

Population Growth and Environmental Degradation: The Case of Bangladesh

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Abstract: *Men are an economic agent whose economic pursuits take place within a socio-economic set up – the economy where the natural environment provides resources for the socio-economic activities of the people. These activities may have negative impacts on the quality of the environment leading to environmental degradation. Conducted on analysis of changes and trends over the last 10 years– the study implies that the rapid population growth in Bangladesh is threatening our environmental management through the expansion and intensification of agriculture, uncontrolled growth of urbanization, industrialization and the holistic destruction of ecological settlement. The natural resources are under increasing strain, even though majority of the people survive at subsistence level. This analysis also reveals that the outcome of high population growth rates is increasing population density in different cities and number of people below poverty line in Bangladesh. The increasing population numbers and growing affluence have already resulted in rapid growth of energy production and consumption in Bangladesh. Besides, the rate of population growth leads to degenerate arable lands, air, surface & ground water, forest ecology which are collectively responsible for great disaster. This study highlights the present status of population and environmental degradation in Bangladesh– may assert some proposals to combine population status and environmental development and turning it into a praiseworthy consequence.*

Keywords: *Over population of Bangladesh, Environment, Management, Development Degradation.*

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1. Introduction

Bangladesh is a lower middle country in South Asia with lot of possibilities due to her potential even if there are some crucial challenges. Over the last twenty years, Bangladesh has accelerated economic growth in order to meet the demands of fast growing population with limited space and natural resources since the independence of the country¹. Bangladesh got healthier position for providing proper sanitation and developing maternal health status regarding Millennium development goals (MDG's). The percentages of people living in poverty declined are 23.05%, extreme poverty rate 12.1%. Our life expectancy is now 70 years, Foreign exchange reserves 32 billion \$; remittance 15.27 billion \$; our export is 34.24 billion\$ (2015-16); per capita income 1466 \$; gross domestic product growth is now 7.11%. Now the country has attained a consistent growth in different sectors such as industrialization, infrastructure development, education, health care, food productivity, social safety net, tourism etc. However, such sectorial development merely embraced protection of natural resources and environmental management practices in the development history of the country as the high population pressure is a big challenge. We know human beings are an essential part of biological environment. The permanent life-cycle of human being is depended on proper interconnection between natural environment and men. But the direct and indirect impact of population degrades our local, national, regional and international environmental equilibrium day by day. Due to the high demand of food, our agricultural systems are shifting – intensive where more use of chemical fertilizers, pesticides degrading the soil profile, texture, structure, fertility and specially the ecosystem services. Unrestrained dumping of solid, liquid industrial waste makes our water body polluted. Different industries and factories emit inimical gas makes our air contaminated. Commercial cultivation, human settlements in forest area degrades our forest biodiversity. Most of the time we have seen, rural to urban migration, environmental deterioration, food insecurity are caused by climate change, according to concerned authority. But the crises are closely related to land encroachment in forest, clash in char-land, river encroachment, deforestation, violation of eco-industrial laws –anthropogenic basically. Population Pressures on natural resources– also created by expansion via housing, huge water demands, use of arable and wild environment. Sewage is a great risk to water table and a disease threat for people if not well managed. Presence of hysterical electricity cables and the land use for poles, Street lights,

¹. Reza, S and Sharmin, D. (2016). "A Comparative Study of Environmental Management Strategies in Japan and Bangladesh", *Social Science Review*, University of Dhaka.

WiFi, block the natural movement of animals, bird and insects. The demand-supply theory of economics regarding Plastic or synthetic materials in modern society are not encouraging to environment wellbeing. On the other hand, uncontrolled industrialization, shrinking of our agricultural land, Concern of adulterate food has created a new dimension in Bangladesh. Day by day, the rate of energy (gas, oil, coal, mineral) consumption is rising. As a result, our total environmental health– the stability of biosphere, atmosphere, hydrosphere, and lithosphere is now under threat. The question is, how many days the triumph-history of human being will be continued? Aren't human beings themselves enemies of themselves?

2. Population Growth and Environmental Degradation: Meaning and Relation

Population growth is the main cause of the socio-economic problem including environmental degradation, pollution, desertification, deforestation, intensive cultivation, over utilization of grazing and other environmental problems. But population growth may not always deter development and not deteriorate natural resources. For example, some of the most crowded countries in East Asia are the most prosperous – Taiwan, South Korea, Hong Kong and Singapore where the population density is 1000 people / sq.km. It depends on what policies they have taken and the public participation. However, Bangladesh is the 9th most populous country in the world. Population density implies as the number of persons per sq. km which is 1251 now. Population growth rate is 1.17%, total population 168 million, Birth's per day 1706, Death's per day 473(Average). The indicators of population status are population growth, life expectancy, crude birth rate, crude death rate, total fertility rate (15-49 years, considering in Bangladesh) etc. A population scenario of Bangladesh² is given below:

| Year | Population | Male (%) | Female (%) | Density(km ²) | Growth Rate (%) |
|------|-------------|----------|------------|---------------------------|-----------------|
| 2016 | 162,410,864 | 50.4 | 49.5 | 1251 | 1.17 |
| 2015 | 160,995,642 | 50.4 | 49.5 | 1236 | 1.18 |
| 2010 | 151,616,777 | 50.5 | 49.4 | 1164 | 1.17 |
| 2005 | 142,929,979 | 50.9 | 49.0 | 1098 | 1.33 |
| 2000 | 131,280,789 | 51.0 | 48.9 | 1008 | 1.88 |

