

ENVIRONMENTAL CHALLENGES FOR BANGLADESH: A REVIEW

Mohammad Mafizur Rahman^a, Muiz Maidi^b, and Feroza Begum^{b*}

^aDhaka University of Engineering and Technology, Gazipur, Bangladesh

^bFaculty of Integrated Technologies, Universiti Brunei Darussalam, Bandar Seri Begawan BE1410, Brunei Darussalam

Abstract

Bangladesh has experienced environmental degradation over the years, which is a major source of concern for us. This has illustrated by deforestations, destruction of wetland and inland fisheries, soil depletion, inland salinity intrusion, air and water pollution. Furthermore, untimely floods, cyclones, tidal surges, have resulted in severe socio-economic and environmental damage. The main source of the issues is a lack of understanding of environmental and conservation principles, as well as poverty and a lack of adequate resources. Bangladesh has a good number of policy and programs related to environmental development. This paper has briefly highlighted the causes and effect of environmental degradation, government strategies and policies and their setbacks. Finally, few recommendations have been put forwarded to conserve the environmental degradation.

Keywords: environmental degradation, environmental issue, infrastructure development, environmental effects, environmental pollution

1.0 INTRODUCTION

The word 'environment' has evolved from a purely physical concept to one which is about complex biological interrelationships between nature, and it has expanded particularly with the growing recognition of the significance of human influence upon major environmental process. Increasing deterioration of environment is possibly the serious long-term danger ever faced by the entire human species. It is one of the most powerful factors affecting the living conditions of hundreds of millions of people of the world [1]. Environment pollution is mainly caused for unrestrained and implanted exploitation of the nature by man. The damaging consequences of this phenomenon are grave and apparently irreversible. Deserts are expanding while forests are disappearing. Every year, billions of tons of fertile soil are washed into the sea. Many species are becoming extinct as a result of overpopulation and poverty, resulting in desperate attempts to survive. The inclination of natural calamities like draught flood tidal bore, earthquake and cyclone is alarmingly increasing. The atmosphere is getting warmer resulting in the gradual melting of polar ice reflected in a slow rise of sea-level [2].

Every country in the world will have to share this burden in varying degrees no matter whether they are responsible for environmental degradation or not. In short the whole world is beset with multifarious environmental problems. Even the security of the nation is threatened in the limited sense at least. It is widely known that the developed countries are chiefly responsible for all global environmental crisis. We the people of developing countries are also responsible for worsening environment, closely linked to our life, in the name of so called development process [3,4]. Poverty, population growth and environment have strong linkage in Bangladesh. The deterioration of environment resulting in degradation of natural resources, pollution of air, water and land, extermination of a number of life forms, down going health status, danger to cultural assets and many socio-economic backlashes. The root of the problem lies in too many people using too many resources wastefully [5].

Over the years Bangladesh has undergone a process of environmental degradation which is the cause of considerable concern. These are illustrated by deforestation, destruction of woodlands and island fisheries, soil nutrient depletion and island salinity intrusion. Furthermore, natural calamities like landslide, floods, cyclones, tidal surges and tornadoes have resulted in server socio-economic and environmental damage. Bangladesh is confronted with serious issues such as overpopulation, extreme poverty, illiteracy, and environmental degradation due to natural resource depletion. [6 - 8]. The major root of man-made problems is lack of understanding of ecological principles, poverty and lack of adequate alternate resources. One sure sign of

ecological imbalance is the lowering of the ground water level that exists in the northern and central parts of the country, resulting in shortage of drinking water. Another symptom of imbalance is the widespread nutrient depletion manifested in crop yield declines. Early anticipation and prevention of major upcoming environmental crisis in these areas will undoubtedly produce enormous benefits in the long-run [9].

This paper shall highlight the causes of environmental degradation and its impact on Bangladesh. It will also cover the Government's response to environmental issue, its setbacks and recommend measures for combating environmental degradation. The aim of this paper is to discuss the environment challenges for Bangladesh and suggest remedial measures accordingly.

2.0 CONCEPT OF ENVIRONMENT

2.1 Environment

The term "environment" refers to the combination of the ecological foundation, natural life support systems, and social and cultural conditions that influence individual and community life. Environment is defined as "the things or the area around everything; or the circumstances in which anything lives or develops." For the exterior conditions of life of humans and other living things, the environment is sometimes described in a more constrained sense.

2.2 Environmental Security

Environmental Security can be defined as perceptions or levels of well-being. Conversely, environmental insecurity may be defined as perceptions of threat arising from eco-system deterioration or collapse on polluted physical systems or a deterioration of social and cultural conditions, or combinations thereof. Thus, environmental security may be seen as a function of the conditions of the physical and human domains.

3.0 CAUSES OF ENVIRONMENTAL DEGRADATION IN BANGLADESH

The greenhouse effect, catastrophic ozone depletion, acid aerosols, biodiversity loss, land degradation, decline in water quantity and quality, and urban concentration are all examples of global environmental change. Environmental degradation is occurring due to many reasons mostly originated by human being and its necessities which is shown in Figure 1.

