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ECONOMIC GROWTH AND ENVIRONMENTAL IMPROVEMENT: PROSPECTS FOR BANGLADESH[*]

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ABSTRACT

Bangladesh has experienced rising GDP and rising per capita incomes now for at least three decades. This article considers whether its continuing economic growth is likely to solve its environmental problems. In doing so, it critically considers the application to Bangladesh of Environmental Kuznets Curve relationships and applies other macro-methods of assessing the relationship between economic growth and the environment to Bangladesh's situation. The consequences of Bangladesh's economic reforms for the economic welfare of Bangladeshis and the state of Bangladesh's environment are also examined. Particular attention is given to environmental change in agriculture in the light of Bangladesh' economic growth, reforms and proposed growth strategy. Doubts are expressed about the environmental benefits claimed by the Bangladeshi Government for its agricultural development strategy. Indeed, it may exacerbate many existing environmental problems, such as depletion of soil fertility and water supplies, already present.

[*] This is a revised version of a paper presented at the conference "Bangladesh in the New Millennium" held at the University of Queensland in 2002. I wish to thank the conference for their comments on the original paper.

ECONOMIC GROWTH AND ENVIRONMENTAL IMPROVEMENT: PROSPECTS FOR BANGLADESH

INTRODUCTION

For more than a quarter of a century Bangladesh has experienced growth in its GDP usually in the range of 4-5 per cent per annum. At the same time, its rate of population growth has on the whole been less than half of its rate of growth of GDP. Consequently, its real per capita income has risen substantially. In addition, its rate of population growth has declined and continues to do so. Thus, despite earlier Malthusian fears, Bangladesh appears to be escaping from its low level of economic development and possibly, from its predominance of poverty. Nevertheless, its per capita level of income is still lower than in South Asia on average, and below the low-income country average (Government of Bangladesh 2001, p. 1) by almost 20 per cent in the former case and by 10 per cent in the latter case.

The economic experience of Bangladesh raises many questions. These include the following: Why has Bangladesh been able to achieve its level of economic growth over such a long period given the substantial resource handicaps that it experiences? To what extent can its success be attributed to trade and investment liberalisation and to its economic reforms generally? What are the prospects for Bangladesh's economic growth continuing? Has the state of the environment in Bangladesh been improved by its economic growth? What changes in Bangladesh's environment can be expected in the future given Bangladesh's (proposed) development path? Will these changes retard or enhance Bangladesh's prospects for sustaining its economic growth? While definitive answers to these questions cannot be given in this short essay, some relevant points are raised which may help in answering them.

This paper is developed by first briefly outlining relevant economic theories about the relationship between economic growth and the state of the environment and mentioning their possible relevance in the Bangladeshi context. This is followed by an outline of economic change in Bangladesh and the possible role of Bangladesh economic reforms in promoting its economic growth and in enhancing the state of its environment. Major issues and trends in sustaining the productivity and value of Bangladesh's natural resources, such as its water and soils are considered, in the light of its economic policies and proposed development path.

Environmental issues focused on agriculture illustrate major difficulties facing Bangladesh. Concluding comments follow the examination of these issues.

II. THEORIES ABOUT THE RELATIONSHIP BETWEEN ECONOMIC GROWTH, THE STATE OF THE ENVIRONMENT AND SUSTAINABILITY

Most mainstream economists seem relatively confident that sustained economic growth is the main pathway for achieving environmental improvement. This suggests that if Bangladesh continues to experience economic growth and rising income per capita, the state of its environment will eventually improve. Although the state of its environment might actually worsen at first with increasing per capita incomes, the expectation is that an eventual improvement will occur. This 'conventional wisdom' is summarised by the Environmental Kuznets Curve (EKC). This curve indicates that pollution intensities bear a reversed-U relationship to the level of per capita income in a country. Such a relationship is illustrated by curve *ABCD* in Figure 1.

