THE ECONOMIC DIMENSION OF EIA IN THE TRANSITION FROM A CENTRALLY PLANNED ECONOMY TO A TRULY PARTICIPATIVE MARKET BASED ECONOMIC SYSTEM

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One way in which an economist familiar with cost-benefit analysis (CBA) may look at environmental impact assessment (EIA) is that EIA is a CBA requiring a large amount of information rigorously collected and analyzed by a group of scientists of various disciplines. One can appreciate that the development of EIA has served to advance the systematic description and quantification of environmental effects in a way which can only serve to improve the quality of CBA undertaken. One can also appreciate that EIA constitutes a process, formalized through environmental legislation, regulations and procedures, which in turn reinforces the community participation required for informed decision-makers seeking the common good. While CBA within EIA is a key generator of information to the decision-makers, recognition should also be given that the EIA process is both a planning tool and an execution monitoring tool. Thus, the role of CBA is not as an intermediate step, but rather as an integrated parallel process. Hence, the CBA should follow up, quantify and evaluate the dynamic iterations created by the exhaustive search of alternatives, by the efficient inclusion of environmental protection and mitigation measures and by the explicit valuation of preference and choice articulated by community, society and their representatives acting in the best interest of present and future generations.

VALUE OF CONSIDERING ENVIRONMENTAL EFFECTS EARLY ON IN THE PROJECT CYCLE

The main purpose of the economic analysis of a project is to ascertain whether the project can be expected to create more net benefits than any other, mutually exclusive option, including the option of not doing it. Consideration of alternative options, therefore, is a key feature in proper project analysis. Often, important choices about alternative project options are made early on in the project cycle. These options may differ considerably in their general economic contribution, and they may also differ greatly concerning their environmental impact. Therefore, including environmental effects in the early economic analyses, however approximately, should improve the quality of future decisionmaking.

The CBA process—defining objectives, searching for alternatives, costing out the resources involved, specifying the effects of each option involved and comparing all the costs and benefits—normally requires considerable efforts. In the case of Cuba, we are faced with two joint families of economic valuation problems: the "environmental" ones and those problems associated with the incipient transition from a centrally planned economy to a truly participative market based economic system.

1. The views presented in this paper are those of the author and not necessarily those of his employer.

In principle, economic analyses are to take into account *all* costs and benefits of a project. With regard to environmental impacts, however, there have been two basic problems even in developed countries. First, environmental impacts are often difficult to measure in physical terms. Second, even when impacts can be measured in physical terms, valuation in monetary terms can be difficult. In spite of such difficulties, a greater effort needs to be made everywhere to 'internalizes' as many environmental costs and benefits as possible by measuring them in money terms and integrating these values in the economic appraisal. The measurement in money terms are made even more difficult in countries undergoing market reforms.

The environmental valuation problems can be summarized as follows:

VALUE OF ENVIRONMENTAL ASSETS

While man-made and human capital may be valued with relative ease by observing existing market systems, where available; the existence value of clean water and air, tropical forests, wetlands, coral reefs and other environmental assets and their functions is much more difficult since not even market prices can reflect their full contribution to other economic activity and to human welfare. In particular, the market price of water does not reflect the various services it provides nor do market values can accurately reflect what happens when irreversible loss or damage of natural resources occurs as environmental degradation exceeds a critical threshold level. Complexity of environmental valuation also arises due to the multiple functions of being a source of raw materials and energy, being a sink for assimilating man-made wastes and providing other services such as recreational/tourism services, storage of genetic diversity and scientific and educational benefits.

The following classification is useful:

- *Direct use* values are derived from the economic uses made of the natural system's resources and services. Examples of these are outputs such as timber, game and recreation from forests or fish and scuba tourism from coral reefs.
- *Indirect use* values are the indirect support and protection provided to economic activities and property by the resource system's natural functions or environmental services. Examples of these are watershed protection and soil erosion prevention provided by forests, and beach sand and mooring facilities protection provided by coral reefs.
- *Non-use* values lie in the special attributes of the natural system as a whole, its cultural and heritage uniqueness; it includes both existence and option values. Existence values reflect public goods which can be enjoyed by more than one consumer without decreasing the amounts enjoyed by others such as clean air, beaches and forests. The existence value is the utility that consumers derive from just knowing the public good exists. A way of measuring that utility would be to measure the willingness to pay or the contingent value assigned if the public good were to disappear. Option values reflect what current generations wish to bequeath for future generations to inherit. They imply both an ethical commitment to sustainabilty for the children of our children and in a shorter time-frame the maintenance of options to solve current problems. Examples of option values have been developed for forests relating to biodiversity and the search for cures of cancer and AIDS - "if forest were to disappear then the options to find such cures will vanish" or "as long as the forest is protected there is the option to find the cure".