(Source: Economic and Social Affairs, Population Division, UN, 2016)

². World Population Prospects-global Demographic Estimates and Projections by United Nations, 2016

Over the last couple of decades, the country has been grappled with a series of environmental deterioration by means of land encroachment at forest, destruction of wetlands and inland fisheries, surface and groundwater pollution, soil nutrient depletion, inland salinity intrusion, natural calamities like floods, cyclones, tidal surges and tornadoes have resulted in severe socio-economic and environmental damage (MoEF, 1992) by a combination of natural/anthropogenic factors. Although the country is making some efforts to resolve some of these environmental issues, no efforts will be adequate to face these challenges without identifying the underlying causes nationally and addressing them locally. Some of these root causes are strong broad based social movement for environmental protection, lack of understanding of ecological principles, poverty and lack of adequate alternate resources.

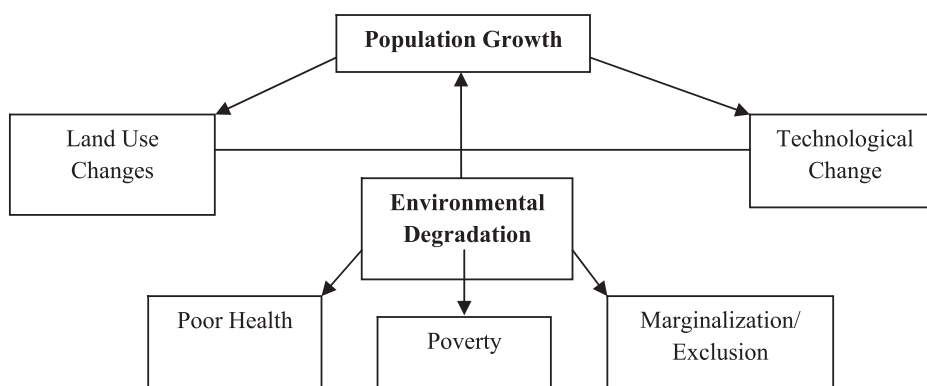


Figure 1: Relation between Population & Environmental Degradation
(Source: Author)

Environmental degradation simply means overall lowering of environmental qualities because of adverse changes brought by human activities. The relationship as it stands today between man and environment is that man's dominance over nature and that of overexploitation and misuse of environment to the extent that it is now degraded (Zinatunnessa, 2001). Men causes environmental instability by destroying the natural vegetation or original species or replacing them by other vegetation or animal species, by altering or modifying one or more components of natural environment, by introducing foreign substances through the use of chemical fertilizers, pesticides or herbicides, by altering chemical and gaseous composition of the atmosphere through unplanned industrialization and uncontrolled urbanization. Human intercession in the justifiable functioning of the natural environment may occur to increase

productivity and to meet consumption needs, e.g. construction of dams, filling up wetlands, canals, lakes, ponds etc. These activities bring about both physical and functional changes in the natural state, in that way disrupting the ecological balance leading to degradation of the environment. It should be noted that population size or population growth can not accurately predict the impact of environmental damage on the economy of a country. The average impact of a person who lives in the United States is much greater than the impact of a person lives in a low technology society. But even in a lower middle income, low technology nation like Bangladesh, the sheer number of people leads to large scale environmental effects. According to Ehrlich and Holdren (1971), the total impact of human population on environment can be determined by this way;

Environmental Impact = (Population size) × (Per capita affluence level) × (Impact from the technologies used to achieve that level of per capita affluence)

3. Population Growth, Poverty and Environmental Displacement

In 2000, the world population had reached 6 billion and in 2010, it was 7 billion, by 2015, it will be 8 billion and it will reach 9 billion within 2050. Over 90% of this growth will be in developing countries. So, of course there will be increased demand for food and for all other necessities of life. When this demand exceeds the sustainable production of agricultural lands, forests and aquatic regimes, the resource base itself will be eroded. Although the growth rate of population in Bangladesh is seen to be falling, its size is already large. Projections of Population with density of Bangladesh:

| Year | Population | Density (Km ²) |
|------|-------------|----------------------------|
| 2020 | 170,466,782 | 1309 |
| 2025 | 179,063,375 | 1375 |
| 2030 | 186,459,898 | 1432 |
| 2035 | 192,500,115 | 1478 |
| 2040 | 197,133,813 | 1514 |
| 2045 | 200,380,556 | 1539 |
| 2050 | 202,209,053 | 1553 |