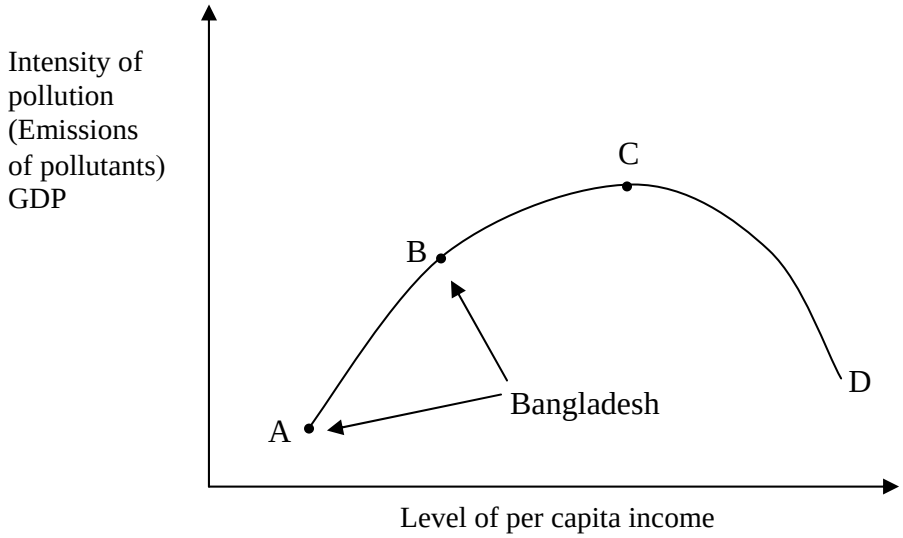

FIGURE I: Typical environmental kuznets curve (EKC)

Although the EKC has been subject to much criticism (see for example, Tisdell 2001, pp. 186-187), it is influential policy-wise and has, for example, found favour with the World Bank (1992). To the extent that an EKC applies to Bangladesh, Bangladesh is likely to be on the left branch of its EKC, and probably during its economic growth in recent decades, has moved from a situation corresponding to A to one corresponding to B. Thus, this curve would suggest that the intensity of pollution in Bangladesh has risen in recent decades. Given the type of EKC in Figure 1, Bangladesh's income per capita will have to increase much further

before its pollution intensity declines. Bangladesh's environmental problems are likely to become worse before they improve.

While Bangladesh's environment probably has deteriorated on the whole as it has experienced economic growth, life expectancy of Bangladeshis at birth has increased significantly and the burden of ill-health has declined. Thus greater availability of economic goods appears to have more than compensated for declining environmental quality in Bangladesh. This does not, however, suggest that the result is ideal. With better policies, it may have been possible to have had just as much growth in per capita income with less environmental deterioration.

The discussion of Figure 1 assumes that Bangladesh's macro-EKC did not shift in recent decades. However, it is possible that it shifted downward as economic growth and reforms occurred. Proponents of the structural adjustment policies involving a small government sector and maximum use of markets claim that such economic reforms are environmentally beneficial on the whole. Therefore, the EKC, before reform is likely to be higher than the EKC after reform (cf. Zylicz 1994). Beginning in the early 1980s, Bangladesh began liberalising its international trade and foreign direct investment and adopting market reforms, a process that has continued to the present (2002). Therefore, given the above view, Bangladesh's macro-EKC prior to its economic reforms might have been as indicated by *ABCD*, but after its reform, a curve like that indicated by *EFGH* could apply.

