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# Sustainable economic development and the environment

Sustainable development

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**Abstract** *To maximize society's welfare, economists should be concerned with the efficient use of the stock of natural resources. The stock of natural resources is a gift of nature. The usefulness of this stock comes from its alternative uses, e.g. existence, exploitation and bequest. Therefore, the maintenance of this stock should be part and parcel of economic policymaking, particularly in less developed countries. Otherwise, the latter countries will face scarcity of wealth induced by decline of their environment.*

## Introduction

Societies strive to attain a better wellbeing and achieve more equitable distribution of wealth within and among generations. Orthodox monetary and fiscal policies may not be sufficient to attain such objectives. To maintain a sustainable wellbeing and a better and more equitable distribution of wealth through time, the political will, social attitude, and well-defined economic goals have to be successfully integrated. Accordingly, the purpose of this analysis is to incorporate the environmental factor into the policy objectives of economic development. In other words, economic development is not complete or sustainable, and will not be successful over the long run unless it takes into account all the relevant factors, including the environment.

## Sustainable development: concept and definition

The wellbeing of any society is influenced by how well its economy carries out its tasks. The quality of life, accordingly, depends on the extent to which an economy utilizes its resources and achieves its objectives successfully. Are developing countries successful in this regard? What follows is a general analysis of the sustainability of economic development.

To maintain sustained growth in economic activities is of paramount importance to any society, especially a developing one. However, economic growth by itself may not suffice to bring about sustainable development. On the one hand, growth means an increase in per capita income or output. On the other hand, development intends, among other objectives, to lift the economic



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status of the poor or the economically under-privileged, increase the level of employment, make better utilization of economic resources, and promote social equality. As will be seen later in this analysis, these two – growth and development – do not necessarily occur together.

In their present forms, national income accounts measure growth rather than measuring sustainable development. As mentioned above, the latter concept includes wider concerns, including the quality of life. Sustainability suggests that societies need policies aimed at making development sustainable well into the future (Holmberg, 1992). Furthermore, sustainable development should be based on maintaining the assets of natural resources, e.g. forests, wetland, soil, water and aquifer qualities, among others, and on maintaining the environmental quality through time (Baumol and Oates, 1993; Kopp and Smith, 1993). Therefore, to make growth and development sustainable, societies need compensatory investment (Serageldin, 1996).

On the margin, the use of the environment and natural resources should not take place if the costs are greater than the benefits. Consequently, if degradation of natural assets takes place, the remaining units of such assets will increase in value. Therefore, sustaining and conserving an “optimal” stock of these assets is a reasonable policy objective. By the same token, the maximization of such an optimal level is a desirable policy priority (see, for example, Warford and Partow, 1989).

In many countries, environmental degradation and resource depletion may go too far in violating economic principles. Therefore, to maintain sustainable development, the quality of the environment in these countries should be maintained; improvements are encouraged and further degradation should be managed. The importance of natural assets suggests that unmanaged degradation and negative changes in natural assets are not welcomed and may in fact violate economic principles. Once again, the earth’s natural resource-base must be managed wisely, if possible enhanced, and thus be sustained into future generations.

The strategy of managing natural resources must take into account all assets and resources, e.g. human, physical and natural capital, and financial and monetary assets. Otherwise, a better wellbeing for all generations will not be maintained. Policies that tolerate exhaustion, depletion and degradation of the economic base jeopardize the successful management of sustainable economic development. Conversely, policies and/or practices that focus only on current living standards lack vision and realism, have a weak rationale, and hence carry the risk of leaving future generations with poorer prospects than those of the current generation (MacNiell *et al.*, 1991).

To overcome the obstacles to sustainable development, societies need a political will, vision, and the courage to adopt policy or institutional changes. The concept of “sustainable development” can provide the needed guide for this vision. Adding the proviso of sustainability to the goal of development

requires the maintenance and accumulation of investments in natural, ecological, and physical (man-made) capital, and requires the integration of societal, political, economic, and ecological factors into the process of decision making. In this way, through achieving a better utilization of resources, sustainable development feeds a growth of the limits.

However, it can also be said that there is no exact consensus about what sustainable development means (Pearce *et al.*, 1990). Therefore, sustainable development can be considered as a vector of social objectives and goals and a criterion for development that does not decrease through time (Pearce *et al.*, 1990; Todaro, 2000).

