

*Aminur Rahman*

## **ENVIRONMENTAL ECONOMICS : VALUATION AND GREEN ACCOUNTING IN THE CONTEXT OF BANGLADESH**

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### **1. Background**

It is no exaggeration that pursuit of economic growth bypassed environment for a long time although environment and economy are closely interlinked. The degradation to environment ultimately lowers the speed of economic growth. Since degradation exerts costs to economy, its accountability is a prerequisite for any proper assessment of growth. Traditional national accounting practices simply fail to take into account many aspects of the economy and until now, there has been little serious attempt at capturing the impact caused to environment by economic activities into the national accounts.

Environmental accounting takes the primary role of introducing the environmental impact in the form of costs and benefits in national accounts. The concept is new to many and its practice at the national level needs concerted efforts by raising interest and awareness among the broad population groups and institutions for the integration of environmental economics in general, and valuation and environmental accounting, into policy-making processes, in

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particular in Bangladesh. This overview is possibly among the first few attempts in this direction.

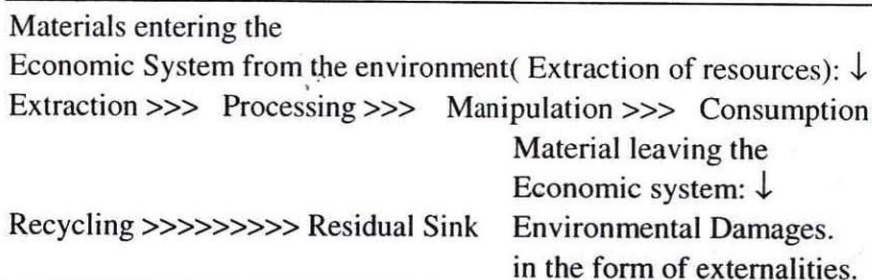
To highlight the above concern, the paper deals with the following areas : (i) the essence of environmental economics in addressing the economic causes of environmental degradation; (ii) the valuation of environmental concerns; (iii) concepts of "Green Accounting"; (iv) application of these tools in the context of Bangladesh; and (v) the IUCN's initiative in green accounting.

## **2. Economic Causes of Environmental Degradation**

The part of economics which exclusively deals with the interface between economy and the surrounding life support system of earth is called environmental economics. In a broad sense the scope of environmental economics also takes into account natural resource issues. Environmental economics is closely linked to welfare economics.

Economic activities, in fact, influence the environment in great many ways. However, in the past, economic growth was given the upper hand completely ignoring the environment.

Economic policies designed by ignoring environment may have disastrous consequences on sustainable development. Since the rise of world wide concern about the rapid environmental degradation a couple of decades ago, different definitions of sustainable development have been used. However, all these definitions have the common concern of preserving the environment. Interactions between economic activities and degradation to environment may be explained by a simple framework. We make extraction of natural resources from a finite source, process it and ultimately consume it. These three stages of interactions immediately relate the economic activities to the environment. The diagram below will clarify the matter further.



Here the economy is assumed to be an open system receiving materials from the environment and releasing back the materials in the form of waste to the environment almost at the same level because all materials cannot be recycled. Moreover, matters and energy can neither be created nor destroyed.

From the diagram, it is evident that if natural resources are extracted in an uncontrolled way, we will soon be running out of exhaustible resources and to some extent renewable resources. Here the problem of natural resource depletion and degradation arises. Moreover, while using these resources, we also wittingly or unwittingly allow residuals to flow back into the environment creating pollution in different forms. A natural inference can be drawn here that if we draw more resources we will simply pollute the environment more. When we pollute the environment, the atmosphere with its natural cleansing system absorbs some of the pollutants. However, the assimilative capacity of the environment is limited. This limitation creates additional problems in a situation of increasing degradation of environment.

Degradation of the environment may be attributed to two factors: absence of a pricing mechanism to reflect the economic value of the environment, and public policies which create incentives to overuse resources. The prices of environmental goods do not reflect their value because the environment does not fit into two key characteristics of goods which can be efficiently allocated in a

perfectly competitive free market. First, environmental goods are considered to be “non-rivalrous”, that is, two different people can consume the same good without forcing each other out. In contrast, consumption of goods sold in a perfectly competitive market is rivalrous or somewhat zero-some. Second, many (though not all) environmental goods are “non-exclusive”, whereas those sold in a perfectly competitive market are exclusive. “Exclusivity” refers to the possibility of excluding individuals from consuming the goods, thus making it possible to require payment for its consumption. For example, it is not possible to prevent non-paying individuals from benefiting from cleaner air; either everyone benefits, or no one does. But it is possible to prevent individuals from buying food, clothes, books, or other economic goods.