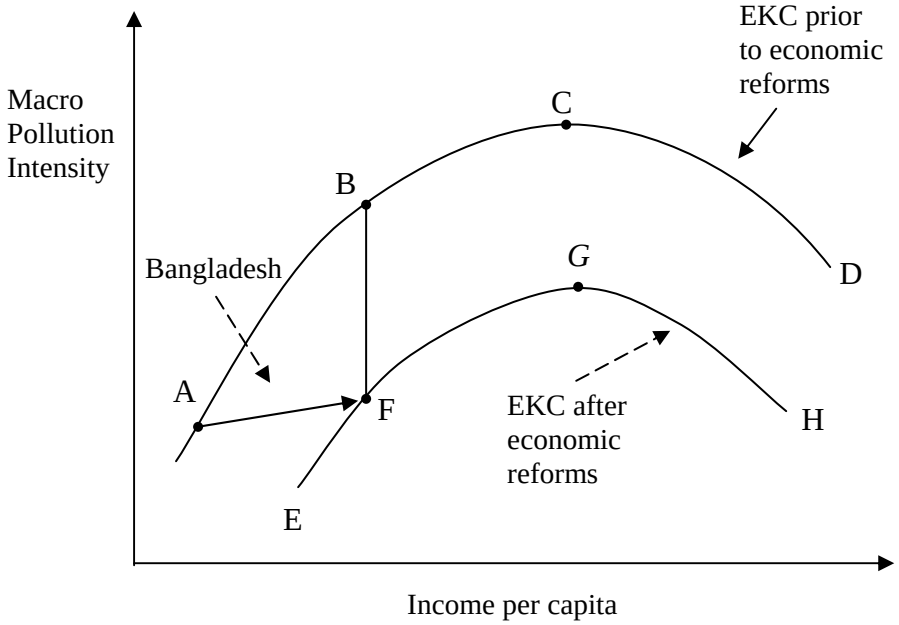

Figure 2 Economic reforms can lower the EKC

Consequently, according to this viewpoint, economic reforms moderate the amount of environmental pollution experienced for the same amount of economic growth. Figure 2 also suggests that as a result of economic reforms, pollution intensities do not reach as high a level as without reform. Furthermore, assuming that economic reforms bring faster growth, they hasten the time when environmental pollution intensities will start to decline. This, therefore, presents a very favourable picture of the impacts of economic liberalisation on the environment. However, it may be too favourable.

The type of analysis involved uses comparative statics and does not consider the path of environmental adjustment. In Figure 2, for instance, if the economy begins at point A as economic liberalisation occurs, the environmental pollution path may initially rise above curve *ABCD* and stay above it for some time before converging towards curve *EFGH*. This could, for example, happen if with market reforms less control of unfavourable spillovers occurs thereby encouraging environmental pollution or degradation. It could also happen if liberalisation of trade results in the relative expansion of 'dirty' industries, for instance because the country has a comparative advantage in production by industries having a high pollution intensity. Also, if the country has lax environmental regulations, foreign investors may be inclined to relocate 'dirty' manufacturing plants or polluting types of production there that are banned in other countries because of their pollution consequences.

Furthermore, macro-environmental modelling has the limitation that it only considers the aggregate picture. While the environment may appear to improve in aggregate, this can conceal important elements of environmental deterioration.

Of course, EKC-analysis is only one macro-method of considering the relationship between economic growth and the environment and it fails to account for irreversible degradation or loss of environmental resources. It is just a flow model. A macro-model suggested by Daily and Ehrlich (1992) comes closer to capturing environmental asset deterioration but also does not fully model environmental consequences of socioeconomic change. Daily and Ehrlich (1992) suggest, for example, that environmental degradation, D, in a country is likely to be an increasing function of the population level of a country, P, its per capita level of income, y, and the extent to which its technology is environmentally degrading, T.

Thus,

$$D = f(P, y, T), \text{ where } \frac{\partial D}{\partial P} > 0, \frac{\partial D}{\partial y} > 0 \text{ and } \frac{\partial D}{\partial T} > 0 .$$

If this view is correct, growth in per capita income can only lead to a reduction in environmental degradation if it is associated with a falling level of population or the adoption of technology that is environmentally more friendly. Since both population levels and per capita incomes have risen in Bangladesh, its economic growth in recent decades would have been achieved (according to the above model of Daily and Ehrlich) at the expense of environmental degradation because, on the whole, there is no evidence to suggest that recent technologies used in Bangladesh are much more environmentally friendly than those used previously. Indeed, much evidence in relation to agriculture suggests that, if anything, its environmental technologies have become environmentally less benign.

However, it could be argued that Bangladesh's current situation is a prelude to better things to come. There are prospects that Bangladesh's population will stabilize in the near future. Furthermore, as incomes of Bangladeshis increase, and the economic costs of its environmental neglect become more apparent, environmental regulation is likely to be strengthened by Bangladesh and environmentally more favourable techniques of production and consumption may be adopted.

The economic growth strategy of Bangladesh has relied on the conventional path of encouraging capital accumulation and imposing weak conditions on the transformation of natural resources and environmental assets into man-made capital and marketed commodities. As the average level of its per capita income increases, Bangladesh may increasingly switch from its imposition of weak conditions on natural resource conversion and utilisation to stronger conditions (cf. Tisdell 1999a). Such a switch may be necessary to sustain Bangladesh's long-term economic growth.

Nevertheless, given irreversibilities in the use of many natural and environmental resources, excessive depletion of these in the period in which weak conditions are applied could endanger Bangladesh's prospects of future economic growth of income and could even result in its unsustainable development. While natural/environmental resource depletions may have been (and could still be) necessary for Bangladesh to escape from its state of economic backwardness, unless such depletions are managed carefully and the economic gains from

these are wisely used, Bangladesh's economic and environmental opportunities could be unnecessarily squandered.