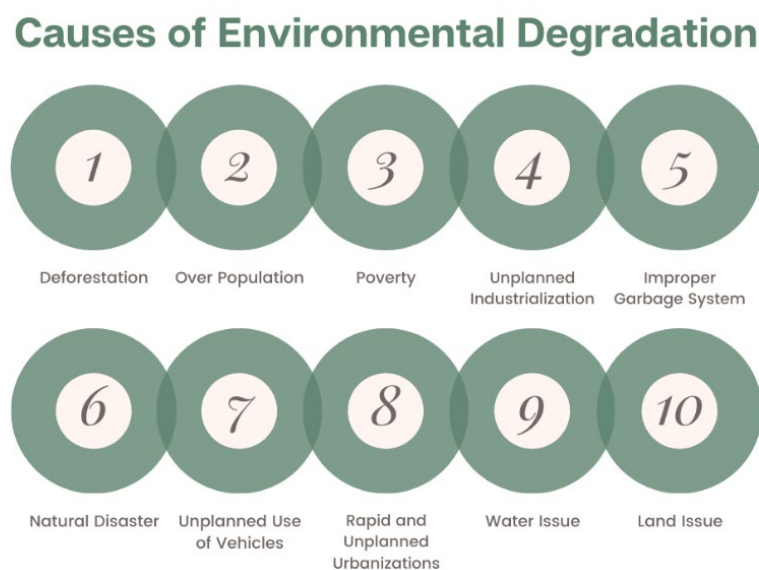


Figure 1: Causes of environmental degradation.

3.1 Deforestation

It is estimated that at least 10 million hectares of forest will be destroyed each year between 2015 and 2020. There has been a continuous depletion of forest resources over the last few decades. Destruction of forest in recent years has emerged as a major problem both in Bangladesh and in all over the world. The existing natural forests in Bangladesh are shrinking at rates ranging from 2.1% to 3.3% per year. [10-12].

3.2 Overpopulation

Bangladesh is most densely populated country in the world. More than 1140 people live in a square km land. As per statistics of "Bangladesh Parishankan Bureau" in 2020, total manpower was about 168 million and growth rate was 1.37%. The growing population pressure increase poverty, decrease food accessibility and increase diseases. The rapid growth of urban population is already beyond the absorption capacity of urban areas in terms of social services, shelter other and infrastructures. More specifically, population growth slows the growth of per capita income and limits the growth of the gross national product. [27, 30].

3.3 Poverty

Poor area and poor people destroy each other. The poor are often the most vulnerable and unable to cope with environmental changes and the impact of natural disasters and hazards. The size and density of population aggravate poverty, while poverty in turn encourages a rapid growth of population. The rural poor are particularly vulnerable to environmental degradation because they rely heavily on fragile natural resources for survival. 55% of rural women work as field farmers and rely on the environment for fuel, wood, food, and water. Water extraction for irrigation causes ground water levels to drop, and water becomes Stalinized, resulting in a severe shortage of drinking water [12].

3.4 Unplanned Industrialization

Among man-made environmental crisis industrial revolution is worth mentioning. Industrialization and growth of mega cities have brought in wide spread degradation in environment. Most of the industries in Bangladesh have generally been developed in unplanned way without considering the environmental factors. Textile and dyeing, tanneries, pulp and paper, cement, metal, fertilizer, and chemical plants emit Sulfur Oxides, Nitrogen Oxides, Carbon Monoxide, and Ammonia, all of which pollute the air and water. Improper Garbage System.

Unsanitary situation of solid waste is terrible in Bangladesh and this situation will be worst with rapid growth of population in municipal area. Dhaka city population generates approximately 3000 tons of garbage per day. The industrial garbage some are toxic and contain heavy metals, organic and inorganic chemical compounds. The environment quality standard is not at all followed because none of the industries have any treatment plant. There is no organize plan to dispose the garbage in the city area and industrial area [17, 35].

3.5 Natural Disaster

Due to the geographical location, Bangladesh is a disaster-prone country. Flood is a regular phenomenon in our country. This devastating flood caused enormous miseries to the people and also caused environmental hazards. Almost in every year cyclone causes immense losses of life, property and resources. This kind of natural disasters caused huge environmental degradation. Over the years, Bangladesh's relationship with cyclones and heavy storms from the Bay of Bengal has left a trail of death and destruction. Here are few major cyclones from the past are given in Table 1 below [13].

3.6 Unplanned Use of Vehicles

Unfortunately, the road conditions of most of the cities/towns do not permit to have a huge number of vehicles. Bangladesh Road Traffic Authority does not have proper control on the use old and hazardous vehicle movement. As a result, traffic jam is a regular phenomenon, which causes the waste of man-hour, burning of extra fuel, ultimate result is environment pollution. The city's transportation is one of the major sources of air pollution.

Table 1 State of major cyclone losses in Bangladesh (2007-2020) [13].

No	Date	Loss	Remark
1	15 November 2007	3363 people	Cyclone Sidr
2	25 May 2009	20000 houses	Cyclone Aila
3	26 May 2013	17 people	Cyclone Mahasen
4	21 May 2016	40000 houses	Cyclone Roanu
5	4 May 2019	63063 hectares	Cyclone Fani
6	9 November 2019	22836 hectares	Cyclone Bulbul
7	20 May 2020	176007 hectares	Cyclone Amphan

3.7 Rapid and Unplanned Urbanizations

Rapid urbanization has major ecosystem impact on water, land and forest resources, species destruction and climate. In Bangladesh unplanned and rapid urbanization has negative effect on environment. This has threatened human health, environment, and sanitation. Because with rapid urbanization other associated facilities like water supply, sewerage system, power supply etc have not expanded rationally. A growing number of the poor migrants have no arrangement for housing public utilities and other amenities. It may be a significant factor in pollution and other issues with hygienic practices, general waste disposal, and the availability of clean drinking water. Loss of habitat can jeopardize native plants and animals.

3.8 Water Issue

Major water issues are also cross-sectoral, affecting almost all sectors. The major issues relate to dry season phenomena such as salinity encroachment in the coastal areas due to reduced and reducing river flows. This reduction is due to the result of construction of polders and embankments, increased and uncontrolled upstream extraction for irrigation and river beyond the borders of Bangladesh. In Bangladesh, 48 million people lack adequate sanitation, and more than 2 million do not have access to an upgraded water supply [14].