Economists have developed the concept of “Pareto optimality” to describe a situation where no one can be made better off, for example, through reallocation of resources, without making someone else worse off. They have then shown mathematically that in a perfectly competitive world the market will automatically lead to such a Pareto optimal situation. In this efficient situation all prices reflect the economic value of the goods being sold. However, because environmental goods are not-rivalrous or non-exclusive, they cannot be allocated efficiently in such a market, so the current level of consumption of environmental goods is not Pareto optimal.<sup>1</sup>

The other economic concept needed to understand environmental economics is “externality” which refers to costs (or benefits) which one economic agent imposes on others but which do not pass through the market. When a firm produces goods, it only takes into account the internal costs of production, disregarding the external costs which it imposes on others. Because the allocation which results from the market for the firm’s output does not factor in the unpriced externalities, it is socially inefficient and is not Pareto optimal. For

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<sup>1</sup> See, K. Turner, D.W. Pearce and I. Bateman, *Environmental Economics : An Introduction*, London : Wheatsheaf Harvester, 1994.

example, a coal-fired power plant may pollute the surrounding neighbourhood, but it does not consider the pollution in its cost calculation. Thus the plant continues producing and polluting at inefficient levels.

Positive externality, on the other hand, takes place when certain benefits flow from economic activities of one agent without a price being associated to the consumption of the benefits external to the consumer. Because of this pricing problem, it becomes very difficult for a market system to set a guideline for the efficient use of unpriced environmental resources. So when market fails, we are left with inefficient allocation of resources arising out of some special types of externalities in the form of public good or public bad (pollution), management of commons etc. Many important natural resources are owned and managed in 'common', where the main problem is 'free access' resulting in externality.

However, recent trends in the use of renewable as well as exhaustible resources have added extra complexities to the concept of externalities. The inefficient allocation of these resources will put an end to its availability which will consequently bring disaster to the environment. In case of renewable resources, certain special principles should be followed. Let us take the example of fish population. It has long been recognised that unrestricted access by competing fishermen leads to considerable externalities between them<sup>2</sup>: the more the one catches, the less is available to others, and hence leading to private marginal product (which means that only private costs are considered without considering the cost exerted on others: the social cost) in excess of social and an over-allocation of resources to fishing. So to protect such resources, before it reaches extinction threshold certain norms should be followed. The introduction of property rights in case of common resource property and avoiding of over fishing may be taken as an example.

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<sup>2</sup> Partha Dasgupta and G. Heal, *Economic Theory and Exhaustible Resources*, London, p. 4.

externalities, it is socially inefficient and is not Pareto optimal. For example, a coal-fired power plant may pollute the surrounding

The exploitation level differs depending on whether the catch is costly or free. In case of free availability, it resembles the condition of the "Tragedy of the Commons" which has come to symbolise the degradation of the environment to be expected whenever many individuals use a scarce resource in common. In case of depletable resources the optimal use will follow a price system which says that price of scarce resources (the supply of all depletable resources is finite) rises exponentially with increasing scarcity. So this depletion as scarcity should be included in the price.

Besides market failure, sometimes government policies indirectly play an important role in damaging the environment. There are instances when price charges for goods and services are less than the marginal cost of producing them. This is because of policy failure. Policy failures occur when governments create incentives (by offering subsidies) for prices less than the real cost of production. So this policy failure leads to over use of natural resources, thereby, hurting the environment. Subsidies to natural resource use are a burning example of this failure.

Our discussion above indicates that degradation occurs because most of the environmental goods do not have any market where competitors confront market determined price. The irony is that environmental degradation actions are regarded to have direct economic values. Because one can sell wood from the forest and get a price for that, while depletion of forest stock has to be taken into account in a non-market situation. So creating of a market becomes a viable alternative. By creating a market for the environment we can create incentives for people to deal with the environment rationally. For example, by imposing different forms of taxes, charges, marketable permits etc., we create a market for clean environment, which implies that those who pollute the environment will have to pay for it.

The scope of environmental economics does not stop here by just citing examples on externalities and environmental degradation. It covers other areas like the modified version of Cost Benefit Analysis (CBA), the designing of policy instruments, green taxes, green accounting, permits, charges, regulations and many other market based instruments together with the traditional Command and Control (CAC) policies to correct externalities and other market failure situations.

### **3. Valuation of Environmental Degradation**

Since the market system does not ensure a price mechanism for most of the environmental goods, we impute monetary values on these goods using different valuation techniques. In a usual project viability calculation, the Cost Benefit Analysis (CBA) is used where social values are calculated based on social costs and benefits of individuals. The social CBA differs from private calculation as in the former non-marketed costs and benefits of the proposed activities, uses of shadow prices, and sometimes weighted costs and benefits accorded to specific groups, are included.

