Economics of Environment and sustainable development - *part 2*

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(Continued from Saturday)

Physical accounting method used by Norway and UNSO effort to incorporate environmental and resource use with economic activities. UNSO methods is used in Mexico and Papua New Guinea.

The variable R, in our formula has been estimated by Mexico and found that depletion of oil, forest and ground water has reduced about 7 per cent of the net national product. The value of A, cost of avoiding environmental degradation has also been estimated in Mexico for air, water pollution and soil erosion and found that another 7 per cent of net national product is required to avoid degradation.

When activities which would minimise degradation of (Dm), restore lost (R) and avert destruction of (A), environmental capital are undertaken, the benefits the country would acquire are, among other things, the increase in GNP to the level of sustainable national income (NNP*). (However, what is required is estimate of "real national income" i.e., GNP plus monetary value of environmental quality). Such activities involve costs. As more than one activity is available a cost-benefit analysis would be very helpful in selecting the best. In a cost-benefit analysis certain problems discussed below have to be encountered with.

Allocative efficiency

Allocative efficiency of a marketable goods or services can be gauged by 'Parato optimal criterion', i.e., at least one person's welfare is increased, measured by increase in income estimated by using market prices, without decreasing the welfare of others as a result of the policy initiative. Although restrictive in application, it is useful as conceptual benchmarks to estimate where inefficiencies lie and also to determine the policy actions to reduce such inefficiencies.

In practice, any policy initiative will create gainers as well as losers. 'Perato optimal criterion', cannot be applied in such a situation. More practical approach, such as 'Kaldor-Hicks criterion', i.e. sum of the welfare increases of gainers are more than sufficient to compensate sum of the losses suffered by the losers of a policy initiative can be used to determine allocative efficiency. This market efficiency is based on the assumption that, not only all people and resources are fully employed and market is in equilibrium, but also all goods and services have a market.

However, an environmental quality is a public good. A public good is one which, when one consumer uses it, simultaneous use of the same by others cannot be prevented.

A textbook example is a lighthouse; a ship using its services cannot preclude other ships from using the same service simultaneously, such a good or service generally cannot have a market or a price. Unlike in the case of a marketable good, same quantity of a public good is shared by all consumers and with public bad all affected suffer commonly, e.g. stench emanating from a polluted canal.

As the public good is supplied in the common quantity to everyone, consumers cannot unilaterally adjust their own consumption as they do in the case of a marketable ordinary good, where each consumer determines quantity he wants at the given price; and the market equilibrium is achieved at the price where demand is equivalent to the supply.

In the case of the public good consumers are required to contribute for the given quantity and when the individual contribution per unit is equivalent to the case of a public bad sufferers have to be compensated in a similar manner. As it is practically impossible or prohibitively costly to exclude consumers from public good it is not possible to get sufficient contribution from the consumers. It is also extremely difficult, if not practically impossible, to work out a practical method for individual contribution.

There may be serious problems in ascertaining the willingness to pay here, as is normally done in the case of the marketable good, because if the consumer suspects that his actual contribution is on his willingness to pay, he would underestimate it and pay only a small contribution or sometimes none at all knowing that they would still have access to it provided others make sufficient payments. ('free rider problem). Otherwise he would overestimate in order to obtain more of it at a given cost. Supply of public goods accordingly are inefficient. Privatising the provision of these goods and services is an important aspect of environmental policy.

However, market prices have been used in valuation of environmental degradation when it leads to losses of productivity or adverse health effects. The replacement expenditure on degradated natural resources can also provide an estimate of environmental damage. For example losses of soil fertility caused by erosion can be approximated by the cost of using purchased fertiliser to replace nutrients. Environmental degradation is indirectly estimated through its effect on other markets, eg. clean air is implicitly traded in property market by being able to charge a higher price for a property situated in fresh air region. Willingness to pay criterion also has been used in to estimate the cost of clean water supply in Brazil, improved sanitation in Ghana and tourist valuation of elephants in Kenya.

Converting public ownership to private or state ownership has been attempted in some countries. Group ownership in the form of common or communal property has also been attempted. Forests in Japan and pastures in Swiss Alps, the Himalayas and Andes, fisheries in Turkey and irrigation water in southern India are some of the successful attempts in group ownership. In these projects methods have been worked out to restrict the access by outsiders, allocating use rights among group members and monitoring and enforcing these rights.

Externalities

Next problem associated with environmental goods and services is that they generate externalities. Externalities are defined here as actions of a producer or a consumer affecting the welfare of others operating through means outside the price mechanism. A classic example is pollution. A firm as a result of its activities pollutes a nearby river adversely affecting activities of others e.g.; loss of income of fishermen, for which they are not compensated as it is not a cost of the firm involved. Similarly, benefits are generated for which rewards cannot be acquired, e.g., when your bees carry bee honey from your next door flower garden to your beehive, owner of the garden cannot charge for it. Because of the presence of externalities the social marginal costs and benefits deviate from the private marginal costs and benefits. Accordingly the economy is not optimal. Second best solution is a Piguvian tax or a subsidy as the case may be.

The market efficiency does not always demand total eradication of pollution; sometimes reduction of pollution up to a point where social marginal cost is equivalent to market price is sufficient. Externalities make the market inefficient simply because those who cause them do not consider them for their decisions as there is no market for externalities.

. Risk and uncertainty

Another cause of market inefficiency is that the real world is characterised by imperfect information. Gathering information and transferring it are costly. Absence of both future markets for environmental quality and adequate markets for risk-bearing are strong arguments to have an environmental policy. Most of the environmental problems are connected with externalities which are not accounted for in the market, as they bear a strong public good character.

Most of the environmental damage people are worried about, will occur in the future and the full extent of its impact cannot be known until then. Hence these costs will not be incorporated into present market transactions. This shows that in the absence of an environmental policy there will be an intertemporal mis-allocation of resources of the natural environment.

So far our analysis was based on the assumption that only marginal changes do occur with the implementation of policies. However, when we have to consider large or non-marginal changes, which is the case in most of the environmental policy changes, the method that has to be adopted is to consider the changes in producer's profits and changes in income of the owners of factors of production. The total social cost of changes in output can be calculated as the some cost of changes in profits and factor income and welfare impact on consumers by change output prices.

Intertemporal comparison

When assessing policy, one has to take note of the fact that costs and benefits related to that policy will occur in different time periods and they have to be made comparable.

To achieve this comparability the future costs and benefits have to be discounted by some social discount rate. The rationale behind this is, one, presumption of intertemporal equilibrium in the economy and two, that the expected returns for any given present investment is a multiple of amount invested or the sacrificed bundle of consumption goods. Intertemporal equilibrium requires that the present value of the future stream of net benefits equate to the benefits sacrificed by forgoing present consumption.

In view of the disastrous consequences that would result in the future owing to environmental degradation, both on economic growth and human welfare it is very clear the present value of the future benefits of environmental policy far exceeds the present sacrifice made to implement it. The discrepancy between GNP as it is estimated and the "real income" estimated assimilating environmental factors is not doubt very substantial.

Environmental degradation although has far reaching adverse consequences in both present and future owing to various practical difficulties it is not given its due place in policy decisions. Environmental quality is of a public good nature without a market for it.

As the impact of the environmental degradation occurs in the future and there is a certain degree of risk and uncertainty about its occurrence and if occurred its gravity. Hence, market economy cannot be expected to consider environmental factors in their decisions. State has to intervene in formulating policies and implementing them as it can neutralise the risk of future environmental degration. GNP as it is estimated under estimate the "real national income" substantially.

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