(Source: Economic and Social Affairs, Population Division, UN, 2016)

As a result, at rural areas— commercialization of agriculture³, contract farming, commercial cultivation in forest area, hill cutting, extraction and depletion of groundwater, land degradation, shrimp farming by encroaching crop fields as well as at urban areas— inadequate and poor housing, slumization⁴ (about 35% people city dwellers are living in over 1300 slums in Dhaka city), urban waste generation, poor sanitation, lower quality of waste/effluent treatment systems, air & water pollution, faulty transport system both has already accelerated environmental degradation of our country.

Population growth worsens the poverty situation of a county. There is already an inequitable distribution of income and assets. The poor are living in a poverty trap. Their income is low and they lack productive assets (Zinatunnessa, 2001). We know the socio-economic condition of marginal, indigenous and religious minority peoples of Bangladesh. At this case, political economy is saying, such kind of discrimination or disparity is created by free-market economy where marginal people are powerless and they do not get any platform to show their problems. This is called relation between center-periphery relation while center is actively involved to exploit or dominate the people of periphery or make the people more marginal. It is a culture of demographic engineering under the system of political engineering. This makes them vulnerable to different types of crisis situation. In Bangladesh, 35 million people still live below the poverty line and the number of rural poor has increased. Subdivision of productive agricultural lands from one generation to another has increased the number of marginal farmers and rural landless. As population grows, their numbers will also increase. Lacking assets, they will look to nature for their survival. *“Poverty drives ecological deterioration when desperate people overexploit their resource base sacrificing their future to salvage the present (Durning, 1990; pp-144/145)”*. People push into fragile ecosystems. They till marginal lands, destroy forests, overfish and overgraze. We know the existence of human being is dependent upon the food chain created by flora and fauna. But overuse of these natural resources is mainly responsible for loss of biodiversity. Such activities go over the carrying capacity of the local environment. If it continues, our total ecosystem will damage. The deteriorated ecosystem is less productive and has less to offer to the people who are dependent on it. Thus, the poverty trap only deepens. The urban

3. Barkat, A., G.M. Suhrawardy and A. Osman. (2015). Increasing Commercialization of Agriculture Land and Contract Farming in Bangladesh, Dhaka: Association for Land Reform and Development.

4. Barkat, A and akhter, S (2001). “A Mushrooming Population: The Threat of Slumization of Urbanization in Bangladesh, Harvard Asia Pacific Review, V.5, Issue 1.

poor are in no better conditions. The rapid increase of population in the urban areas is changing the scenario of housing, sanitation, water, energy and living condition. They live in slums under unhealthy and unsanitary conditions. As they do not have enough sewerage systems and garbage disposal facilities, the wastes generated by their day to day living only help pollute their environment. Besides, environmental displacement is alarming for Bangladesh. The factors can be either natural or anthropogenic. Floods, severe cyclones, water logging, salinity intrusions, droughts and river bank erosion which induce mass population displacement. By the year of 2020, 78 million people can be displaced (Tahera, 2009).

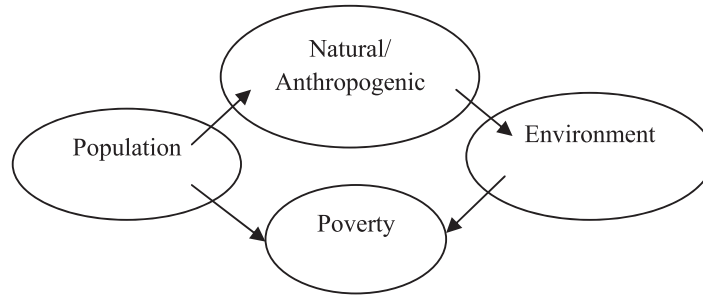


Figure 2: Environmental Displacement (Source: Author)

On the other hand, displacement can be in such ways– vested property act, migration politics, demographic engineering, ethnic conflict, anti agricultural product pricing system, political influence of rent-seekers.