In some complicated cases dealing with the environmental impact, shadow price mechanism ( based on true economic cost that arises due to the existence of distortions in the markets ) is used to work out the valuation problem. However, in more complicated cases involving environmental impact of projects to goods where no market and price exists, the scope of CBA needs some modification. In these cases, the shadow prices are to be estimated using economic valuation methods. Such estimates depend on individuals willingness to pay (WTP) or willingness to accept (WTA) compensation to tolerate the environmental impacts. WTP as a measure of an individual's preference for a good in the market place is revealed by the willingness to pay for that good. On the other hand, WTA indicates something they do not like or that they might be willing to accept compensation for tolerating something they do not like. For

example, if data can show that air pollutants emitted from a electric plant lead to damage to human health, then the cost of this environmental impact will be people's WTP to avoid or WTA to tolerate this damage. To capture all environmental changes economists have introduced the concept of Total Economic Values (TEV).<sup>3</sup>

### 3.1 Valuation Concepts:

The calculation of total economic values is accomplished using different valuation methods. Basically they are based on use values and non-use values. Use values are divided into direct values and indirect values.

However, at the outset it should be made clear that we will consider the basis of economic valuation on the anthropocentric system (individual value: only economic value) rather than intrinsic one, as is usually emphasised by the ecologists. Although such a system is not inconsistent with many of the goals that ecologists would wish to pursue, such as the protection of key natural resources. In all cases, therefore, the purpose is to elicit individual values, as expressed in terms of WTP for environmental improvement or WTA compensation for environmental deterioration.

One significant difference between the economic and intrinsic value approaches is that economic values, in principle at least, can be measured. Intrinsic values cannot be measured. The practical problem with economic valuation is one of deriving credible estimates of these values in contexts where these have no apparent markets or very imperfect markets.

There are values derived from the use of resources, however, there are also values like option values, bequest values and existence

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<sup>3</sup> See, David Pearce and K. Turner, *Economic Values and Natural World*, London, EARTHSCAN, 1993.



values which are derived from the potential for use of resources. Values of this type refer to non-use value. Thus, the key concept of environmental benefits and costs is, therefore, that of Total Economic Value (TEV) as under:

$$\text{TEV} = \text{Direct Values} + \text{Indirect Values} + \text{Option Values} + \text{Existence Values} + \text{Bequest Values}$$

Use values (direct +indirect values) refer to the situation in which values are derived by using the resources as well as getting benefits from the natural eco-system. For example, the forest wood and other non-forest wood products are termed as direct benefits while the flood protection activities of forest together with other attributes are termed as indirect benefits.

In short, existence values are used to capture some WTP for resources which is not connected with current or future use. It simply captures the expectation of the existence of the resource. An example may be the Royal Bengal Tiger of the Sunderbans. Someone home or abroad may be interested in the preservation of these tigers and willing to pay for it even though he/she would know that it will not give them any benefits. However, their mere existence has some value to them. Bequest values refer to the situation which measures people's willingness to pay for some resource which can be used by the offspring of the payers. Options values are those values where an individual expresses his willingness to pay for the option of using an asset so that it can be used in future.

Our next concern is how to capture these values. Economists have developed different approaches to the economic measurement of environmental impact. With the example of a tropical forest we can locate these values as under.

The table gives us some idea about the various values associated with an environmental resource. However, one must capture them to make it a reality. In this particular aspect we go beyond the

domain of conventional CBA and use the various techniques of valuations.

### **Total Economic Values of a Tropical Forest**

<u>Direct Values</u>	<u>Indirect Values</u>	<u>Option Values</u>	<u>Existence Values</u>
Timber	Nutrient Cycling	Future Direct &	Value from
Recreations	Wind protection		Indirect use knowledge of
Medicine	Air Pollution Control		continuous existence
Non wood	Watershed		based on e.g., moral
forest products	protection		conviction.
etc.	Carbon fixation		

### *3.2 Valuation Methods<sup>4</sup>:*

For conventional markets the method of valuations are Dose Response and Defensive Expenditure Method. In case of surrogate or implicit markets, Travel Cost Method, Hedonic Price Methods are usually used. However, in case of hypothetical markets, the experimental methods are used where experiments are done in two ways: Contingent Valuation Method and Contingent Ranking or Stated Preference Methods.

Dose Response method is used when a given level of pollution is associated with changes in output. The lost output, for example, from crop losses due to soil erosion, can be valued at market or shadow prices.

Defensive Expenditure method is used to assess the cost of preventing a damage apparently caused by environmental deterioration. The cost of having filters for water in case of contaminated water can be termed as the defensive expenditure.

Travel Cost Method is applicable to capturing the value of eco-tourism, for example. To calculate this, expenditure on the travel

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<sup>4</sup> Concepts used here are based on Anil Markandya, *Natural Resource Management for Rural Poverty Alleviation*, Rome, IFAD, 1996.

needed to this site of interest can be interpreted to give an estimate on the benefit arising from the recreational experience.

