



Population and Environment in Bangladesh: Designing a Policy Accounting For Linkages

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INTRODUCTION

1. Bangladesh is facing several major environmental problems arising from population pressure. The problems are: land degradation, depletion of natural resources, degradation of soil conditions and fertility, natural disaster like floods, droughts, cyclones, storm surges, climatic changes and sea level rise. Now a day, the consequences of environmental hazards are also being felt increasingly in Bangladesh like other developing countries. The link between population growth and environment is complex and interdependent. Both population growth and environmental degradation are caused by many factors. Blaming population growth as the only cause of environmental degradation and vice versa is misleading. Population growth contributes to the depletion of natural resources and degrades environmental quality, which induces poverty and reduces human welfare.

2. The population has already grown to a size that poses a formidable difficulty for the policymakers to plan for a sustainable development. The population of Bangladesh may exceed the size of 200 millions during the next forty to fifty years due to population momentum. Another concern that has gained importance during the past two decades is associated with the environmental issues. It has been observed that environmental concerns need to be linked with the population and economic growth factors; otherwise the survival of the population will be at stake.

3. Rapid population growth in the face of finite environmental resources will have catastrophic effect on human well-being. More people mean more mouths to feed and more resources to be exploited which induces poverty. Increased population leads to resources scarcity. More people also mean the use of the same land continuously. So, land available for other uses declines. This phenomenon is observed in Bangladesh where an extremely high population is struggling to survive by using natural resources till its exhaustion.

4. This emphasizes the need for an integrated policy, which could control population growth and reduce poverty as well as lead to sustainable natural resource management. In Bangladesh both rapid population growth and degraded environment pose serious threats to the economic development. On the other hand, the environment is extremely vulnerable to damage and degradation as a result of many factors out of which outstripping local resources is a vital one. Though population control received high priority in the national policy packages, which brought success to some extent in reducing birth rate; but the environmental issues could not attract proper attention to the policy makers of Bangladesh till the recent past.

POPULATION GROWTH AND ENVIRONMENT

Population Growth Trends

5. Bangladesh is one of the most densely populated countries in the world having a population of about 140 million at present within a total surface area of 147,570 sq. km. The density of population is 860 per sq. km, which is one of the height in the world. The population structure is pyramidal where the under aged groups (below 15 years) occupy about 43% of the total population and the economically active population is only about 35% of the total population. As a result the dependency ratio among the people is also very high. At present the population of Bangladesh stands at 140 million and growth rate is 1.58 percent.

6. The future scenario of population in Bangladesh is shown to be slightly brighter though population will keep growing at a rate higher than expected and stable growth will still remain as a distant goal to be achieved. In the year 2020 Crude Birth Rate will be down to 18 per 1000 persons

from the present 22.4 per 1000 people, while Crude Death Rate will come down to 7.5 from 8.2 per 1000 persons. Total Fertility Rate per woman is projected to be 2.2 in 2020 compared to 3.0 in 2000. Life Expectancy will improve to 67.0 years from 60, 8 years at present.

7. Another feature of population growth trend is the increase of urban population faster than rural population, which could be linked to the increase of poverty and unemployment in the rural areas. The urban population accounted for 19.6 per cent of the total population. The ratio of urban and rural people will be 4:6 in 2020 from 2:8 at present. Such growth has negative impact on the urban environment and in turn, on the quality of life.

Environmental Concerns

8. The initial formulation of the linkage among population and environment was introduced by Ehrlich and Holdren in 1971 by the equation: $I = P \cdot F$, where I = environmental impact, P = population and F = per capita impact. Here, the term per capita impact is rather vague. This equation was modified at a later stage by Martine in 1995 as: $I = P \cdot A \cdot T$, where A = affluence and T = technology. In Bangladesh degraded environment is being manifested mainly in water and sanitation problem, soil erosion, air pollution, deforestation, wetland loss, biodiversity loss and degradation of the coastal environment. Following are the major environmental concerns in Bangladesh:

a. **Land Degradation.** The population density in Bangladesh is one of the highest in the world today. This implies a very low availability per capita of arable land. Almost all the arable lands in Bangladesh are under cultivation. Hence use of arable land has already reached its peak. The annual use of fertilizers appear to be higher (86 kg/ha) in Bangladesh than in any other South Asian country. Land use pattern shows that more than 50 per cent of the land is under crop production. About 20 per cent of the total land is used for homestead, cities and settlements, while 14.5 per cent of the land is under forestry. The rest of the land is used for industry, infrastructure and social needs. Limited land resources and the increasing demand for food led to the extensive use of chemical fertilizers and pesticides. Extensive and inappropriate use of these lands is degrading the quality of soil. The energy crisis in the rural areas, resulting in the burning of twigs and fallen leaves, which reduces the amount of organic matter in the soil, contributes to the removal of the fertile topsoil. In addition to declining soil fertility, water logging, salinization and lowering of water level are also adversely affecting the productivity of crops and livestock.

b. **Water Pollution.** Bangladesh is criss-crossed by over 250 rivers, which form a complex and ever changing delta as they are passing through the country in a north to south direction. All the rivers and streams constitute 24,000 cubic meters per second water flow. Due to the geographical location of Bangladesh, water management has become the key issue in Bangladesh's environment. The interaction zones of the 710 km long coastal areas, where fresh water from the interior and saline water from the sea meet together, have been facing major threat. In the urban slum areas only half of the households use tube well water for all purposes. In the subsequent paragraph water pollution is discussed in relation to the human activities:

(1) Industry and agriculture are the major sources of water pollution in Bangladesh. The major polluting industries are chemicals, textiles, pharmaceuticals, cement, electrical and electronic equipment, glass and ceramics, pulp and paper board, leather tanning, food processing and petroleum refining.

(2) In the south-west parts of Bangladesh, water logging is occurring as a result of flood control embankments, failure to repair damaged sluice gates, faulty constructions and badly designed drainage systems.

(3) The reduction of river flow due to siltation has been causing increase in salinity in the coastal areas. An area of 1.47 Mha of coastal and offshore areas has saline soils. Most of this saline area is in the Sunderban mangrove (0.62 Mha).

(4) A specially glaring example of the negative consequence of poor planning leading to environmental damage on the people is evident from the history of shrimp farming in Bangladesh. In Bangladesh shrimp farming covers more than 300,000 acres of land of which 80 percent is in Khulna, Satkhira and Bagerhat. The rest is in Chittagong, Barisal, Patuakhali, Jessore and Noakhali districts. Shrimp cultivation has a number of environmental problems including salinity in water.

c. **Air Pollution.** Air includes factors such as winds, humidity, temperature, and change in composition. All these factors are associated with health conditions of population as well. Consumption of energy at an increasing rate by the industry and transport sector pollutes the environment through deteriorating the air quality. The details of air pollution are discussed below:

(1) Air pollution in Bangladesh is significant, especially in Dhaka city. It is far above the international as well as national standard. The concentration of suspended particulate matter (SPM) in Dhaka city is much higher than the acceptable level set by

the World Health Organisation. For example, the SPM concentration at three points in Dhaka city was 570 micrograms per cubic meter in 1992 compared to 75 micrograms per cubic meter of the WHO standard and 400 micrograms per cubic meter of the Bangladesh Department of Environment (DOE) standard.

(2) Vehicular and industrial emissions are the main sources of urban outdoor air pollution in Bangladesh. Vehicular exhausts appear to be a major contributor to SPM levels.