III. ECONOMIC CHANGE AND ECONOMIC REFORMS IN BANGLADESH TOGETHER WITH SOME FURTHER ENVIRONMENTAL OBSERVATIONS

Since 1973, Bangladesh has maintained a growth rate of GDP broadly in the range of 4-5 per cent (cf. Shand and Alauddin 1997, p. 5; Government of Bangladesh 2001, p. 2) but this growth rate on average was slightly in excess of 5 per cent in the second half of the 1990s (Government of Bangladesh 2001, p. 5).

The extent to which this record of economic growth can be attributed to Bangladesh's economic reforms is debatable. One thing, however, is clear. Bangladesh's recent phase of economic growth did not begin with its economic reforms. In fact, Bangladesh's economic growth rate declined after it started its economic reforms. These reforms began in the early 1980s and have progressed steadily, if somewhat slowly, for two decades (Yunus Ali 1999). Bangladesh's economic growth in the period 1973-80 averaged 4.9 per cent per annum according to Shand and Alauddin (1997) but was on average slower in the 1980s and early 1990s, the reform period, even though it was still in excess of 4 per cent on average.

Bangladesh's economic growth in the 1970s and into the early 1980s was largely attributable to the Green Revolution (Alauddin and Tisdell 1991). Total factor productivity in Bangladesh agriculture rose rapidly in the Green Revolution phase (1968-81) and declined significantly as Bangladesh began its economic reforms (Alauddin and Hossain 2001, p. 53). This decline continued from 1981 to 1990 with little recovery apparent until the second half of the 1990s. After 1981, most of Bangladesh's economic growth was accounted for by its non-agricultural sector (mostly manufacturing) until the mid-1990s. Then in the second half of the 1990s, the growth rate of its agricultural sector recovered to compensate for a decline in its rate of manufacturing growth and growth in Bangladesh's GDP accelerated to over 5 per cent.

Although Bangladesh's economic reforms were not the initial source of its economic growth in the last three decades of the 20th century, it is possible (but not certain) that they played a significant role in sustaining this growth rate once agriculture's contribution to economic growth began to falter in the early 1980s.

In common with many other South Asian countries, Bangladesh concentrated initially in its economic reforms on increased fiscal and monetary discipline and on international trade reforms (liberalisation of international trade and currency exchange) and encouragement of foreign private investment. Price reforms were undertaken more slowly. While some privatisation of government-owned financial institutions and industrial enterprises occurred, this process was especially slow and the Government of Bangladesh still has a large number of government-owned enterprises and is still burdened by their losses (Government of Bangladesh 2001). In practice, Bangladesh's policy reforms were initially macroeconomic in nature. Its microeconomic structural reforms lagged and have been partial (cf. Hossain and Chowdhury 1998, p. 71). Nevertheless, by the end of the 1990s substantial microeconomic reform had been achieved. For instance, The Government of Bangladesh (2001, p. 11) reports that: "Under donor persuasion and the dictates of Structural Adjustment Program, Bangladesh has brought down its level of public support to agriculture to an absolute minimum. Recent estimates of the Aggregate Measure of Support (AMS) to agriculture put this at around 1 percent of agricultural output although the permissible level of such support under the Agreement on Agriculture of the WTO is 10 percent". Subsidies on inputs such as chemical fertiliser and pesticides, for example, were effectively removed. These agricultural inputs often generate adverse environmental spillovers and their use has adverse consequences for the long-term sustainability of agricultural production. At the same time, the government has taken little or no direct action to manage or control adverse environmental spillovers from agricultural practices.

Furthermore, tariff reform was accelerated in the 1990s. As a result of such efforts, the average nominal rate of protection fell from 89 percent in 1990-91 to 25 percent in 1995-96. The government has also pressed ahead with foreign exchange convertibility and has been active in adopting measure to encourage foreign direct investment.

However, the level of foreign private direct investment has been disappointing. Furthermore, trade liberalisation has been accompanied by reduced diversification of Bangladesh's exports both by commodities and destinations. In addition, its foreign exchange reserves are under pressure. While Bangladesh has generous provisions for repatriation of profits from foreign direct investment, there is concern that its dwindling foreign reserves might constrain the scope for such repatriation. It seems that international economic liberalisation has not yet

brought Bangladesh the secure high level of economic growth that many of its supporters had hoped for.