Hedonic prices method is used to separate the environmental attributes from other values such as, property. This method can be used in case of property prices in a noisy area as well as calm and quiet area. The hedonic price approach measures the quality of environmental attributes by detecting the prices of implicit goods affected by environmental conditions.

Contingent Valuation Method (CVM) is considered to directly reveal the preferences of the people. They are asked with the help of a structured questionnaire, how much they are willing to pay for a benefit and/or how much they are willing to receive by way of compensation to tolerate a cost. What is sought here is the personal valuation of the respondent of the increase and decrease in the quality of some goods contingent upon any hypothetical market. Respondents express what is the maximum they would be willing to pay for an environmental improvement or the minimum they would willing to accept for the decline in environmental quality if a market existed for the good in question.

In Contingent Ranking method, respondents are asked to rank several alternatives rather than expressing a willingness to pay. This type of method can be used in evaluating the benefits of reducing, for example, pesticide use for the production of bread.

All these methods have their relative merits and demerits. We will discuss about their application plausibility in the section where the Bangladesh context will be drawn. For the time being, we will be discussing the other major tools of measurement of environmental issues. This is done in the context of the economy as a whole. The environmental accounting process has been developed to incorporate the values derived by different valuation methods to give a total picture of the economy in a non-conventional way.

#### **4. Environmental Accounting**

Environmental accounting or green accounting is the new concept of national accounting practice for modification of System of National Accounting (SNA), which is the conventional system of national accounts, because of its failure to take into consideration the regrettable or defensive expenditure and natural resource depletion. In the absence of clear inclusion of these expenses, a transparent idea about the economic activities and its consequence on the economy cannot be ascertained. SNA gives macroeconomic indicators and other aggregate measures like GDP and GNP etc., on which policy makers base their future course of action regarding the economy. However, any action based only on GDP and GNP indicators ignoring the environmental impact on the economy is sure to have disastrous consequence as it misses the link between the environment and the economy.

By defensive expenditure we mean the expenditure incurred in avoiding or protecting environmental damages or harm. In the SNA these expenditures are treated as income. However, in case of green accounting or environmental accounting it should be debited not credited to the national account. In the case of environmental goods and services, the accounting procedures of SNA cannot give any entry in its present format. In this category, the indirect effect of environmental assets are enumerated which has a value in green accounting but not in the SNA. For example, the flood protection power of a mangrove forest.

In the SNA, the resource use in its market price is estimated which constitutes an income. However, its scarcity due to depletion is not taken into account. So much depletion ensures more income in the SNA while in case of green accounting it should be the opposite. The consequence of this entry in the SNA is inflated GNP and other sectoral value added.

We observe from the above discussion that certain deductions are missing in the SNA which make the account in the present format less useful specially for the sustainable development context.

SNA is based on multiple accounting practices which is complex and misleading. SNA follows a standard procedure in posting items in its accounting framework which is also an international practice. This international characteristics of SNA make it more difficult for introducing any new postings as it must be followed by other countries. This is more difficult in case of environmental goods. There is much controversy in the modification of SNA as different approaches to this modification have been suggested to incorporate the environmental issues in it. This methodological difference includes the concepts of, among others, Physical and Monetary accounting, Satellite System for Integrated Environmental and Economic Accounting (SEEA), Genuine Savings Approach (GSA) etc.<sup>5</sup>

Physical account takes into consideration the compilation of data about natural characteristics of the environment and its use, the size of natural assets like forest or other subsoil, the quality of water or air etc. Thus the prime task of this approach is to provide a coherent picture of resource use and depletion or increase, which can be linked to or integrated with national account. However, the implication of the system requires well-developed monitoring and data collection capability. Monetary account places an economic value on the characteristics of resource or their use, so as to understand the role they play in the economy. This practice confronts problem as there are difficulties in estimating the monetary value of certain aspects of environment like the non-marketed goods and services.

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<sup>5</sup> See, UNSEEA, *Integrated Economic and Environmental Accounting*, UNSD, 1993.

However, among the approaches the SEEA is leading as it is being experimented following UN method. UN is also the developer of SNA. In our discussion, we will elaborate the SEEA concept and the GSA. The idea of SEEA is that it does not replace the existing data system like natural resource accounting, SNA, but rather to incorporate this element as far as possible to establish a comprehensive data system. The SEEA procedure provides a picture of the interrelationship between the natural environment and the economy that is both comprehensive and consistent. So the SEEA activity of synthesising of different approaches should not lead to a combination of incompatible data sets.<sup>6</sup>

However, SEEA does not respond to all problems faced by different countries in addressing the incorporation of environmental impacts in to the national accounts. It fails in many accounts like, the flood problem in a country when its causes are mostly external and when international transfer is involved with this problem. Moreover, SEEA is only a proposal, tested in a set of pilot studies which suggested that considerable data improvements would be required. In view of the changed scenario certain alternative approaches have also been suggested by different groups of expert on national income accounting, namely, Input-Output framework, Net welfare accounting and natural patrimony accounting etc.