3.1 Economic Growth, Environment and Sustainability

Economic pursuits of human beings are dependent on the natural environment as nature is the provider of raw materials for the production of different goods. Natural environment provides us two types of resources. Natural or material resources– mineral and fossilized energy which are extracted from the natural state at some cost to the economic agent who is involved in the extraction of the resource as well as environmental resources– clean air, water, rivers, natural beauty, oceans etc. the use of these does not involve any payment as there is no market for natural goods. Besides, natural environment works as a waste assimilator as the wastes are discharged into the natural environment without anybody having to pay for it. On the other hand, modern technology increases the use of resources and also enables us to affect the environment in many ways. Before the invention of CFC's, used as propellants in spray cans and as coolants

in refrigerators and air conditions, we were not causing depletion. Economic activities of human being and their impacts on environment are given below:

| Economic Activities | Impacts on Environment |
|---|--|
| Land development for industries, housing, brick fields | Loss of fertile agricultural land |
| Construction of buildings, roads in unsustainable ways | Soil erosion, destruction of hill ecosystem, topographic level |
| Solid wastes disposal by households, industries and hospitals | Land degradation |
| Wastes and effluents discharged by different industries | Water pollution, lack of safe drinking water, groundwater pollution |
| Emission of inimical gases, ashes, particles from industries and transportation | Air pollution |
| Industries and transportation | Noise pollution |
| Over pulling out of water for consumption | Depletion of groundwater, fall in water table, heavy metals or arsenic contamination |
| Unplanned construction of high rise buildings | Crowded neighborhoods, overloaded utilities |
| Unplanned land use changes | Lack of open space, heat island |

(Source: Author)

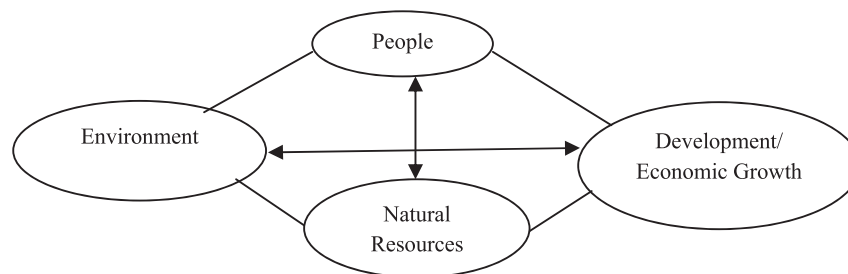


Figure 3: Primary linkages of Population, Environment & Economic Growth

(Source: BCAS, 1998)

We can consider the use of energy resource such as coal in the generation of power. The combustion of coal produces heat that generates power and the wastes such as carbon dioxide is released into the atmosphere and the solid wastes are disposed of on land. The environment has the capability of transforming some of these wastes into useful products – tree converts carbon dioxide into carbohydrates through photosynthesis. The wastes may also be harmless through

biogeochemical processes. These reflect the waste assimilative capacity of the environment. As a result, economic activities do not overload the assimilative capacity of environment. However, when too many wastes are discharged into a specific environment, it cannot assimilate all these and there is environmental pollution. Pollution induces the negative externality⁵ which is unsustainable to society, economy and environment.

It is common that, agricultural production increases arithmetically and population increases geo-metrically. Increasing population growth at first rate mainly in the developing countries has put enormous pressure on forested land because it becomes necessarily to clear the virgin forest covers and convert them into agricultural land so that agricultural production may be significantly increased and food may be provided to hungry human population. This trend has resulted into large scale destruction of savanna vegetation in the subtropical region, rich and extensive grasslands of Russian 'steppes', South American pampas, Newzelandean native forests, has been extensively converted to agricultural farms and these areas have now become major granaries of the world. We can compare the different countries status in terms of environmental security, economic growth and sustainability;

America, Japan, Canada, Australia, France, and Germany - are in first category. They are involved in high quality research; ensure the public participation in environmental management.

China, Malaysia, India, Brazil and Vietnam- are in second category. They are developing their institutional and technical capability to combine economic growth and environmental security.

Paraguay, Venezuela, Bolivia, Ecuador and Argentina- established ownership of natural resources with a strong movement of the people and trying to develop economic status, environmental condition.

Sudan, Nigeria, Zimbabwe, Zambia, Angola, Sierra Leone and Columbia- the people are victims of different imperialistic countries and multinational companies, local corporate grabbers and rent-seekers. Basically they do not know what their own resources are. General people are deprived to use of their own resources. Here the main question is "FOOD"; as a result environment is not main concern.

⁵. Dorfman, R and Nancy, S. (1997). " Economics of the Environment Selected Readings; W. W. Norton and Company Inc. Newyork

We want development, high per capita income, and economic growth. But the term ‘Development’ does not carry the same connotation for all— upper, middle, lower, marginal, indigenous, religious minorities. Either the extraction of development enriches the majority of people or makes some people rent-seekers. It depends on the patterns of development and public participation. Environmental Kuznets curve⁶ implies us how per capita income of any country increases the pollution, contamination, degradation level.