### National income measures

Current economic accounting systems are concerned mainly with the flow of market activities. These measures do not account, however, for non-market factors or for the quality of the capital stock on which most market activities are based. Thus, building up the stock of physical capital, i.e. investment, is included in the measurement as additions, and the use of this capital stock, i.e. depreciation, is deducted from the national income account. However, this procedure has not been applied to natural capital stock. The current system ignores changes in the value and in the stock of natural resources. Current national income accounts have a bias in favor of market expenditures and have failed to account for the exhaustion and degradation of the natural capital stock.

Policy makers often boast about gross domestic product (GDP) growth rates even if those growth rates were based on running down the resource base. Such growth will not be sustainable indefinitely and can eventually result in a lower standard of living for future generations. To elaborate on this, in Indonesia, Brazil, Thailand, Congo, Madagascar among other countries, the cost of soil erosion and timber extraction is not accounted for in these countries' GDP. By the same token, in the USA the cost of ozone degradation is also not accounted for. Accounting for such degradation of the ecological base lowers these countries' growth rates (Warford and Partow, 1989). Consequently, and to reiterate, it is possible to show high growth rates in national income accounting by running down the resource stock and degrading the environment. This, in turn, can lead to unsustainable development, and thus may have a negative impact on the welfare of future generations. Therefore, even though it is politically unpopular, national income accounts should be adjusted to recognize natural resources and economic-base changes. If national income accounts do not include changes in the resource base, these accounts may carry the wrong message, i.e. growth rates that are exaggerated and thus development that cannot be sustained.

Even though accounting for the environment in the aggregate measures is desirable because it helps policymakers adopt policies that can lead to

economic as well as ecological sustainability, there are some limitations to such a practice. For instance, there is no agreement among economists over the correct method of valuing resource-base appreciation and depreciation. Also, as most of the environmental resources are “non-marketed common-property goods”, the valuation of their benefits, i.e. their existence and use, may not be straightforward. To preserve the ozone quality, to maintain forests, and to improve water quality, etc., carry with them many benefits. However, the nature of such intangible benefits is still debated by economists. There is no general agreement about the correct method for valuing these benefits. Nevertheless, despite these difficulties, any measure of environmental values would be a major advance over present accounting procedures. It is a start that ensures that a better measurement techniques will be developed in the future.

### **Benefit-cost analysis and sustainability**

Economists argue that there are benefits and costs associated with changing the capital stock of natural resources. For example, because of lack of land for agricultural purposes, to extract minerals, and/or to build new developments, forests are cleared, wetlands are drained, and an already scarce natural habitat is reduced. Clearing forests, drilling the arctic for oil and gas, or draining wetland has benefits (cost) in terms of gains (losses) caused by the use to which the land, etc., is then put. Depleting the environment, therefore, has benefits and costs. Using the environment as a waste basket, and using a forest in depleting ways can reduce production and consumption costs compared with the alternatives. But these choices may, *inter alia*, destroy the natural habitat, rule out recreation and aesthetics, and may adversely affect scientific research. This suggests that natural resources and the environment have more than a use value. They also have intrinsic (non-use) values, among which are their existence itself and also their bequest values. These “non-use” values have to be accounted for when evaluating the cost of any new development project.

A simple method for estimating the benefits that result from improving or maintaining the environment and/or the natural resource base is to apply the benefit-received principle. The benefits can be estimated by asking people how much they are willing to pay to secure the environment or the natural resource base. In other words, if there seems a need to use the environment or the natural resource base, people can be asked how much they are willing to give up to preserve these values. If people are willing to pay a lot, it means that society believes in maintaining and managing their natural assets at a “constant capital”, and hence believes in sustainable development. Also it means that that society believes in, and hence places high priority on conservation. Conversely, if willingness to pay for preserving natural resources and the environment appears to be strategically lower than it should be, unjustifiably more of these will be used. In such a case a successful management of natural assets will not be maintained by that society. This is a drawback to sustainable development.

One of the reasons that lead to underestimating the price (willingness to pay) of natural resources is society's ignorance of the multiple functions of natural resources. For instance, investment in water-quality improvement may yield additional revenues from fishing, boating, swimming, spectating and other uses associated with water-quality improvement. In addition, water-quality improvement yields other "non-market outputs" such as water purification and hydrological protection, among others. Therefore, if we include the benefits from these "non-marketed" goods and services in their economic value, the rate of return on such an investment would be much more significant than it would be without including them.