The objective of the SEEA includes segregation and elaboration of all environmental related flows and stocks of traditional accounts, establishment of linkages between physical resource accounts and monetary environmental accounts, assessment of environmental cost-benefits and measurement of indicators of environmentally adjusted product and income.

SEEA as an integrated process has not been experienced widely, however, in Mexico, the Philippines, Thailand and to some extent in

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<sup>6</sup> *Ibid.*

the Papua New Guinea some case studies have been done. In all these cases some different results have been achieved.

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SEEA in Short Version:

Conventional measurement of GDP by expenditure method.

SEEA

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$\text{GDP} = C + I + X_n - dK_m =$	$\text{GDP} = C + I + X_n - E_p =$
$\text{Net Domestic Product (NDP)}$	$\text{GDPe} - dK_n = \text{GDP sustainable} - dK_m = \text{Sustainable NDP}$

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$dK_m$  and  $dK_n$  are depreciation of man made capital and natural capital respectively while  $E_p$  is environmental protection costs.

The Genuine Savings Approach (GSA) is quiet new and probably introduced by Ernst Lutz and Kirk Hamilton.<sup>7</sup> GSA is different from NDP approach in that the adjustment for depletion of natural capital and pollution is made to national savings, not to national income. Following the GSA approach one can estimate the Genuine Savings (Sg) as proportion of Gross Domestic Product(GDP) by deducting depreciation of human made capital ( $dK_m$ ), natural capital ( $dK_n$ ) and the total cost of pollution (MPC.E) which is nothing but the marginal unit cost of pollution(MPC) times total emission of pollutant (E) from savings (S) as measured in the conventional way.

The incorporation of natural resource depletion and other environmental costs ensures one thing that natural resource is not a free gift of nature considering its abundance and no marginal value option, which apparently is helpful material for the policy maker because it will tell them about the actual strength of a particular sector of the economy.

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<sup>7</sup> See, K. Hamilton, *Genuine Savings in Developing Countries* (mimeo), UK, University of East Anglia, 1995.

Environmental accounting can also help detect which is illusory growth and which is not, and even it can show that the transitory gain in income by depleting natural resource leads to a permanent loss in wealth. For macro planning environmental accounting can play the most crucial role. In case of agricultural production, for example, if excessive fertiliser is used to get immediate improvement in crop production, it will simply lead to soil erosion which will ultimately lead to a permanent loss of crop production. So this crop production at the cost of soil erosion can only be reversed if certain measures are taken. In the usual SNA calculation these factors are not considered.

It may be mentioned that environmental accounting is not only interested to find out a green GNP, rather it can be used better at the sectoral level. Not a single country so far has successfully implemented the environmental accounting in its totality. However, country experiences show that its probable application will help identify the macro issues like forest resource management, the level of pollution emission of certain economic sector, the use of water among competing users and land degradation effect on the productivity of range land, identification of the problem of overfishing, mineral resource depletion etc. However, improved macroeconomic modelling and forecasting together with the detection of other environmental problem based on green data can also be dealt with in green accounting practices in a better way than the traditional national accounting.

Moreover, in case of developing countries, the role of environmental accounting is enormous because of its dependence on few primary export commodities which in most of the cases are natural resource based. A proper accounting framework can only detect its scarcity and help the nations take proper action before it's too late and thereby, save it from future damage to its economic potentials.

The above discussion helps us to see the role of valuation and environmental accounting in addressing the environmental problems.



However, they are closely related concepts as valuation generates inputs for the greater aggregation of environmental impacts account covering the entire economy

## **5. Valuation and Environmental Accounting in the Bangladesh Context**

Like all other developing countries, the application of economic tools to environmental policy making is quite new in Bangladesh and very little progress has been achieved in this field so far. However, our concern here is to explore how far the use of different economic tools in addressing different environmental problems is feasible. There are many environmental problems in Bangladesh. However, for our present concern we will concentrate on few from the following areas: sanitation and health, deforestation, industrial pollution, natural disaster, water pollution, agrochemicals, soil erosion and depletion, loss of biodiversity, unsustainable urbanisation, fisheries and live stocks and other natural resource depletion etc. Among these broader categories there are hundreds of sub-areas of environmental concern.

### *5.1 Valuation and Environmental Problems in Bangladesh*

For clear exposition of these problems we will cite a few examples and show how economic tools can be of immense help to address this problem.