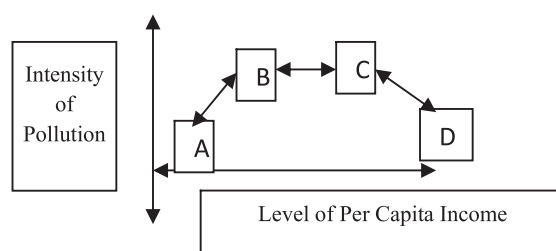


Figure 4: Environmental Kuznets Curve (EKC)

When the natural resources and its development, management transfer to private or business level then degradation occurs. When the environmental resources – air, water, land, forest, hill, and wetland are affected by corporate grabbers and where the environmental laws, policies, management strategies are at rudimentary stage, then environmental insecurity, pollution, contamination level increases. Regarding the population growth, it is possible to amalgamate economic augmentation and environmental sustainability but it needs prior green-economic reform.

4. Environmental Challenges in Bangladesh

Population growth and the development patterns of “Neo-liberalism” are contributing too many serious environmental problems in Bangladesh. These include land degradation, water insecurity, high demand for energy, air pollution, land encroachment, loss of biodiversity, habitat destruction, and urban migration, lower quality of environmental sanitation, solid wastes generation.

4.1 Energy: Rising Demand

Population pressure has imposed relentless strain on non-renewable and conventional energy resources like fossil fuel (coal, petroleum, natural gas) and

⁶. Clem Tisdell (2011); will Bangladesh’s Economic Growth Solve its Environmental Problems ? Economics, Ecology and Environment, University of Queensland.

mineral resources such as iron, copper, lead, silver and gold. On the other hand, the increasing consumption of fossil fuel for domestic, industrial needs, transport has generated air pollution and health hazards particularly in cities and industrial areas. According to Energy Policy, 1996; “Ensure environmentally sound sustainable energy development programs causing minimum damage to environment”. Energy Consumption in Bangladesh:

| Energy Sources | 2000 | 2010 | 2020 | 2030 |
|----------------|--------|--------|--------|--------|
| Natural Gas | 7.7 % | 14.2 % | 22.9 % | 33.6 % |
| Oil | 3.2 % | 5.9 % | 8.9 % | 12.1 % |
| Coal | 0.3 % | 0.6 % | 1.3 % | 3.0 % |
| Renewable | 0.1 % | 0.2 % | 0.5 % | 0.7 % |
| Total | 11.3 % | 20.9 % | 33.6 % | 49.4 % |

(Source: GDRC- Gas Demand and Resource Committee)

4.2 Urban Health and Environmental Sanitation

A major challenge faced by the developing countries is that of human waste management and disposal. The primary concern is the amount of money that is required for proper management and disposal of human wastes. It is important to understand that the improvement of health is not possible without sanitary disposal of human excreta. There are some Problems of groundwater development in Bangladesh. Such as, arsenic in groundwater, excessive dissolved iron, Salinity in coastal areas, water table is lowering due to over-exploitation of groundwater for irrigation and intensive cropping. The urban area is a composite of different subsystems of physical structures and human activities all having links with one another. Growth in the urban population of Bangladesh is more or less centered on the three metropolitan areas of Dhaka, Chittagong and Khulna. It can be 38% of the total population by the year of 2020. Economically affected, socially excluded and environmentally displaced people will join in urban area as beggar, hotel worker, porters, day laborers, maid servant, rickshaw puller, petty traders etc.

| Migration | Rate (%) |
|----------------|----------|
| Urban to Rural | 1.10 |
| Rural to Rural | 3.42 |
| Rural to Urban | 51.8 |
| Urban to Urban | 4.36 |

(Barkat, 2001)

| Year | Population | Percentage (%) |
|------|------------|----------------|
| 2016 | 56,856,665 | 34.9 |
| 2015 | 54,983,919 | 34.2 |
| 2010 | 46,035,276 | 30.4 |
| 2005 | 38,373,642 | 26.8 |
| 2000 | 31,229,852 | 23.8 |

(Source: Economic and Social Affairs, Population Division, UN, 2016)

Dhaka has a population 14.4 million and density of 19,447 people per square miles. Urban Population Status in Bangladesh:

Planned and unplanned human activities taking place within the urban area have profound impacts both within and outside it. The degradation in the quality of the urban environment is the consequence of these economic activities, which may affect the environment either directly or indirectly. For sustainable urban health, the environmental sanitation through environmental education can play key role.

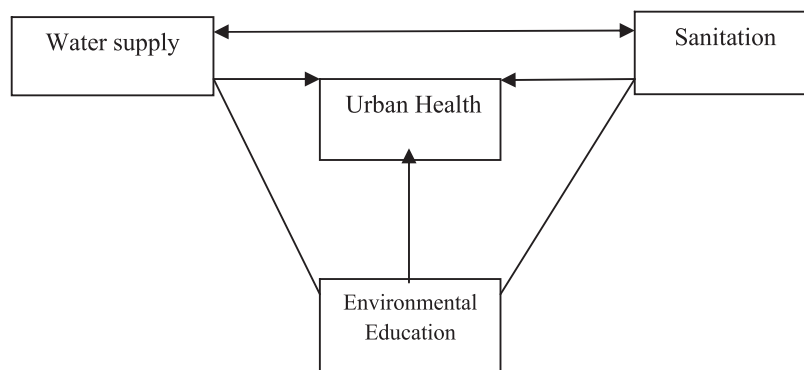


Figure 4: Urban Health Sanitation Nexus (Source: Author)