3.9 Land Issues

Land is a basic and crucial asset for livelihoods. As in many other emerging nations, agriculture has historically been Bangladesh's major sector. Around 50% of the population works in this industry, while 70% of people depend on agriculture for their livelihood altogether. Land area is fixed; hence it inevitably becomes a scarcer resource. Due to a high land-to-person ratio, competition for the utilization of land is fierce in almost all sectors [15]. Environmental issues relating most directly to these resources are discussed below:

3.9.1 Continual Riverbank Erosion

The most devastating land degradation in Bangladesh is river bank erosion triggered by floods. River bank erosion occurs every year affecting over million people, creating increasing landlessness and rural migration into urban centers. Bangladesh is one of the nations most prone to natural disasters because of its location at the meeting point of the three most powerful river systems in the world: the Padma, Brahmaputra, and Meghna. The biggest river-related disasters are flood and riverbank erosion. The Padma and the Jamuna have drained 180,000 hectares of land during the past thirty years. In 2008, the Padma River's bank erosion made nearly 200,000 people homeless [18].

3.9.2 Increasing of Landlessness and Land Fragmentation

Landlessness is increasing day by day including an increasing fragmentation of land by rural poor. Such land fragmentation is an obstacle to proper resources management for sustainable development. Landlessness make rural life less economical which in turn affect wood cutting for energy, increases soil erosion and reduces biodiversity as it destroys the remaining wildlife habitats in the country.

4.0 EFFECT OF ENVIRONMENTAL DEGRADATION

The effects of environmental degradation are fatal to human survival. As a result, the concept of environmental degradation encompasses a wide range of issues, including deforestation, biodiversity loss, desertification, global warming, animal extinction, pollution, and many others. The effects are multi-dimensional and mostly interlinked with each other's which is shown in Figure 2.

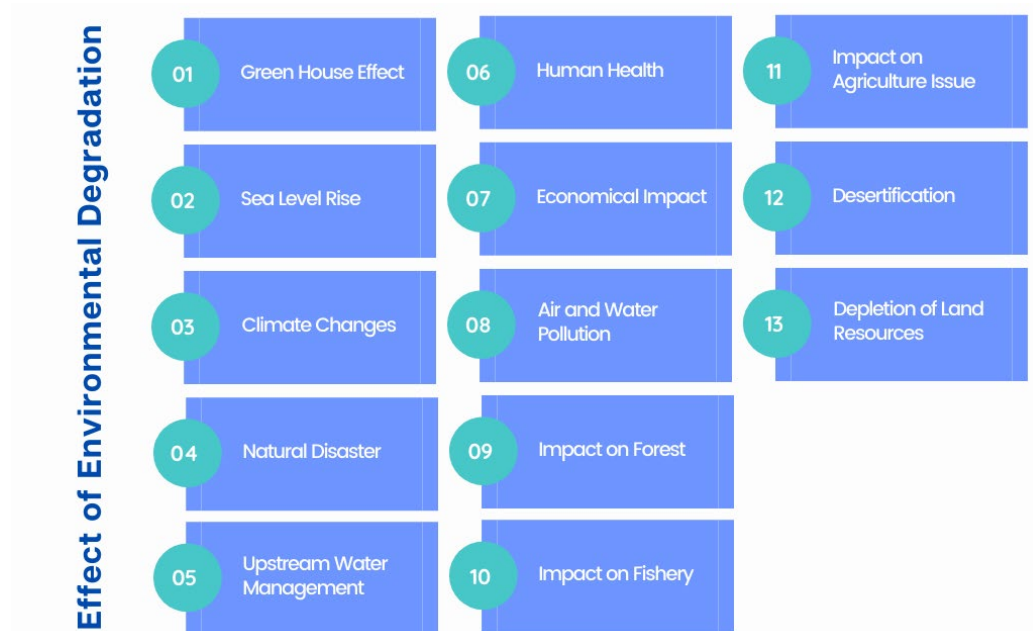


Figure 2: Effect of environmental degradation.

4.1 Green House Effect

Greenhouse effect is based on some gases like carbon Dioxide 65%, Mithen 16%, Nitrous oxide 6% and others 13%. As various gases absorb heat from the earth's long-wave radiation, the atmosphere warms up, similar to how a greenhouse warms its air. Between 1906 and 2005, the average global surface temperature increased by 0.6 to 0.9 degrees Celsius (1.1 to 1.6 degrees Fahrenheit), and in the last 50 years, the rate of temperature increase has nearly doubled. [25, 26].

4.2 Sea Level Rise

Bangladesh is less than five meters above sea level in two-thirds of the country. Bangladesh has 28 percent of its people living along the coast, where tidal flooding brought on by sea level rise is the main cause of eviction. The rise in sea levels alone might force up to 18 million people to relocate. Bangladesh may lose 11% of its land by 2050 due to a projected rise in sea level of 50 cm, which will have an impact on the estimated 15 million residents of its low-lying coastal region. [8]. This sea level will rise due to thermal expansion of ocean, melting of snow and land-based glaciers. Another important effect is a drastic increase in salinity of both soils and ground water in the affected areas. The Bangladeshi economy's backbone, agriculture, is also severely impacted, and crops already at risk from growing salinity are now also at risk from the resultant soil deterioration.