#### The Sunderbans Mangrove Forest:

One may begin with the use of valuation technique in the case of the Sunderbans, one of the largest mangroves in the world. The question is whether it will be destroyed and subsequently developed or alternatively conserved in its present state. The importance of the Sunderbans is apparently vast. It is not only valuable for the wood

products or non-wood forest products, its value in ecosystem and global warming reduction is equally important. Moreover, the value of the Sunderbans in terms of eco-tourism deserves special attention. In this particular case, Travel Cost Method (TCM) looks appropriate. Let us elaborate it further.

The Sunderbans have different values: direct values, indirect values, option values, existence values and bequest values. Since the Sunderbnans have values other than as the source of timber or agricultural lands, whether they are cleared, it is important to recognise all components of total economic values (TEV). The TCM technique is used to infer the values of a tourist place on recreational experience of visiting a mangrove forest. However, the technique does not include values by people who do not travel to the site and it may be an underestimation of TEV.

However, one need not stop here to look at the shortcomings of TCM. Since other values are also associated with the preservation of the Sunderbans, we have to see whether other values can be captured. Let us take the case of existence values, which mean WTP for a resource for some moral, altruistic or other reason that are unrelated to current or future use. Maybe, the WTP for local people who do not visit the area is quite substantial or there can be potential willingness to pay on a global basis for the preservation of the Sunderbans considering the global warming impact. To capture these special values, we have to use the contingent valuation method (CVM), which simply sets up carefully worded questionnaire which ask people their willingness to pay to avoid and/or to accept WTAC for changes in environmental resources. Responses to these questions can give a preliminary idea of people's preference. In this particular respect, the importance of economic valuation technique is quite important. Our elaborate example of the Sunderbans simply indicates that the destruction of it will bring enormous loss in value so its preservation become more viable.

### Air pollution problem:

Air pollution has been growing since economic development has taken an accelerated path. Rapid industrialisation, growing of mega cities and greater dependence on sub-soils assets have brought in widespread degradation of the environment. In many cities of Asia the air pollution problem is worsening day by day and Dhaka is no exception. A recent study by the Ministry of Environment and Forest (MOEF) on some particular city area showed that the air pollution problem is getting worse. Special tests were done on the collected samples in checking Suspended Particulate Matter (SPM), Sulphur Dioxide (SO<sub>2</sub>), and Nitrogen Oxide (Nox).<sup>8</sup> The overall test results showed that the state of air pollution within the city limit is of great concern. These excessive emissions are the cause of many health hazards. High levels of pollution from motor vehicles, for example, contain high proportions of CO<sub>2</sub> which lead to respiratory, cardiovascular and lung diseases. High SPM leads to cancer and asthma. Air pollution also seriously damages the environment, as well as human health. Economic tools can be used to calculate the cost due to health hazards.

Monetary valuation of air pollution impact on human health presupposes the establishment of Dose-Response Functional relationship between morbidity/mortality and air pollution levels controlled for various other things. Treatment costs for various types of diseases attributable to air pollution need to be known for estimating the medical expenses in case of morbidity and value of statistical life in case of premature death.

### Soil erosion:

Soil erosion is a major environmental problem in Bangladesh. However, to have an idea about the cost of this problem, we need to

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<sup>8</sup> Study done by Bangladesh Centre for Advanced Studies (BCAS), 1997.

apply the economic tools in our hand. Let us see how to do it by valuing the costs of soil erosion. Soil erosion is the prime cause of loss of productivity of land. A Dose-Response function is the appropriate tools in addressing this problem. A Dose-Response function calculates the "response" in terms of reduced crop output resulting from a unit 'dose' of erosion. Soil loss is a function among other factors, the erodibility of soils, the slope of the land and conservation practice. Soil loss, thus, can be related to crop yield, based on results of a range of test of examining this relationship. The reduction of crop production can be valued. It can be done crudely by multiplying the loss in crop by the current market price for the crop.

#### Wetlands life support capacity:

For valuation of wetlands life support capacity, the replacement cost technique can be used. We know that wetlands are a store of organic matter, which could be replaced at least in part by artificial fertiliser. Other functions like the genetic diversity, maintaining level and quality of water, cleansing of nutrients and pollutants could be replaced by irrigation, dams, water transportation, water purification etc. which can be evaluated in monetary terms. The total values of a wetland, thus, can be calculated by utilising economic tools.