In urban poor areas among the latrines, pit latrine with slab without lid and water-seal is the major one (53%). Pit latrine with slab and water-seal is 13 per cent. Use of other types of improved latrines is relatively low. Pit latrine with slab and flap without water-seal is 8 per cent. 'Latrine without slab or open pit latrine' is 7 per cent. Latrine connected with open drain with flush or pouring water is 5 per cent. Use of hanging latrines is 3 per cent (Barkat, 2013).

4.3 Land degradation

Agriculture land availability declined at 0.26% annually between 1976 and 2010. Arable Land (hectares) per person in Bangladesh was last measured at 0.05 in

| Sectors | Percentage (%) |
|---------------------|----------------|
| Agriculture | 50 |
| Urban | 15 |
| Tea/Rubber | 2 |
| Village Forest | 4 |
| Unclassified Forest | 7 |
| Classified Forest | 13 |
| Social Needs | 8 |

(Source: estimated by Author)

2011. Agricultural land or basically Arable land is decreasing due to the house settlements, uncontrolled industrial development and even in forest area, poor transport and communication systems, rudimentary institutional and technical capacity in exploring and management of energy, power, mining etc. land use patterns in Bangladesh are given below:

As urban population and urban economic activities increase, more land is needed for commercial units. Expansion of the transportation system is an integral part of the urban development. Construction of new roads and widening of existing ones, have become necessary as economic activities disperse over a large area. Increased demand for bricks is the outcome of an expanding construction industry, which follows rapid urbanization. To meet this demand, the number of brickfields keeps on increasing in the outskirts of urban areas. Growing numbers of brickfields mean loss in prime agricultural land. Top soils are reducing around the brickfields. As a result, soil loses the water holding capacity and fertility. On the other hand, Intensive cropping reduces soil nutrients and organic materials as well as wetlands are covered by contract and shrimp farming as we know, food security is given top priority in Bangladesh. Her large and growing population needs a steady supply of food grains. In Chittagong, excavation of hills for the construction of houses and for acquiring earth for leveling land elsewhere is turning the beautiful city into a disaster zone (Zinatunnessa, 2001). The hills of Nasirabad pahartali, lalkhanbazar, baizid bostami and the khulsi area are all threatened by unplanned construction and earth excavation. Besides, in Bangladesh, much of the problems of water logging and salinity have been attributed to the lack of maintenance of existing flood control, drainage, irrigation and poor design and planning of new infrastructure.

4.4 Air pollution

In developing countries where there is no control on emission or where monitoring system is unable, cities are virtual gas chambers where people breathe

in air polluted with high levels of lead, carbon monoxide, carbon dioxide, dust and different types of poisonous gases emitted from industries, construction activities and automobiles. Bangladesh is not out of those activities. The level of air pollution is highest in Dhaka followed by Chittagong and Khulna, the two other industrial cities. Incidence of air pollution is not an isolated event but is a continuous process as the sources of pollution operate throughout the year. The ambient air quality of Dhaka city with respect to CO, SO₂, NO_x, CO₂ and PM₁₀ is given below:

| Location | Pollutants concentration | | | | |
|-------------|----------------------------|---|---|--|--------------------------|
| | CO (µg/m ³) | NO _x (µg/m ³) | SO ₂ (µg/m ³) | PM ₁₀ (µg/m ³) | CO ₂ (ppm) |
| Mohakhali | 2519 | 376 | trace | 547.66 | 435 |
| Farmgate | 7730 | 752 | trace | 289.92 | 590 |
| Mogbazar | 5726 | 339 | trace | 383.53 | 475 |
| Sonargaon | 3435 | 75 | trace | 161.93 | 500 |
| Science lab | 5726 | 113 | trace | 169.64 | 500 |

(Source; Ahmed et al, 2010)

There are a lot industries and factories in Dhaka city. Their percentages in air pollution are given below:

| Industrial sectors | Contribution (%) |
|--------------------|------------------|
| Pulp & paper | 13.7 |
| Cements/clay | 16.6 |
| Textiles | 10.5 |
| Food industry | 38.7 |
| Tobacco | 4.5 |

(Source: Islam, et.al. 2001)

Besides, 86% of vehicle in Dhaka city exceed the acceptable limit of emission. Vehicle type- air pollutants are;

| Vehicle Type | CO (%) | HC (%) | NO _x (%) | PM (%) |
|----------------|--------|--------|---------------------|--------|
| truck | 13.4 | 8.6 | 59.7 | 47.5 |
| bus | 10.3 | 9.7 | 18.5 | 29.4 |
| minibus | 7.3 | 3.9 | 6.5 | 19.1 |
| car | 38.2 | 18.2 | 6.5 | 1.2 |
| Three wheelers | 10.6 | 26.9 | 6.0 | 1.2 |
| Motor cycle | 14.0 | 28.3 | 0.3 | 1.0 |