Bangladesh's economic growth has been accompanied by a disappointingly small reduction in its incidence of poverty. Its incidence of poverty for the mid-1990s was reported to be around 40 per cent (World Bank, 1996). Bhattacharya and Rahman (2001, p. 13) point out: "Poverty situation in Bangladesh, both relative and absolute, did not register any marked improvement in the 1990s. Although there was some improvement in the urban poverty situation, Bangladesh entered the new millennium with one of the largest segments of world's population under the poverty line. Rural poverty situation remained dismal with the number of people living below the poverty line declining at a rate of only one per cent per annum over the 1990s: about 51 per cent of the rural population still live below the poverty line." Furthermore, as economic growth and liberalisation have taken place, economic inequality has risen in Bangladesh both in terms of income inequality and differences in economic opportunity. However, in an economic world that is becoming increasingly integrated, Bangladesh probably has little option but to go with the predominant trend in favour of economic globalisation.

IV. PARTICULAR ENVIRONMENTAL CHANGES IN AGRICULTURE IN THE LIGHT OF BANGLADESH'S ECONOMIC REFORMS AND ITS AGRICULTURAL GROWTH STRATEGY

The geographic circumstances of Bangladesh are, as outlined by Metcalfe (2003), such as to create inherent long-term environmental problems for it. It is environmentally vulnerable. As a result of its economic growth, Bangladesh's natural environment and resources are being altered in varied ways but to a large extent, adversely (cf. Government of Bangladesh 2001, p. 15). Overall, it seems that Bangladesh is procuring its current economic growth at significant environmental cost involving depletion and degradation of its natural resources, as was mentioned above. Some of the features of the loss will now be outlined concentrating on its rural environment.

Green revolution agricultural practices tend to deplete soil fertility. It is well known that such practices involve a package of pesticides, chemical fertilisers and water. Even in the absence of subsidies, farmers become locked into the use of this package (Tisdell, 1999b). The package has three undesirable consequences: (a) it encourages monocultures, (b) it has

undesirable resource spillovers – it may result in excessive water demands and contaminate waterways so for instance, adversely affecting fishery production and even human health, for example, via arsenic intake and nitrate loads in water – and (c) it depletes soil fertility because the off-take of soil nutrients contained in crops harvested usually exceeds the amounts of nutrients added in fertilizers, and there are other adverse long-term consequences for the soil, such as acidification. Thus to some extent, mining of the soil takes place. While there can be an economic justification for this, it does jeopardise long-run agricultural productivity.

One of the main ways in which green revolution technologies add to agricultural production is by allowing the number of crops grown on the same plot of land in a year to be increased, that is, by increasing cropping intensity. However, this increased intensity is usually at the expense of soil fertility and yields per crop are liable to show a long-term downward trend unless offsetting changes such as new technologies, for instance involving use of superior seeds, can be introduced.

Bangladesh's rural production is at present very centred on rice. A long-term of strategy the Government of Bangladesh (2001, p. 26) is to diversify the rural economy in the period 2001-2010. "Given that more than 75 percent of the population resides in rural areas and a significant proportion of them live below the poverty line, diversification of the rural economy, focusing on development of agriculture, fishery, livestock, rural industry and other non-farm activities through improvements of rural infrastructure, provision of finance and extension service will be important components of the poverty alleviation strategy", according to the Government of Bangladesh (2001, p. 26).

It is pertinent to note two matters in this regard. First, the highest occurrence and incidence of poverty is in rural not urban Bangladesh (Tisdell and Alauddin, 2003; Islam, 2003). Therefore, the government's targeting seems to be appropriate. Secondly, the role of roads is stressed by the Government. In fact, the Government of Bangladesh attributed much of the recent increased production of agriculture to its investment in improved rural infrastructure during the 1990s. It plans to continue this policy. In fact, it has portrayed improvements in rural roads, market facilities and access as an economic success story (Government of Bangladesh 2001, p. 22).

The Government plans to encourage agricultural diversification. Nevertheless, its three-pronged strategy for agricultural development in the period 2001-2010 does raise some continuing environmental concerns. The Government of Bangladesh (2001, p. 35) states: "Given the experience of agricultural development in the past, the broad strategy of agricultural development over the next decade will have to be diversification of the sector. This, in turn, would necessitate actions along three lines. First, attempts must be made to intensify crop production so as to release resources for other non-crop production. Second, Bangladesh has a comparative advantage in a number of high valued crops and attempts need to be made to diversify agriculture into such competitive products. Third, development of non-crop agriculture also needs to be pursued simultaneously."