#### Water pollution :

Water pollution causes health hazards as it carries lots of diseases. Nearly 80% of all illness are related to water borne diseases. Diarrhoea, cholera typhoid, dysentery, etc., are the common water borne diseases. They cause mortality as well as morbidity. The economic cost of these diseases can be calculated by using for mortality the Human Capital Approach<sup>9</sup> and Willingness to Accept (WTA) approach. In human capital approach which is also

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<sup>9</sup> See, A. Shibli, UNDP/NEMAP Report, 1996, p. 25.

sometimes called production function approach, values the loss of output resulting from premature death. Willing to accept approach is used for measuring the cost of higher mortality by the values society places on the individuals. This is a summary estimate reflecting the WTA compensation for an increased risk of death. So costing of water pollution gives the clue that by capturing the total economic values, a water purification system can be rationalised. In the absence of this technique, the cost estimate would have been much lower, thereby, reducing the importance of pure water.

### Floods

Floods in Bangladesh are a common yearly feature causing extensive damage to life, property, infrastructure and many species. However, normal flooding is not a problem as it helps increase the fertility of land and works as the cleaning agent of environment. But over-flooding frequently causes havoc. To capture the total costs of flooding through economic instruments, we have to apply the productivity loss and replacement cost methods. However, for morbidity and mortality due to flooding, other methods have to be used.

Besides the above mentioned problems, the problem of urban solid waste management, agro-chemicals, biodiversity and habitat loss and other natural disasters due to environmental degradation can also be addressed by economic valuation approach within the cost benefit analysis.

### *5.2 Environmental Accounting and Environmental Problems in Bangladesh*

Valuation techniques are essential inputs for framing the environmental accounting as it looks for broader aspects of an economy. In the context of Bangladesh this technique can be used in addressing many issues of the day.

### Automobile Sector:

In case of sectoral value added, the environmental accounting can give a good guideline. Value added contributions of some sectors can be promising at first sight, however, after taking into account this sector's negative contribution to environment, the scenario may be different. The example of automobile sector is appropriate here. Automobile sector may contribute a high portion of income to the gross domestic production of Bangladesh. However, when the cost of environmental degradation is taken into account the sector's total contribution can go down substantially which may require policy change in respect of this sector.

### Food self-sufficiency programme:

The food self sufficiency programme can bring good results as it can increase the food production which is considered in the SNA as product growth. However, if we take into account the cost of this programme in the form of destroying the wetlands, the associated biodiversity with it, marginal land, the use of extensive pesticides and fertiliser leading to land degradation, the actual contribution will be less and the introduction of environmental accounting can address the problem by exposing the true achievements. It may require policy changes in this particular area by advocating rice import at lower total cost.

We are emphasising on sectoral indicators like value added in the above cases as the macro aggregates such as GNP, capital formation, final consumption and capital stock figures need elaborate accounts. The major problem in case of Bangladesh is the dearth of data. Dearth of data is already visible in the present national account practice, and for environmental accounting this is likelt to be more acute. However, sectoral value added which is a good approximation to the overall aggregates should be emphasised at the pioneering stage of the development of environmental accounting.

### Garments industry:

Recently the garments industry in Bangladesh is showing some marks of rapid growth. This sector stands as the number one sector in terms of export volume. However, its true value added is not that promising as it imports most of the intermediate inputs for final production. In the national accounts the contribution of this sector is occupying a big place, however, due to rapid expansion of this sector a huge urban sanitation and health problem has arisen which is causing unprecedented damage to the already shaken city environment. The poor living conditions of the garment workers are giving rise to sanitation, water pollution and air pollution (due to fuel wood burning for cooking). The environmental damage caused by this sector is unique in the sense that these plants are situated in the urban area only and employ mostly the female workers. These female workers are recruited from the rural areas only for this purpose. If they somehow fail to get the job in the garments industry they, land up taking employment as the house servants. So in the national accounts this environmental damage costs have to deducted to reflect a proper contribution of this sector to the economy. Since SNA distinguishes between five overall economic sectors: financial corporations, non-financial corporations, government, households and non-profit institutions, the environmental costs due to sewage and cooking fuel pollution should be attributed to household sector, and the cost of industrial pollution originating from the plant to the non-financial sector. This way an environmentally adjusted accounting system can really disclose the real situation.

### Energy and macro policy:

In Bangladesh all sources of energy (more or less) are subsidised. However, our most important source of energy, natural gas is of great concern as it relates to the finite supply of exhaustible resources. In pricing gas consumption, the concept of marginal user cost (reflecting scarcity as more is extracted) has been totally

ignored, thereby, raising the level of overuse of the resource. A subsidy on it makes the unit cost even lower. The sectoral value added has shown to be lower due to this under-pricing which makes the sector less worthy with respect to total sectoral contribution. However, if proper accounting framework is selected with the possibility of taking into account the scarcity phenomena, thus reflecting the natural resource depletion, the price will go up and sectoral value added will shoot. At the same time it will discourage overuse.