(Source: country profile of environment, Bangladesh, 2006)

4.5 Solid waste generation

Disposal of solid wastes in all the urban areas is inadequate. Household garbage, industrial wastes and infectious wastes from clinics and hospitals are all dumped in the same place. Waste estimation of five hospitals in Dhaka city is given here:

| Institutes | Per day/kg/bed/day |
|----------------------------|--------------------|
| Dhaka medical college | 1.19 |
| Popular hospital | 1.23 |
| Lab Aid | 1.20 |
| Salimullah medical college | 0.80 |
| Ibne Sina hospital | 0.83 |

(Source: UI/ah, 2006)

Although there are 700 street cleaners in the Dhaka city corporation, most of the streets are never swept. Daily waste produced in Dhaka city is about 3000 metric tons, of which 40% are left on the streets (Daily Star, February, 2000). Nowadays, in south city corporation, 3 thousand 500 tons waste are generated where 1 thousand 900 tons are processed but 1 thousand 600 tons are out of processing. Besides, generation of electronic waste such as, TV, Freez, computers, tube lights, and mobiles has created a new threat for us. According to environment and development organization, 2016; during the period of 2011-12, it was 5 million metric tons and 2013-14, it was 11 million metric tons. However, the rates are increasing day by day in Bangladesh.

4.6 Water Insecurity

Water is an essential part of each and every plant, animal and microbial life. We can hardly live for a few days without water. It is an essential commodity not only for the development of industrial and agricultural development but also it supports ecosystem, biodiversity, economic development, community well being and in cultural values. Average water consumption in Bangladesh:

| Water consumption | Liter/per capita/day |
|-------------------|----------------------|
| Commercial use | 40 |
| Industrial use | 20 |
| Public use | 25 |
| livestock | 20 |
| Loss & damage | 40 |

(Firoze and Ahmed, 2005)

However, in our country, quality of water is decreasing day by day due to the large and rapidly growing population; unplanned industrial pollution; improper use of agricultural chemicals and pesticides; indiscriminate disposal of municipal, industrial and agricultural wastes enter into the inland water systems, poorly designed flood control, drainage and irrigation works, lack of adequate regulatory measures and institutional setup for proper monitoring and control etc. According to Asian water development outlook, 2016; 80% wastes are dumping into river in Bangladesh as well as water security index, Bangladesh is 44th out of 48 countries. Every day four thousand tons solid waste & 22 thousand tannery waste mixes with water in Buriganga River While lot of heavy metals-copper, iron, lead, nickel are contaminated the water. Different industries and their contribution in pollution are given here:

| Industrial sectors | Contribution (%) |
|------------------------|------------------|
| Pulp & paper | 47.4 |
| pharmaceuticals | 15.9 |
| Metals | 14.0 |
| Food industry | 12.1 |
| Fertilizers/pesticides | 6.6 |

(Source: Islam, et.al. 2001)

At present, around 250 industries are discharging chemical pollutants into Buriganga and Sitalakka River (Reza, et. al, 2016). If we think urban areas, the groundwater laced with harmful chemicals may then be supplied to urban dwellers who are unknowingly exposed to health hazards. Besides, another source of water pollution is discharge of sewage directly into the rivers and low-lying part around the urban areas. This is happening in all the cities of Bangladesh. Eutrophication and bacterial content in lakes and rivers are also high. This is a threat to the health of urban dwellers as river water is also supplied by the “Water Supply & Sewerage Authority” for drinking and other purposes. On the other hand, reduction of river water flow due to siltation is increasing salinity at the coastal areas. Shrimp farming creates more salinity at agricultural land which is 80% in Khulna, Satkhira and Bagerhat districts.

4.7 Land Encroachment, Habitat Destruction and Forest Biodiversity

Bangladesh has three types of forest ecosystems including the extensive mangrove forests in the southwestern region. All these are already degraded and their area has been shrinking continuously over the years as population continues to grow. Out of 46,000 acres in Madhupur Sal forest, 7,800 acres have been given

out to Commercial plantation, 25,000 acres has given into illegal possession. According to the Forest Division of Tangail region, Encroached forest area in various Ranges in this forest:

| Range | Encroached forest area in Acres | | |
|-----------------------|---------------------------------|---------|----------|
| | Garo | Bangali | Total |
| Dokhola | 3700.46 | 7748.16 | 11448.62 |
| Central National Park | 2247.78 | 1571.82 | 3819.60 |
| Madhupur | 461.92 | 3476.29 | 3938.21 |
| Arankhola | 301.72 | 1709.20 | 2010.92 |