The foregoing analysis suggests that the market system has failed to allocate and price natural assets correctly. This failure of the market system to value natural assets correctly created the need for further extending of social benefit-cost analysis by including the environmental impact. To elaborate on this, the formal benefit-cost rule for undertaking a project is written as:

$$B - C \geq 0.$$

Here  $B$  denotes benefits and  $C$  denotes costs. The requirement for undertaking a project is that the benefits be greater than the costs, or that net benefits be positive. The extended approach includes the external environmental improvement benefits, as well as the costs of external environmental damages and of control measures (see, for example, Todaro, 2000). The basic methodology of this comprises two steps. First, we need to identify and then measure the environmental impact in physical terms. Second, a translation of this impact into money-metric measure should be included in the benefit-cost framework. The impact on the environment (which can be positive or negative) is represented by the letter  $E$ . The basic rule above, for the projects vector, becomes:

$$B - C - E \geq 0,$$

and, if we include the discount factor ( $\delta = e^{-rt}$ ), the rule becomes:

$$\sum \delta(B_t - C_t - E_t) \geq 0.$$

Here,  $t$  denotes time and  $\sum_t$  denotes the summation of benefits and costs over time. To maintain sustainability, the sum of the environmental depreciation should be close to zero. In other words, it is the present value of  $E_i$  constrained to be positive. This implicitly means that policymakers have to develop a shadow project(s) ( $A_j$ ), whose purpose is to counter-balance the environmental depreciation ( $E_j$ ) caused by the other projects that degrade the ecological base. Thus for sustainability maintenance, societies need:

$$\sum PV(A_j) \geq PV(E_i).$$

Since the policymakers' objective is to maximize the net present value of any project, subject to the environmental constraint, this can be written as follows:

$$\begin{aligned} \text{Maximize} &= \sum \delta[B(Q_{it}) - C(Q_{it}) - E(Q_{it})] + \sum \delta[B(Q_{jt}) - C(Q_{jt}) - E(Q_{jt})] \\ &P, S, Q_i, Q_j \\ \text{s.t.} &\sum \delta[E(Q_{it}) - A(Q_{jt})] \leq 0. \end{aligned}$$

The Lagrange is:

$$\begin{aligned} L = &\sum \delta[B(Q_{it}) - C(Q_{it}) - E(Q_{it}) + \delta[B(Q_{jt}) - C(Q_{jt}) + A(Q_{jt})] \\ &- \mu \{ \sum \delta[E(Q_{it}) - A(Q_{jt})] \}, \end{aligned}$$

where P is a vector of projects ( $Q_i$ ), S is a set of shadow projects ( $Q_j$ ), and A is a set of environmental benefits.  $Q_{it} \geq 0$ ,  $Q_{jt} \geq 0$ ,  $i, t$ , and  $\mu \geq 0$ .  $\mu$  is the price of sustainability constraint. Its value is equal to the decrease in the net present value of all projects when the maximum (permitted) net environmental damage is reduced further by a small, marginal, amount.

From the first order condition, the derivative with respect to  $Q_{it}$ , after rearranging terms, is:

$$\frac{dB}{dQ_{it}} - \frac{dC}{dQ_{it}} = (1 + \mu) \frac{dE}{dQ_{it}}.$$

This states that the net marginal benefits from a project equal the costs of the environmental damage plus the shadow price. This shadow price represents the sustainability factor, i.e. replacement and aversion. Thus a shadow project ( $Q_{jt}$ ) could have a negative net present value, but its output ( $A_{jt}$ ) impact on the environment could be so great as to justify the project in terms of its contribution to fulfilling the sustainability constraint. In that case, the project would benefit and help sustain economic development through time.

What is/are the manifestation of the above analysis? What does it signify? And, why should societies undertake projects that address the problems of environmental degradation? These questions, among others, will be undertaken in the following section of market imperfections.