(3) Indoor air pollution is also affecting the health and environment, especially in the rural areas. In Bangladesh about 70 per cent of total energy is provided by the traditional sources, such as agricultural residue, fuel wood and animal dung.

d. **Deforestation.** Forest is an important element of national economy. It contributes 4 per cent to the GDP and nearly 2 per cent to the employment sector. During the last decade, the rate of annual deforestation was between 3 to 4 per cent in Bangladesh, which was much higher than the South Asian average of 0.8 per cent. In many parts of the country deforestation is taking place fast and half of the country does not have any public forest. The Sal Forests, near Tangail district, forest cover is reduced from 1000 hectares in 1970 to about 500 hectares in 1990. In less than 35 years, the volume of commercial species, Sundari and Gewa has declined by 40 and 45 per cent respectively due to increase in the salinity of water resulting from reduced flow from the Ganges and due to deforestation.

e. **Biodiversity Loss.** Most of the environmental problems discussed above such as water pollution, salinization, deforestation and over fishing are threatening the biological diversity. The Royal Bengal Tiger, Gangetic Dolphin, elephant, leopard and White Wined Duck face the danger of extinction. The loss of biodiversity is related to activities like clearing and burning forests, conversion of natural ecosystems for agriculture, desertification of natural grasslands, reclamation of wetlands and illegal harvesting of animal and plants.

INTERACTION BETWEEN POPULATION AND ENVIRONMENT

9. **Theoretical Views on Population-Environment Relationship.** Rapid population growth in the face of finite environmental resources will have catastrophic effect on human well being. This view has been supported by the proponents of sustainable development. The theoretical literature of sustainable development tends to suggest that rapid population growth will seriously impair the chances of truly sustainable development. Deforestation and lack of drinking water can increase the time cost of fuel wood gathering, livestock pasturing and water logging. Children can perform these activities and make themselves valuable to their parents. The linkage among population-poverty-environment can be expressed as follows:

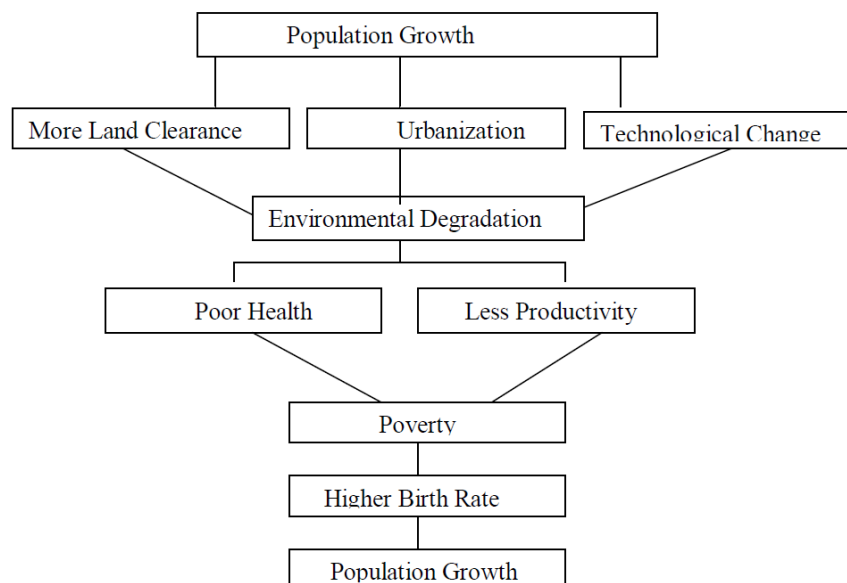


Figure 1: Population, Poverty and Environmental Degradation: Linkages

A very simple interaction between population and environment is that high growth of population may lead to over-consumption of natural resources and degradation of ecosystem and environmental potentials but this relationship could be further aggravated by a number of other social factors. The theoretical views can be explained through Positive and Negative Externality:

a. **Positive Externality.** The view here is that population is not necessarily a cause of environmental degradation and increased population means a spur to technological change. The exponent of this view Ester Boserup suggests that land extensification ceases as good land is exhausted, or as other factors prevent further development of new lands. Then intensification occurs. In fact, the evidence is that intensification occurs before this point of exhaustion and the two often run in parallel. A study of 23 Latin American countries in the 1980s found that agricultural area expansion was positively related to population growth.

b. **Negative Externality.** Population growth and environmental degradation (as well as economic development as a whole) are linked negatively in the following ways:

(1) Population growth was thought to lower the ratio of capital to labour and hence lower the marginal product of labour, thus lowering the wages. To keep pace capital must be widened and this may have deleterious effect elsewhere, for example, reducing funds available for infrastructure.