4.3 Climate Changes

Particularly susceptible to climate change is Bangladesh. The nation is under danger due to its low elevation, high population density, poor infrastructure, and heavily dependent agricultural economy. Bangladeshis have long utilized migration as a coping mechanism because of the nation's predisposition to harsh weather. However, as climate change-related conditions worsen, more people are being ejected from their houses and

parcels of land as a result of more frequent and severe dangers. According to reports, some areas of Bangladesh will experience more drought as a result of changing rainfall patterns brought on by global warming. Many people have already been forced to relocate due to salinization, erosion, landslides, flooding, and sea level rise. One in seven people in Bangladesh are predicted to be displaced by climate change by the year 2050 [8, 29].

4.4 Natural Disaster

Due to the environment degradation the natural disaster is common phenomenon in Bangladesh. The most common natural disasters include high-intensity floods, droughts, ground water pollution, salinity ingress and cyclonic activities in the coastal areas, riverbank erosion, tornadoes and earthquake. From 1954 to 1998 there are 32 major floods occurred, out of those 17 had serious effects on people. Floods are a yearly occurrence, with the worst ones taking place in July and August. 20% of the country is often affected by river flooding, with the percentage rising to 68% in exceptional years. Floods in 1988, 1998, 2004, and 2007 were especially devastating, causing extensive damage and fatalities. In Bangladesh nearly one million people are directly or indirectly affected by natural disaster [28].

4.5 Upstream Water Management

Bangladesh being the downstream a huge watershed is naturally vulnerable from upstream neighbors. This vulnerability is multiplied by the low terrain of the delta on the one hand and by salt water encroachment on the other. Floods carry water surges towards south causing extreme erosion of river bank and siltation plug up irrigation works. The other most severe upstream activity is the drought in the dry season due to the Farakkha and several other barrages in India.

4.6 Human Health

Climate change will have an impact on human health in developing countries with tropical climates. Today there are more and more infectious diseases due to the changing environment. The main cause of the transmission and spread of many contagious waterborne diseases, such as cholera, typhoid, and diarrhoea, is environmental degradation. Polluted logged water may cause dermatitis and Malaria, Dengue etc. High level of arsenic in ground water can cause serious health problems for a long time. Use of arsenic contaminated water in agriculture also is not safe for human being.

4.7 Economical Impact

The combined effect of siltation, soil erosion, decreased surface water level, and increased salinity is so severe for Bangladesh that the country's ecological sustainability is jeopardized. Sectors like agriculture, industry, navigation and aqua culture of Bangladesh have been suffering serious setbacks. Extreme weather events may cause physical asset damage, including real estate, capital, and infrastructure, as well as loss of life, resulting in property and casualty (P&C) insurance losses, damage to household and firm balance sheets, increases in defaults, and potential financial sector distress. Salinity has an impact on the Sundarban forest, which provides raw material for newsprint mills, paper mills, match factories, and all types of construction activities.

4.8 Air and Water Pollution

Deterioration of quality of air, water and soil which has bad effect on people and environment:

4.8.1 Air Pollution

Bangladesh ranks ninth among the top ten countries in terms of outdoor Ambient Particulate Matter (PM 2.5), which is very small at 2.5 micrometers in diameter or less and is produced by all types of combustion found in urban and rural areas. In 2019, there were 173,500 deaths in the country as a result of air pollution, which is more than 50,000 more than in 2017. Many of these deaths are due to Acute Respiratory, Infections Cardiovascular disease, Lung cancer and respiratory diseases [19].

4.8.2 Water Pollution

Normally water pollution occurs due to the organic garbage, industry and house hold waste. In our country most of the industries plants are located along the major rivers and water sources, discharging untreated liquid and solid waste. Surface water pollution in Bangladesh is primarily caused by sewage and solid waste, as well as industrial waste and effluents. Arsenic contamination in groundwater is devastating in Bangladesh, where an estimated 35 to 77 million people are chronically exposed to arsenic in their drinking water [20].

4.9 Impact on Forest

Bangladesh's total forest area is 2.6 million hectares, accounting for nearly 17.4% of the country's total land area. The forestry sector accounts for approximately 3% of the country's GDP and 2% of the labor force. Forest degradation will hinder prospect of sustainable development. The main causes of deforestation have been overcutting by timber merchants, increased fuel wood consumption linked to population growth, and land clearing for agriculture [21].

4.10 Impact on Fishery

As an agricultural country, fisheries have always been important to the national economy. It contributes 3.61% of Bangladesh's national GDP and approximately 24.41% of agricultural GDP and is a very important source of employment opportunity with an estimated two million people working in this sector. The reclamation of wetland for urban and agriculture use in a major cause of declining growth of fisheries. In addition, the drainage of surface water also contributing to a decline in fish stock. The direct contamination of aquatic system by industry is widespread and a matter of considerable concern [22].

4.11 Impact on Agriculture Issue

Unsustainable land use practice and unscientific cultivation method are having negative impact on the environment through soil erosion and reducing soil fertility. The net cultivable area of Bangladesh comprises approximate 57 percent of total land area. However, the environmental impact of this increased intervention is expected to be a further by lowering of groundwater level. Other environmental issues related to agriculture are soil erosion and degradation as well as indiscriminate use of pesticides [23].

4.12 Desertification

Desertification is Bangladesh's most serious environmental challenge. Various forms and degrees of degradation affect approximately 43 percent of the total geographical area. Low soil fertility is recognized as the root cause of land degradation leading to desertification in drier parts of Bangladesh. Reduction in the ground water level is due to reduced water flow and extraction of ground water beyond its limit for irrigation. The restriction of fresh water flows is major cause of desertification in Bangladesh. The diversion of Ganges water by the Farakka barrage in India has reduced surface water availability and exacerbated desertification in the country's northwestern region. [24 ,31].