### Market failure

In many countries, the increase in the demand for primary products led policymakers to adopt misguided policies. *Inter alia*, the increase in population and income, the increase in demand for urban employment, and the increase in demand for primary products domestically and internationally, inspired policymakers to adopt policies that encourage projects undertaken that do not account for environmental degradation. For example, in many developed and

developing countries, policymakers adopted tax incentives to extract minerals, and made agricultural chemicals, irrigation systems, and bank loans available to farmers at a fraction of their true costs. These policies increased the amount of land demanded for mining and agriculture purposes. A large part of this new land was, undoubtedly, provided by converting forests, etc. In the long run, however, such a practice can act against the self-interest rule of benefit maximization associated with land use. Economic efficiency requires that land be allocated to those uses from which potential benefits (market and non-market) are the greatest. However, because input and output prices are subsidized, and because property rights in many less developed countries (LDCs) may not be exclusive in rural areas:

- environmental conservation is ignored, neglected, undervalued, and even could be discouraged;
- water is wasted and misused;
- land is rendered useless because of salinization; and
- many natural habitats are degraded and can be lost for good.

The increase in population and income, the lack of well-defined property rights, the unavailability of arable lands, the promotion of the agriculture and forestry sector, and last but not least the ill-fated sectoral and macroeconomic policies of output and input price subsidies led, in turn, to deforestation and exploitation of other natural resources around the world. As a consequence, the environment and ecosystems are misused and mismanaged. In both developed and developing countries, in the name of growth, the policy objective of managing the economic base rationally was weakened, and hence development became not sustainable.

The foregoing analysis suggests that macroeconomic and sectoral policies, and sustainable development, are part and parcel of one another. The relationship between these factors, accordingly, can be described as mostly complementary rather than opposing. If policymakers foresight such relationships and to have a realistic picture of economic growth and development, preventive and corrective investments are desirable policy objective. Otherwise, future generations bequest a weakened natural assets base and, consequently, the efficient and equitable distribution of wealth between current and future generations is not maintained. This is a valuation to economic principles.

### **Final remarks and conclusions**

The stock of natural resources is a free gift of nature. The existence of this stock is affected by exploitation and, if not maintained properly, by natural disintegration among other losses. Furthermore, the full usefulness of this stock comes from its flexible uses. Thus the use or the mere existence of this stock provides a flow of services and utility, and generates satisfaction.

Accordingly, economists are concerned with the optimal use of this stock, which maximizes current and future generations welfare.

Economic growth is a necessary but may not be a sufficient condition for sustainable development and for the equitable distribution of income within and between generations. In many developing societies, policymakers' ability to promote sustainable development can be affected adversely by government's lack of political will and limited ability to enforce the law, particularly in remote rural areas. On the other hand, policymakers may not be immune to corruption and/or the influence of special-interest and political groups in the more developed societies. Therefore, it is possible that policymakers in both developed and less developed societies help in steering growth and development away from their desirable, sustainable, path.

Societies should strive to allocate their natural resources to the optimum possible uses. The rationale behind such an intent is that exploiting natural resources has a direct effect on any society's wellbeing, especially if it is a developing society. Natural resources are a good source of revenue. This revenue is essential in assisting policymakers in promoting socioeconomic objectives. And second, natural resources' exploitation provides employment, and therefore income. That is, these two factors have a direct and indirect snowball, multiplier, effect on production, employment, and consumption, as well as revenue to the governments' coffers. In turn policymakers create new employment, etc. in the local as well as the national economy.

The proper management of natural resources is affected by predatory behavior, political regimes, an unfavorable economic and technological climate, and other endogenous and exogenous factors. These factors have led to poor linkage between economic performance and natural resources exploitation. As a result, depletion of land, forests, the environment, and other natural resources ensue.

To have economic progress and a better distribution of income within and between generations, environmental and economic-base maintenance should be looked at as part and parcel of economic growth and development. But, the developing countries have a limited number of scientists and their research and development base is very thin. If such a base exists, its practices are similar to those of developed societies and may not be location specific. Stated differently, like physical and human capital, scientific and technological knowledge in many developing countries are limited; most of the work on the environment is coming from developed societies. In other words, unlike developed societies, developing countries face scarcity of wealth, including environmental wealth. Simply stated, to maintain their economic wellbeing, less developed societies must develop the capacity to invent techniques that are location specific, economically viable, socially acceptable, and ecologically dependable. Such a desirable outcome appears doubtful.



In sum, developed societies, which have the technological capabilities and those which do not are both acting irrationally by violating economic principles of not utilizing scarce resources optimally. Second, as most of their technologies are imported, for the foreseeable future LDCs will be technologically and economically dependent, and hence possibly exploited by the more advanced western economies.

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