(2) **Burden Of Dependency.** It is argued that rapid population leads to a higher proportion of young people dependent on the older working population. The latter have to divert resources to services such as care, food, housing and education.

(3) **Household Effect.** Within families more children means spreading limited family resources widely but thinly. Then nutrition suffers. More children affect the ill health of mothers through rapid child bearing. In general, both parental and child well-being are thought to suffer in large families.

(4) **Natural Resource.** This can be discussed by resource type in the following ways:

(a) **Land and Food.** It is widely argued that until the Second World War, food output increases were mainly by extensification. Since then they have been secured by intensification.

(b) **Fuel wood and Water.** Population growth has simply to imply demand levels that increase faster than the regenerative capacity of trees and water for a simultaneous ecological and economic crisis to emerge. The major effect of population on water is via food demand and hence irrigation.

10. **Empirical Evidence of Resource Scarcity and Environmental Degradation.** Though it is difficult to measure the extent of the effect of population growth on the environment, but it is not difficult to understand that in Bangladesh, population growth affects the availability of natural resources such as land, forests, fisheries and natural gas. Following sub-paragraph will discuss the impact of population growth on the environment and vice versa, and present some monetary estimates of environmental degradation in Bangladesh from the existing literature.

a. **Population And Resource Scarcity.** Increased population leads to resources scarcity. More people mean the use of the same land continuously. This can be explained in the following ways:

(1) To start with the renewable resources, forest and fisheries are the major resources being exploited extensively by the people. Conversion of forest land into agricultural land and for infrastructure development for a bigger population are the important factors for deforestation.

(2) Exploitation of fish resources has also increased to a large extent. Fish production has been increasing constantly. In 1997 total production of fish was 1492 thousand metric tones compared to 827 thousand metric tones in 1987. Though a renewable resource, unlimited exploitation can reduce the future yield and cause extinction of the resource.

(3) Non-renewable resources such as natural gas face the risk of being exhausted fast due to population growth. Though Bangladesh has a large reserve of natural gas, the supply cannot be ensured beyond a certain point of time.

b. **Population and Pollution.** As discussed before, pollution level is very high in Bangladesh, which is mainly due to population growth. The effect of environmental degradation is felt through damage of health and losses in production and amenities. Environmental degradation reduces society's welfare through ill health and premature mortality.

(1) **Health Effect.** In Bangladesh people face serious health risks from water and air pollution. Respiratory diseases, asthma attacks, bronchitis and lung cancer are among the morbidity effects of increased particulate concentration in the cities. Estimates show that the costs of avoided health damage from Dhaka city's outdoor particulate air pollution are in the range of Tk. 12.8 to Tk 171.8 billion accounting for 2.5 to 33.4 per cent of the national GDP in 1990.

(2) **Productivity Effect.** Environmental degradation reduces the productivity of many resources used directly by

people resulting in perpetuation of impoverishment. Industrial water pollution, municipal sewerage, agricultural chemicals and degradation of wetlands damage fisheries. Water logging and salinisation of soil due to shrimp cultivation and excessive ground water withdrawal for irrigation lower crop yields.

HOW MANY PEOPLE ARE SUSTAINABLE IN BANGLADESH

11. **Conceptual and Methodological Issues.** It is quite understandable that there are too many people for too little resource, and the present population growth is not sustainable for Bangladesh. Vigorous efforts and measures are needed to control the population growth and to bring it down to an expected level. The limits of population growth must be in accordance with the carrying capacity of natural resources. Carrying capacity is usually related to a specific resource and is defined as its ability to support consumption to specified limits. In simple words, the carrying capacity of a given area is the maximum number of people that can be sustained by the resources on that land. The application of carrying capacity concept to human is difficult because of the following reasons:

- a. Per capita natural resource consumption by human varies quite often.
- b. People can control, to some extent, the natural resources on which they depend.
- c. They can also expand carrying capacity through technological innovation and trade.
- d. Conversely, they can diminish carrying capacity through environmental mismanagement, usually caused by rapid population growth.