4.13 Depletion of Land Resources

Due to the unplanned industrialization, urbanization, increasing of salinity, rise of sea level and desertification, the total cultivated land is now reducing in great extent. With the rapid population growth furthering the share of land and basic natural resources has gone down to a lower scale. Soil erosion, deposition of sand on agriculture land, brick field are also causes of depilation of land. This will have adverse effect on Bangladesh in future.

5.0 BANGLADESH RESPONSE TO ENVIRONMENTAL ISSUE

Bangladesh Government has undertaken multilateral initiatives to implement the environmental strategy for sustainable development. These include development of new administrative mechanism, expansion and introduction of appropriate policies, strategies and action plans, which are depicted in Figure 3 and discussed below.

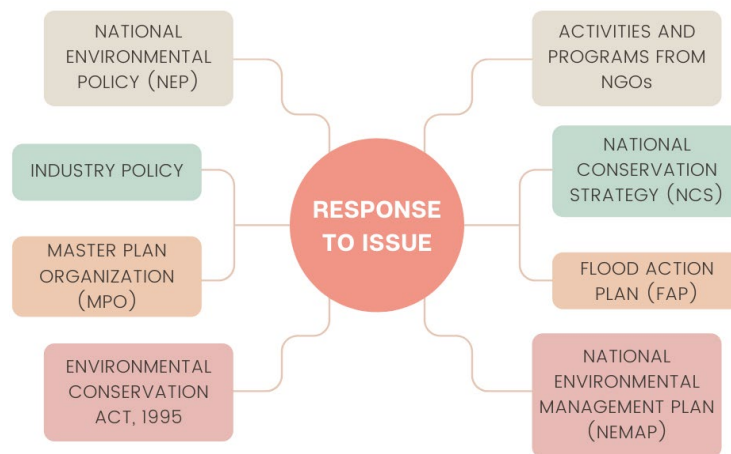


Figure 3: Response of Bangladesh to environmental issue.

5.1 Activities and Programs of NGOs

Bangladesh has about 26,000 NGOs ranging from very small to the very big in wide variety of area. A number of NGOs have been active in environmental issues in the last few years. Their categories with respect to their activities/programs are research and development. However, in the recent time, there have also been a number of initiatives taken by groups of NGOs in the environmental sectors [32].

5.2 National Conservation Strategy (NCS)

After Bangladesh endorsed the World Conservation Strategy in 1980, the government began work on developing the Bangladesh National Conservation Strategy. The document's goals were to provide guidance for future resource use and conservation, as well as to ensure resource conservation while maintaining the current rate of resource utilization and economic development [33].

5.3 Flood Action Plan (FAP)

Flood action plan is an initiative to study the causes and nature of flooding in Bangladesh and to develop flood-control guidelines. Bangladesh Government has formulated a Flood Action Plan. It addresses the environmental issues by the concept of "Controlled flooding". FAP has evolved an approach to sustainable development of Bangladesh. The Flood Plan Coordination Organization coordinates all the FAP activities.

5.4 National Environment Management Plan (NEMAP)

NEMAP, a pro-active and public consultation process where people would have an opportunity to define their environmental concern, prioritize problems and suggest solutions. NEMAP is a synthesis of the government's, non-governmental organizations', and citizens' perceptions of environmental issues and the actions required to address them. One of the main objectives of the plan is to create public awareness about environmental issues.

5.5 National Environment Policy (NEP)

Bangladesh Government has formulated a NEP. The objective of this policy is maintenance of ecological balance and overall progress of the country through protection and development of the environment.

5.6 Industrial Policy

The industrial policy was introduced back in 1991 with a view to maintain environmental balance caused by industrial pollution. Existing industries will be required to adopt anti-pollution measures within the time frame

specified by the government. The industrial waste has to be environmentally acceptable before discharging them to land and water.

5.7 Master Plan Organization (MPO)

A master plan is a dynamic long-term planning document that serves as a conceptual framework for future growth and development. In 1983 government introduced present organization within the country assisted by UNDP and world Bank known as MPO under the Ministry of Irrigation, water development and flood control.

5.8 Bangladesh Environment Conservation Act, 1996

The act covers conservation and enhancing the quality of environment and control, abatement and mitigation of pollution.

6.0 WEAK AREAS OF MANAGEMENT CONSIDERATION

6.1 Resources Constraints

Bangladesh is a poor country and does not have adequate infrastructural bases to face the environment degradation. The limited budget for this purpose cannot fulfill the huge requirement appropriate for our country. As such many policies, rules and regulations could not be implemented. Some of the points are highlighted in Figure 4.

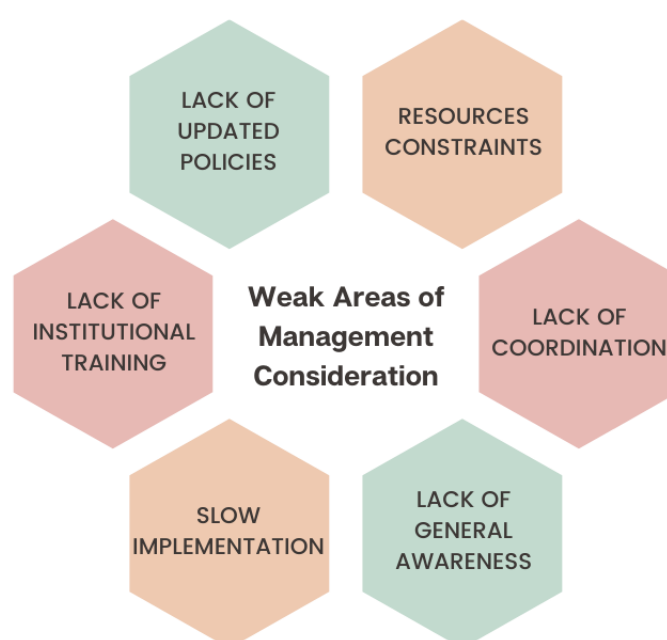


Figure 4: Weak areas of management consideration.

