Program
CUP	Centre for Urban Studies
CWBMP	Coastal and Wetland Biodiversity Management Project
DCC	Dhaka City Corporation
DDT	Dichloro-diphenyl-trichloroethane
DEMO	District Employment and Manpower Office

DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DOE	Department of Environment
DOF	Department of Fisheries
DMIC	Disaster Management Information Centre
DMIN	Disaster Management Information Network
DPP	Development Project Proposal
DWASA	Dhaka Water and Sewerage Authority
ECA	Ecologically Critical Areas
ECNEC	Executive Committee of the National Economic Council
EIA	Environmental Impact Assessment
EPB	Export Promotion Bureau
EPZ	Export Processing Zone
ETP	Effluent Treatment Plants
FCD	Flood Control and Drainage
FCDI	Flood Control, Drainage and Irrigation
FDI	Foreign Direct Investment
GED	General Economics Division
GEF	Global Environment Fund
GDP	Gross Domestic Product
GoB	Government of Bangladesh
HDI	Human Development Index
HHK	Hybrid Hoffman Kiln
ICOR	Incremental Capital Output Ratio
ICT	Information and Communication Technology
IDCOL	Infrastructure Development Company Limited
IOCs	International Oil Companies
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IUCN	International Union for Conservation of Nature
IWT	Inland Water Transport
JPOI	Johannesburg Plan of Implementation
LED	Light Emitting Diode
LGED	Local Government Engineering Department
LNG	Liquefied Natural Gas

LRT	Light Rail Transit
MDG	Millennium Development Goal
MEA	Multilateral Environmental Agreement
MFA	Multi Fibre Arrangement
MIS	Management Information System
MNCH	Maternal, Neonatal and Child Health
MoEF	Ministry of Environment and Forests
MoHFW	Ministry of Health and Family Welfare
MoL	Ministry of Land
MoLE	Ministry of Labour and Employment
MoLGRDC	Ministry of Local Government, Rural Development and Cooperatives
MOPA	Ministry of Public Administration
MoPME	Ministry of Primary and Mass Education
MoSW	Ministry of Social Welfare
MoYS	Ministry of Youth and Sports
MTBF	Medium Term Budget Framework
MW	Mega Watt
NAP	National Action Programme
NAPA	National Adaptation Programme of Action
NBSAP	National Bio-diversity Strategy and Action Plan
NCB	National Coordinating Body
NCS	National Conservation Strategy
NCSA	National Capacity Self Assessment
NCSD	National Commission on Sustainable Development
NE	North-east
NEC	National Economic Council
NEMAP	National Environmental Management Action Plan
NFP	National Focal Point
NGO	Non-Government Organization
NICAR	National Implementation Committee on Administrative Reorganization
NPA	National Plan of Action
NSDS	National Sustainable Development Strategy
NRBs	Non Resident Bangladeshis

NRR	Net Reproductive Rate
NW	North-west
PA	Protected Area
PPP	Public Private Partnership
PSA	Production Sharing Agreement
RAJUK	RajdhaniUnnayanKartripaksha
RNF	Rural Non-farm
SAARC	South Asian Association for Regional Cooperation
SDB	Sustainable Development Board
SDMC	Sustainable Development Monitoring Council
SFYP	Sixth Five Year Plan
SHS	Solar Home System
SPARRSO	Space Research and Remote Sensing Organization
SPEC	Special Project Evaluation Committee
SPM	Suspended Particulate Matters
SOEs	State Owned Enterprises
SRDI	Soil Resource Development Institute
SREDA	Sustainable and Renewable Energy Development Authority
SW	South-west
TAPP	Technical Assistance Project Proposal
ToT	Terms of Trade
TSP	Triple Super Phosphate
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Conference on Sustainable Development
UNEP	United Nations Environment Programme
UCRA	Urban Community Risk Assessment
URRAP	Urban Risk Reduction Action Plan
VGD	Vulnerable Group Development
VGF	Vulnerable Group Feeding
WHO	World Health Organization
WSSD	World Summit on Sustainable Development

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25	Lecturer (English) Farhana Binte Aziz	Research Fellow (BCS Education)

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13	Colonel BY Baffa (Nigeria)
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15	Captain RD Oderemi (Nigeria)
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18	Group Captain HA Adebowale (Nigeria)
19	Group Captain AG Ochai (Nigeria)
20	Colonel Sanjay Thapa (Nepal)
21	Group Captain Saud Mohamed Abdulrahman Al Balushi (Oman)
22	Brigadier Shah Zaman (Pakistan)
23	Brigadier H R N Fernando, RSP (Sri Lanka)
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38	Brigadier General Moinuddin Mahmud Chowdhury, psc
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67	Additional Secretary Kajal Islam
68	Joint Secretary Nanda Dulal Banik
69	Additional Secretary Ziaul Hasan
70	Joint Secretary Shahan Ara Banu
71	Joint Secretary Mohammad Abul Kalam
72	Joint Secretary A B M Azad
73	Joint Secretary Shahin Islam
74	Joint Secretary Md. Abdul Hakim Majumder
75	Additional Secretary Golam Shafiuddin
76	Deputy Inspector General Md Mohsin Hossain
77	Deputy Inspector General Helal Uddin Badri
78	Director General Shah Ahmed Shafi

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3	Dr. Ainnun Nishat
4	Ambassador Liakot Ali Chowdhury
5	Dr. Fahmida Khatun

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5	Lecturer Farhana Binte Aziz	Research Fellow	Assistant Coordinator


Implementation Challenges of Lasting Activities
Weakness in Implementation, Mon
and Shared Learning


> Remittances from unskilled labours working abroad has become another major source of foreign exchange for Bangladesh.
> Almost 9 million Bangladeshi migrant
are contributing about 11% of
'Gross National Income (GNI)'
INDUSTRIALIZATION IN BANGLADESH
Benefits and Costs

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