12. **Population-Carrying Capacity in Bangladesh.** The FAO has estimated the carrying capacity of 117 countries for the year 1975 and 2000 in terms of potential production of food at three levels of technologies. Low-level input refers to the use of no fertilisers, pesticides or improved seeds. Intermediate input is the use of some fertilisers, pesticides and improved seeds, conservation measures and improved cropping patterns on half the land. The details are discussed in the following sub-paragraph:

- a. If all cultivable land is devoted to food crops, Bangladesh will be able to support only 79 percent and 97 percent of its expected year 2000 population (153.3 million as projected by the UN) with low and intermediate level input respectively. However, as technological assumptions improve the carrying capacity improves too. So with high input, Bangladesh would be able to feed 21 percent more than its expected year 2000 population.
- b. The exploitation of fuel wood is uncontrolled. The country has only 2156 thousand hectares of forest, which is only 14.5 per cent of the total land area of the country. Fuel wood is being cut without equivalent replacement, the result of which is the fast destruction leading to fuel wood crisis. Per capita availability of forest area is only 0.016 hectare. The carrying capacity based on fuel wood from the natural forest cover is done in the following way. The natural forest cover is 769 thousand hectares.

CONCLUSION

13. The environmental perspective of the population and the population perspective of the environmental problems are not adequately reflected in the related policies of the country. The national five year plans assign great importance to the population issue and spell out various measures to control the growth through effective family planning and ensure better health services. However, environmental aspect is not included as a strategy to solve the population problem. The aims and objectives of the national population policy do not include improvement of the environmental situation as one of its objectives to ensure a better life for the people. It has been rightly said that increased population will increase the population density and reduce the land-man ratio as well as food supply. This will aggravate the poverty situation and a large number urban population will either be floating or have to live in the slums. On the other hand, environmental issues did not receive as much importance as the population issues.

14. Environmental crises are the consequences of inauspicious effect of interaction between man and environment. For a disaster-prone country like Bangladesh, economic development can not be achieved at the expense of the environmental protection. The present rate of population growth and the resource utilisation practice are not sustainable and they pose threat to the existence of both human and non-human inhabitants of the country. The primary objective is therefore to control population growth and maintain it at a sustainable level, and to ensure long-term maintenance of the livelihood

of these people through sustainable management of the natural resources. Thus the importance of the population and environmental problems and linkages between them put the challenge to the policy makers to formulate policies arresting both the problems simultaneously.

15. A very simple interaction between population and environment is that high growth of population may lead to over-consumption of natural resources and degradation of ecosystem and environmental potentials. An environmental perspective of population and health issues reinforces the emphasis on developing human capital through education, family planning and public health programmes. Rapid population growth undoubtedly depletes resources and threatens sustainable development but it is often accompanied by misdirected policy measures or other factors. So the solution lies not only with the reduction of population growth but also correcting policies. In the long-run solution to the population as well as environmental problems depends on the macroeconomic policies, which will promote stable and broad based income growth for larger section of the population who have to depend on the extraction of the natural resources for their livelihood. This will help alleviate poverty as well.

RECOMMENDATIONS

16. To save the environment from impact of over population following steps may be taken:
- a. A concentrated effort to increase the public's perception and responsibility towards the effects of each individual's actions on the environment should receive top priority.
 - b. Strengthening national population policy and family planning programme through integration of health and family programme by administrative re-organization to better community environment.
 - c. Education should be ensured at all levels to control the population growth and protect the environment.
 - d. A rigorous effort should be given to understand the inter-relationship between environment and population.
 - e. Equal distribution of resources, as far as possible, should be made among all the population
 - f. General people should be made aware of poverty, limited resources availability and consequences of environmental degradation.
 - g. Peoples participation should be ensured in the protection of the forests together with its economic exploitation.
 - h. Participation of NGO's in family planning and environmental protection may be encouraged.