6.2 Lack of Coordination

In addition to the ministry and Department of Environment, a number of other government agencies (Department of Forest, Directorate of Fisheries, Water Development Board etc) work on different environmental issues. Besides, a good number of NGOs are working in the environmental area with active participation of people. But unfortunately, all these organizations work independently with various dimensions. As such, a synchronization of the efforts by all is required for improving the overall environmental development in Bangladesh.

6.3 Lack of General Awareness

Bangladesh has adopted many policies, legislation, project and program. But the fact is unknown to the general mass. Mass awareness on environmental issues can only be developed through proper and well-coordinated education by different organizations.

6.4 Slow Implementation

There are good numbers of policies adopted in the country but their implementation is very slow due to lack of commitment and will power. As such, we have failed to sustain environmental challenges.

6.5 Lack of Institutional Training

In Bangladesh there are no institutional training facilities available to impart training on environmental issues. To face the environmental challenges effectively institutions must develop their own capacity to react for sustainable environmental development and re-orient themselves to be more responsive and pro-active.

6.6 Lack of Updated Policies

The different policies adopted in Bangladesh on environment are backdated and cannot cope with current environmental challenges. The rapidly changing environmental threats demand current and updated policies and strategies to deal with the threat effectively.

7.0 RECOMMENDED MEASURES FOR ENVIRONMENTAL MANAGEMENT

The basic solution to environmental management lies with dramatic and rapid changes in human attitude specially those relating to reproductive behavior, economic growth and the environment itself. Figure 5 represents the recommended measures for environmental management of Bangladesh.

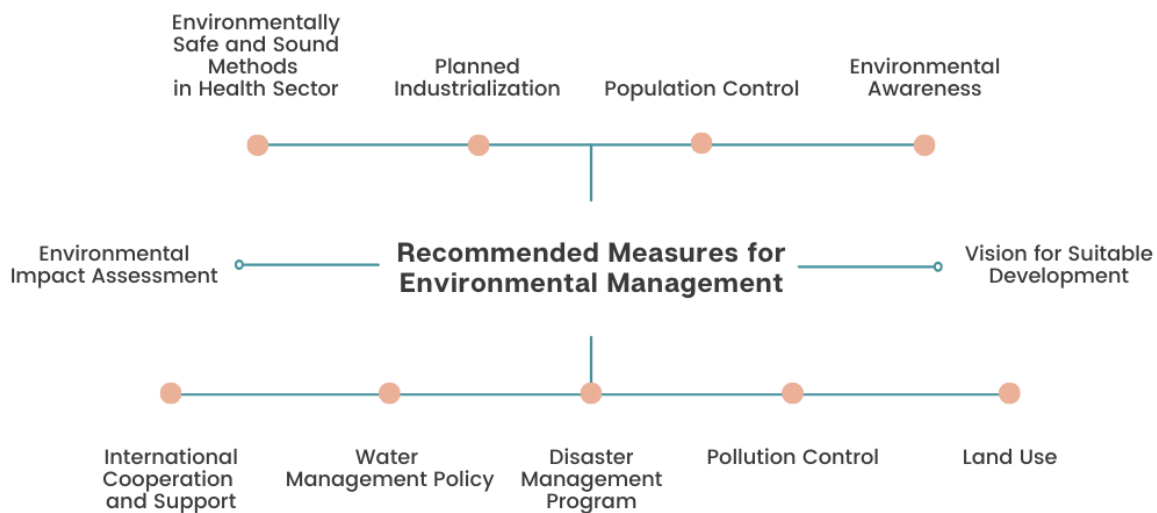


Figure 5: Recommended measures of environmental management.

7.1 Planned Industrialization

These will support collective treatment of waste and to reduce pollution load in water ecosystem. Ministry of Land, Ministry of Industry, Ministry of Environment and Forestry, private sectors and business community should have coordinated and integrated efforts.

7.2 Environmentally Safe and Sound Methods in Health Sector

The potential action for protection of health sector due to environmental damage must be assessed and effective ways should be devised to mitigate such effects. There should be also methods for evaluation and monitoring environmental effect on health programs.

7.3 Population Control

In national perspective, the most significant factor for creating greater change in ecosystem is growing population control. This will virtually stop all human related problem like-poverty, deforestation, urbanization, natural resource depletion etc.

7.4 Environmental Awareness

Formal education program in the national curriculum would be essential step towards responsible environmental behavior. The research and media-oriented NGOs need to establish and disseminate better information and publications relations to environmental issues. Organized mass media education appears to be an effective and fruitful method for creating environmental awareness among the people.

7.5 International Cooperation and Support

Wide ranging cooperative actions are needed to halt adverse environmental trends and their impacts. This can be done by sharing of technological information and methods from the developed countries.

7.6 Water Management Policy

Bangladesh should initiate programs for protection, conservation and rational use of surface and ground water. Bangladesh effort should continue to strength its relation with India to reach bilateral agreement for long-term sharing of common water resources. Environmental Impact Assessment to be carried out before implementation of any flood control and agricultural project.

7.7 Disaster Management Program

Basing on the past damage and impact data of natural disaster, the government should prepare an action plan covering pre-disaster, during disaster and post-disaster period for minimizing the damage. NGO's involvement in this sphere should be incorporated in the action plan so that their contribution may be available on an emergency basis.