(Source: Bangladesh environmental lawyers association, 2007)

At hilly forest area, tobacco farming is increasing rather than the mainstream food. About 10 national and international companies are involved in tobacco farming. In 2000, about 300 hectares land was used which has increased 4232 hectares in 2010. Now the farming area is about 10,000 hectares. The overall condition of Bandarban district:

| Bandarban(Hilly district) | |
|---|--|
| Lama | Alikodom |
| 1. Total tobacco cultivated land is 5 thousands and 399 acres | 1. Total tobacco cultivated land is 1 thousand 812 acres |
| 2. Previously, those land were suitable for 21 food crops | 2. Previously, those land were suitable for 23 food crops |
| 3. The amount of these food crops is about 11 cores tk. | 3. The amount of these food crops is about 3 cores 78 lacs tk. |

(Source: Investigation 360⁰, Jamuna Television, 2015)

Nowadays commercial cultivation has become a prevalent fact which is related to the intensive agricultural system. Forest areas are not out of intensive cultivation because of land encroachment and growing population rather forest areas are going under the suppression of commercial cultivation because at Sal forest, native plant species like kumbi, koroi, banza, sheura, jalpai, amloki, bohera are being replaced by alien species like rubber, acacia, eucalyptus, pine apple, teak etc. Similarly at Hill forest, native plant species like telsur, garjan, koroi, chapalish, dhundal are being replaced by tobacco, sugarcane, cotton, turmeric, groundnut, maize, teak etc.

On the other hand, shrimp farming has increased the rate of land encroachment more than double from 45,596 hectares in 2000 to 96,283 hectares in 2010 at

Mangrove forest area (Reza. S, 2016). In Sundarban, the total areas are decreasing:

| Sal Forest | | Hill Forest | |
|------------|------------|-------------|-----------|
| Native | Alien | Native | Alien |
| Kumbi | Rubber | Telsur | Sugercane |
| Koroi | Acacia | Garjan | Cotton |
| Banza | Eucalyptus | Koroi | Tobacco |
| Sheora | Pine apple | Chapalish | Maize |

(Source: Reza. S, 2016)

In 1959, the total plants were 296 per hectare, 180 in 1983, and 144 in 1996 and it will reach 109 within 2020. Besides, Sundri trees were 211 per hectare (1959), 125 (1983), 106 (1996) and it will be 80 by the year of 2020 (Prothom Alo, September, 3, 2016). Many of country's mammals, birds and reptiles have already been lost. Such as, one-horned rhinoceros, Asiatic rhinoceros, Javan rhinoceros, blue bull, wild buffalo, gaur, banteng, swamp deer, marbled cat, pink headed duck, common peafowl, marsh crocodile (Rahman, 2008).

| Year | Sq.km |
|------|--------|
| 1776 | 11,256 |
| 1841 | 9,279 |
| 2015 | 5,467 |

Commercial plantation and illegal possession in Sal forest and inappropriate jhumming, illegal logging, stone exploitation, brick fields, Bengali expansionism in Hill forest as well as apiculture, shrimp by catching and animals hunting in Mangrove forest area - all issues are raising a concern about conservation of forest biodiversity. In resulting, land encroachment by local elites or corporate grabbers in the name of agricultural development and industrialization, affects the totality of genetic potential, species and ecosystem stability, degrades the humus and topsoil, changes the food chain, decreases the capability of hydrological cycles and circulation of nutrients as well as the aesthetic value of forest in Bangladesh.

Besides, Bangladesh was known for its variety of fishes. Fish was available everywhere and in all seasons. The main source of protein for the people of the country was fish. Population growth has led to overfishing in almost fisheries in the country. Many species of fish are now extinct. The scenic beauty of different islands is degrading due to over exploitation of fisheries, population growth, and

unregulated tourism activities. Wetlands are used for rice production or filled up with earth for construction purposes.

8. Conclusion and Recommendations

Human Resource Management is a great challenge to combine population and environmental status. Population size cannot be a problem on environment if we convert human capital to human resources through home grown development philosophy. Sustainable development will not be possible if thoughtful efforts are not made to educate people regarding environment. Curricula of educational institutional should be premeditated to incorporate facts about the environment. To press forward awareness and to motivate people to protect the environment that sustains them, dissemination of environmental information is needed through mass media. Environmental and social inclusion are impossible without economic development, on the other hand, economic development will not be sustainable without environmental consideration. Regarding the high population size, we need to combine supply of more environmental quality (green technologies) and demand of better environmental quality (income, changes in preferences). Effective family planning, empowerment of women, creative employment generation for the poor is some of the measures for improving condition. Involving people in environment and resource management, biodiversity conservation, developing institutional and technical setting, utilizing indigenous knowledge, implementing environmental laws and policies, improving mental faculty of people can be effective to trim down environmental degradation.

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