#### Shrimp culture:

In case of shrimp culture, the environmental accounting can play a vital role in reflecting the true worth of this sector. Shrimps are being cultivated in Bangladesh mostly for export purposes, and the sector enjoys many facilities from the government. In the national income accounts, the sale proceeds are recorded as income. However, during the culturing process the costs in terms of increased salinity, loss of other species, pollution from diesel driven power etc. are not deducted from the income.

#### Exchange rate policy:

It has been indicated in the document of World Bank<sup>10</sup> that overvaluation of exchange rate results in adverse terms of trade, encouraging the production of subsistence crops at the expense of internationally tradable products. If the subsistence crops are environmentally harmful, then currency overvaluation leads to environmental degradation. The conventional national account will ignore this environmental impact while the major concern of environmental accountant is to look for it. This relationship is quite valid for Bangladesh as the country maintains an overvalued currency. However, this problem is not addressed by SEEA and any

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<sup>10</sup> Mohan Munasinghe (ed.), *Environmental Economics and Natural Resource Management*, Washington D.C., World Bank, 1993.



other visible methods of accounting so one can be tempted to explore avenues how to include it in the accounts.

#### Flood problem:

As we have mentioned in the valuation section that over flooding is a problem. As the majority of rivers of this country originate in other country the flooding problem can assume to have international character. In the environmental accounting the flood damages are considered and given some value in case they do not have any market price. However, these costs can be shared internationally if they can be valued properly. For example, deforestation in Nepal can lead to over flooding in Bangladesh and the cost of this flood damage can be reduced if Nepal is encouraged to afforestation. The green accounting concept is quite valuable in addressing this type of problem. However, this is an issue of international transfer as the causes of floods are mainly external to this country and our concern should be to find out ways of the incorporation of this environmental impact in the balance of payments account or the X-M (trade account where: X is export and M is import) portion of conventional account. The SEEA approach apparently does not address these issues.

Environmental accounting practices are quite important for Bangladesh to keep track of its natural resources as the country depends on a few resource based commodities for export. Even in case water use among different sectors of water price setting the green accounting can play a vital role as water has become a scarce commodity in irrigation purpose. In the absence of scarcity phenomena, its use will be misused thereby creating shortage of it.

### **6. IUCN's Green Accounting Initiative and Bangladesh Component**

Earlier we have shown the causes of environmental degradation. No system can sustain if these are not compensated by corrective

measures. But how can one know what to do if he is not sure about the size of damage? An environmental accounting system can lead one to this direction. Many countries have already tried some aspects of environmental accounting. However, its full implementation will take sometime as databases are quite weak and time consuming. However, considering the rapid degradation of environment, it has become important even for poor developing countries to look for such endeavours pretty urgently. However, economists cannot solve this problem alone as the subject environment is multi-dimensional. We can rationalise this by citing an example<sup>11</sup> : after assessing the environmental costs of coal mining, which are expected to exceed the sector's contribution, the authority can reduce the subsidy for this sector and divert the fund for alternative energy source. But that can create problem as union members may lose their job and hence, block the move. Thus, social, environmental and economic circumstances are important if any such move is to be materialised. However, before embarking on a big project, an initiative at least in the present format can make some difference.

The above elaboration clearly identifies the need for initiating a dialogue where the agents from government as well as non-government, research policy analysis organisations, university communities, the media and other individual interested in environmental issues, can participate. This participatory approach will be of great importance in introducing the concepts of valuation and environmental accounting to key government and other concerned authorities. At the same time, the importance of environmental accounting to economic policy making and laying of future ground work in the same discipline can be initiated .

Keeping in view the above objectives, IUCN Bangladesh has initiated a project as a part of Global Green Accounting Initiative,

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<sup>11</sup> Sheng Fulai, *Making Green Accounting a Tool of Policy Change*, WWF, 1996.

which has the objective of introducing the concepts of valuation and environmental accounting to key government official, NGOs, members of the research and academic communities, and policy makers. The project also intends to demonstrate the costs of environmental degradation through valuation case studies and draw the potential contribution of environmental accounting to economic and environmental policy making. However, it also aims to begin a network among environment; economists and people with related interests in Bangladesh. To accomplish the above task, the project has already initiated a network building process. It also aims at soliciting recommendations in framing the future course of action to explore the possibility of initiating a green accounting process at all levels.

## **7. Way Ahead**

There is a need for environmental accounting to be integrated in the policy making process. It requires further initiatives in the form of concrete actions. IUCN aims to extend the horizon of its search for establishing a long term efforts by highlighting the following activities; conducting training programme in environmental valuation based on different valuation method. Carrying out of valuation studies considering the priority of the time and creating opportunity for those trained for learning in a concrete way and preparation of selected iterations of environmental accounting through launching of environmental accounting processes based on UN system of accounts. However, these long term goals need concerted efforts from the concerned quarters.