7.8 Pollution Control

Preventive measures should be taken to improve understanding of the interaction between chemical or physical agents and biological systems. The effectiveness of regulatory systems to control pollution should be improved by building institutional capacity, strengthening training, monitoring and ensuring enforcement. Pollution for organic, sewage and domestic wastage should similarly be treated before discharge.

7.9 Land Use

Being one of the important issues it needs a more integrated multi sectoral planning approach for land utilization and land reclamation. A comprehensive national land use should be made covering land resources assessment, land degradation preservation and use zoning for crops, livestock, fisheries, forestry and other purpose. Government should develop a national master plan and formulate policies for sustainable utilization and conservation of wetland.

7.10 Environmental Impact Assessment

This assessment should be carried out to assess and predict the environment consequence of an existing or future development project. Department of Environment jointly with other associated ministries should review

environmental assessment program and set up standard procedure and necessary guidelines. The universities and associated educational institution need to develop curricula and training on environmental issues.

7.11 A Vision for Sustainable Development

The Sustainable Development Goals (SDG) agenda was adopted after extensive consultations with governments, civil societies, business and development partners to agree on a new and inspirational agenda for global development. The SDGs link people, the planet, and prosperity, and provide a framework for all countries, developed and developing alike, to pursue better paths to development. Looking forward, it is possible to ensure a significant improvement in the quality of our life without further damaging the environment, The vision would include the following [34]:

- a. To eradicate extreme poverty and hunger
- b. To achieve universal primary education
- c. To promote gender equality and empower women
- d. To reduce child mortality
- e. To improve maternal health
- f. To combat HIV/AIDS, malaria, and other diseases
- g. To ensure environmental sustainability
- h. To develop a global partnership for development

8.0 CONCLUSION

Environmental degradation implies a destabilizing interference in the ecosystem's equilibrium which having negatively affected human society. Environmental degradation in terms of land degradation, desertification, deforestation, greenhouse effect, global warming and ozone layer depletion has been a global phenomenon. The environmental degradation is basically due to the pressure of population growth and as a part of fulfillment of a development process, result in impoverishment of the people and growing incapability of the state. Like most developing countries, Bangladesh faces the whole spectrum of environmental problems. The effect of environmental degradation in Bangladesh is severe than the other countries of the world. Due to population explosion, per capita land holding has been steadily declining resulting growing poverty in Bangladesh. The air and noise pollution occurs from vehicular and industrial sources. Disposal of solid wastes is another serious problem. Chemical fertilizer, construction of polders and saline water are responsible for degrading rural environment. The rise of industries in the country has generally been unplanned without keeping the issue of environmental protection in careful consideration. Destruction of forest has seriously affected top soil and caused land erosion.

The environmental degradation has devastating consequences on a state's economy and above all survival of the people. The combined effect of environmental degradation on Bangladesh is multifarious. With the disappearing of forests rare wildlife and biological diversity have also been reduced rapidly and desertification is going on. The rapid growth of industries and unplanned urbanization has caused air, water and land pollution. Due of greenhouse effect, the climate of Bangladesh has been changed and natural disasters are taking place almost in every year. This ultimately leads to health hazards, agriculture and other collateral damage. Thus, economic development is seriously hampered by the environmental degradation. As a result, Bangladesh may be worst sufferer country than the other nations of the world.

Bangladesh has signed, ratified, and acceded to various international environmental conventions, treaties, and protocols as a result of its awareness of the potential environmental threat. The important ones, among these are mainly National Conservation Strategy, National Environment Management Plan, National Environment Policy, Industrial policy and Bangladesh Environment Conservation Act 1995. Besides different NGOs are working in promoting environmental development. But unfortunately, these programs could not be implemented due of lack of seriousness, resources, coordination, institutional training and serious commitment of the people. These laws are back dated and cannot cope of present requirement. The focal point is that general mass is unaware of the environmental degradation issue.

Environmental concern encompasses all sectors of the economy. A multidisciplinary approach is, therefore, needed for the formulation of policies and implementation of programs related to environmental issues. The basic solution to environmental management lies with rapid changes in human attitude, consciousness and awareness. Population control, planned industrialization, health care, disaster management program, pollution control and above all environmental impact assessment are few remedial measures.

9.0 RECOMMENDATIONS

The following recommendations are suggested to meet the environmental challenges:

- a. Environmental education program in national curriculum to be incorporated particularly at primary and secondary level. Besides, media should be fully utilized to create a mass people awareness to conserve environmental degradation.
- b. Government policy for the donors should incorporate environmental issue on their main development funding program.
- c. Bangladesh should continue to participate and encourage regional efforts at assessing climate change, its impacts as well as mitigation strategies.
- d. A concerted effort to increase public's perception and responsibility towards the environmental issue should receive top priority. Understanding of the inter-relationship between environment and population is a must.
- e. Bangladesh Government should update and modify all environmental policies to suit the present and future requirement and implement those to address its most pressing environmental problems.
- f. Bangladesh should seek for collaboration of developed countries in the provision of appropriate training and transfer technology relevant to the environmental pollution control.
- g. As a guide to effective sustainable development policies, research should be conducted on the connections between population, consumption and production, the environment, natural resources, and human health.