This pattern of agricultural development will diversify agricultural production in Bangladesh. As per capita incomes in Bangladesh rise, one could expect a growing demand for greater diversity of food and for more livestock products. So it seems that the Government intends to reinforce or support this 'natural' trend. However, the extent to which such trends will be environmentally beneficial is less clear. Furthermore, it may also be a trend which results in agriculture diversifying to more fully meet the demands of richer urban consumers e.g. for livestock products. This could 'crowd out' products demanded by the urban poor, so disadvantaging them. This type of rural development could also result in the rural labourers experiencing similar crowding out in access to some food supplies. Rising income inequality in Bangladesh could result in the poor being increasingly deprived of food, especially protein-rich food. Many of the poor already suffer from protein deficiency, and there has actually been a slight decline in per capita daily protein intake in Bangladesh since 1985-86 (BBS 1998, 2001; Alam and Janssen 2002).

A part of the Government's plan is to encourage a reduction in the amount of land used for rice production but to utilize remaining rice land more intensively so as to release some land now used for rice for other agricultural purposes. This could, however, accelerate the depletion of soil fertility of land that continues to be used for rice. Alternative crops to rice can also reduce the fertility of soils. Furthermore, greater livestock production is to be encouraged. The impact of increased livestock production on the environment depends on the production method used and policies for disposal of animal waste. To maintain agricultural productivity, it is important to give greater attention to mixed agricultural systems and appropriate rotation of land use. Present economic development trends favour the growth of

commercialised specialist farming heavily reliant on marketed inputs and sales. Considerable doubts have been raised about the long-term ecological sustainability of such systems (Conway 1987; Tisdell 1999). While a strategy of improving access of agricultural products to markets and commercialising agriculture can have immediate economic advantages, its long-term ecological and environmental advantages are doubtful. This is particularly so when there is a failure to take adequate account of environmental spillovers.

Governments in some developing countries have, in their haste to liberalise their economies, dismantled institutional structures that could have assisted them in managing natural resource spillovers. For example, the deregulation of shallow tubewells in the mid-1980s in Bangladesh seems to be an example. Sobhan (1997, pp. 455-456) reports: "The growth in the area under irrigation has been explosive since the mid-eighties when siting, imports and prices of shallow tubewells, were deregulated and their procurement as well as distribution was privatised. This permitted for proliferation of tubewells amongst the farmers". It seems that this has reduced the availability of water to users of surface water and possibly its availability to those with deep tubewells. In any case, open access does nothing to address the problem of falling watertables and fails to promote economically optimal use of water given that, to a large extent, water resources are shared resources. Uncontrolled private access to available water can result in less agricultural production than attainable with better allocation of this water between farmers. It may also result in agricultural production that cannot be sustained due to depletion of underground water reserves. Furthermore, the greater the demand for agricultural products and growth in agricultural production, the more pronounced these problems are likely to become.

5. Concluding Comments

Bangladesh has sustained economic growth for several decades and has experienced a significant increase in its real level of per capita income on average. However, it seems that this has been obtained at the expense of its natural resource-base and has been associated with a deteriorating natural environment. There are few signs that this situation will change in the foreseeable future. Yet improved availability of human necessities, such as food, has resulted in a significant increase in life expectancy of Bangladeshis at birth. In addition, the rate of increase in Bangladesh's population has declined steeply, and it is possible that Bangladesh may achieve zero population early in this century. While this demographic change could be environmentally favourable, by itself it does not ensure environmental

improvement. Most Bangladeshis are likely to want higher levels of income and material consumption for some time to come. However, unless more is done to protect Bangladesh's natural resource-base and its environment, Bangladesh's economic growth may be short lived. Economic growth alone will not solve Bangladesh's environmental problems. In fact, given present economic policies, they could well become worse. In order to achieve sustainable economic development, it is imperative for Bangladesh to give greater attention policy-wise to sustaining its natural resource-base and limiting environmental deterioration. While its environmental standards at its stage of development could justifiably be lower than in higher income countries, it can ill afford to ignore such standards completely or just pay lip service to these.

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