References

- [1] Legal Definitions of the Environment and of Environmental Damage by Marie-Louise Larsson and Zakaria Aissa Assia, University of Sidi-Bel-Abbes.Oct 2019.
- [2] Environmental Pollution Causes And Consequences: A Study by Dr. Ramamohana Reddy Appannagari at North Asian International Research Journal of Social Science & Humanities Aug 2017.
- [3] Environmental Degradation: Causes, Impacts and Mitigation by Dr. Mahendra Pratap Choudhary ,Rajasthan Technical University and Govind singh Chauhan Mewar University} February 2015 Conference: National Seminar on Recent Advancements in Protection of Environment and its Management Issues (NSRAPEM-2015).
- [4] An introduction to environmental degradation: Causes, consequence and mitigation by Pradip kumar Maurya Gurukula Kangri Vishwavidyalaya and Anwar Ahmad University of Nizwa on Jan 2020.
- [5] The implications of population growth and climate change on sustainable development in Bangladesh by Md Sanaul H Mondal .East West University (Bangladesh) on Sep 2018.
- [6] Studies on the Causes, Impacts and Mitigation Strategies of Landslide in Chittagong city, Bangladesh, M. T. Mia*, N. Sultana and A. Paul,Chittagong University on Journal of Environmental Science & Natural Resources, 8(2): 1-5, 2015.
- [7] Recent Concerns about the Environment in Bangladesh by Neville G. Gregory, Paritosh K. Biswas and Shafique H. Chowdhury on June 2010 at SAGE Journals.
- [8] <https://ejfoundation.org/reports/climate-displacement-in-bangladesh>.
- [9] http://ismail3322.blogspot.com/2012/03/ecological-imbalance-in-our-country_31.html.
- [10] <https://www.tonerbuzz.com/blog/deforestation-facts-and-statistics>.
- [11] Deteriorating forestry and the tale of Adivasis in Bangladesh: whom to blame? by Rakibul Hasan ,at Proceedings of 5th International Conference on Environmental Aspects of Bangladesh on 2014.
- [12] <https://www.theindependentbd.com/post/229385> by Sultan Mohammed Giasuddin on Dec 2019.
- [13] <https://www.dhakatribune.com/bangladesh/2021/05/24/major-cyclones-in-the-history-of-bangladesh> by on May 24th, 2021.
- [14] <https://water.org/our-impact/where-we-work/bangladesh>.

- [15] Revitalising Bangladesh's agriculture sector by Mohammed Parvez Imdad at The Daily Star on Feb 2021.
- [16] Role of Agriculture in Bangladesh Economy: Uncovering the Problems and Challenges by Md. Tahidur Rahman at International Journal of Business and Management Invention on July 2017.
- [17] <https://openjicareport.jica.go.jp/pdf/11785235.pdf>.
- [18] Riverbank Erosion Displacees In Bangladesh: Need For Institutional Response And Policy Intervention by MD Fakrul Islam, Ph.D, and A.N.M. Bazlur Rashid, Ph.D ,University of Rajshahi at Bangladesh Journal of Bioethics, 2011.
- [19] <https://www.dhakatribune.com/bangladesh/2020/10/21/death-toll-from-air-pollution-sees-alarming-rise-in-bangladesh> on October 21st, 2020.
- [20] Water pollution in Bangladesh and its impact on public health by Md. Khalid Hasan, Abrar Shahriar and Kudrat Ullah Jim on Heliyon. 2019 Aug.
- [21] http://bforest.portal.gov.bd/sites/default/files/files/bforest.portal.gov.bd/notices/c3379d22_ee62_4dec_9e29_75171074d885/4.%20Forest%20resources_NCS.pdf.
- [22] The economic contribution of fish and fish trade in Bangladesh by Md. Mostafa Shamsuzzaman, Mohammad Mojibul Hoque Mozumder, Sabrina Jannat Mitu, Abu Faisal Ahamad, and Md Sumon Bhyuian at Aquaculture and Fisheries Volume 5, Issue 4, July 2020.
- [23] Distribution of Crops and Cropping Patterns in Bangladesh by M Nasim , S M Shahidullah, A Saha , M A Muttaleb , T L Aditya , M A Ali and M S Kabir at Bangladesh Rice J. 21 (2) : 1-55, 2017).
- [24] Status of Land Degradation and Desertification in Bangladesh and the Role of Agro forestry in their Control, by M. Robiul Islam, Weijuan Zhang, Sishuai Mao, A. Egrinya Eneji and Yuegao Hu on journal of agriculture, biotechnology and ecology on 2010.
- [25] <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>, on 2014.
- [26] <https://earthobservatory.nasa.gov/features/GlobalWarming/page2.php>, published on Jun, 2010.
- [27] http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/6a40a397_6ef7_48a3_80b3_78b8d1223e3f/2021-06-30-04-37-90c4374ce2c14b93852ae7830f7ec3c1.pdf.
- [28] https://www.adrc.asia/countryreport/BGD/2020/BGD_CR2020.pdf on 2020.
- [29] <https://www.iucn.org/sites/dev/files/import/downloads/health.pdf>.
- [30] Public Health Problems in Bangladesh: Issues and challenges by Faisal Muhammad , Moniruddin Chowdhury , Mohd Arifuzzaman , ABM Alauddin Chowdhury. at South East Asia Journal Of Public Health on Apr 2017.
- [31] Desertification: Slow onset of an irreversible disaster by Md Sohrab Ali at The Daily Star on 2007.
- [32] <https://www.adb.org/sites/default/files/publication/28964/csb-ban.pdf>.
- [33] <https://www.iucn.org/asia/countries/bangladesh/national-conservation-strategy-ncs>.
- [34] Bangladesh: Journey towards achieving Sustainable Development Goals (SDGs) by Tapash Chandra Paul at The Financial Express on May 2019.
- [35] Environmental Problems of Bangladesh: A Review by Nishita Ivy, University of Chittagong, Bangladesh. Ulab Journal Of Science and Engineering Vol.7, No. 1, November 2016.