Direct Effects Valued on Conventional Markets

Some methods are directly based on market prices or productivity. This is possible where a change in environmental quality affects actual production or productive capability.

Change-in-Productivity. Development projects can affect production and productivity positively or negatively. The incremental output can be valued by using standard economic prices where available.

Loss-of-Earnings. Environmental impacts can significantly affect human health. In theory, the value of health impacts should be determined by the willing-

ness to pay of individuals to maintain their health. In practice, one uses earnings lost upon early death, disease or job absence. This approach is used in highway and industrial safety, and in air pollution studies.

The "implicit value of human life" approach is rejected by many as dehumanizing since human life can be said to have infinite value. However, society, government regulations, insurance companies and judicial courts implicitly and explicitly place finite values on human life and health. This is a necessity reflecting limited resources to be allocated for health expenditures. The relatively high level of health expenditures in Cuba would indicate a high implicit value of human life and health. However, one can also discern a political motivation and its attendant benefits behind it.

Preventive Expenditures. Individuals and governments invest in prevention measures to avoid or reduce unwanted environmental effects. Environmental damages, are often difficult to assess, but historical information on preventive measures and their costs may be interpreted as a minimum value for the expected benefits that the preventive measures seek. If it is found, for example, that there is a historical pattern of under investment in Cuba for natural disaster planning and prevention; then, it can be inferred that the benefits expected from such preventive measures have been very low. This conclusion would in turn imply that the loss of human life would be assigned a relatively low value. While this possible conclusion may appear to conflict with the high political priority for health expenditures, it can be observed that the level of damages or loss of lives caused by natural disasters cannot be easily attributed to government inaction and thus the political cost may be easily explained away.

Potential Expenditure Valued on Conventional Markets

Replacement Cost. Simply, the costs that would have to be incurred in order to replace a damaged asset. The estimate is not a measure of benefit of avoiding damage since the damage costs may be higher or lower than the replacement cost.

Valuation Using Implicit (or Surrogate) Markets

Sometimes one must use market information indirectly. Approaches to be considered are the travel cost method, the property value approach, the wage differential approach, and uses of marketed goods as surrogates for non-marketed goods. Each technique has its particular advantages and disadvantages, as well as requirements for data and resources. One must determine which techniques might be applicable to a particular situation.

Travel Cost. This approach measures the travel cost (and time involved) which reflects the willingness of consumers or users can serve to measure the benefits produced by recreation sites (parks, lakes, forests, wilderness). It can also be used to value "travel time" in projects dealing with fuelwood and water collection.

Property Value. This valuation method is based on the general land value approach and can determine the implicit prices of certain land areas. The property value approach can help analyze willingness to pay for properties with different pollution levels and infer the implicit cost of pollution. The method compares prices of houses in affected areas with equal size and similar neighborhood characteristics elsewhere in the same metropolitan area.

Valuation Using Constructed Markets

Contingent Valuation. When society's preferences as revealed in market prices are not available, the contingent valuation method tries to obtain information on individual preferences by posing direct questions about willingness to pay. It basically asks people what they are willing to pay for a benefit, and/or what they are willing to accept by way of alternate compensation to tolerate an environmental cost. This process may be achieved through a direct questionnaire/survey. Willingness to pay is difficult to measure and depends on the income level of the sample subjects, and involves problems of designing, implementing and interpreting questionnaires. While its applicability may be limited, there is now considerable experience in evaluating the quality of supply of potable water and electricity services.

Artificial Market. Such markets can be constructed for experimental purposes, to determine consumer willingness to pay for a good or service. For example, a home water purification kit might be marketed at various price levels, or access to a game reserve may be offered on the basis of different admission fees, thereby facilitating the estimation of values placed by individuals on water purity or on recreation facilities.

THE DISCOUNT RATE

Discounting is the process by which costs and benefits occurring in different time periods may be compared. The discount rate to be used has been a general problem in cost-benefit analysis, but it is particularly important with regard to environmental issues, since some of the associated costs and benefits are very long-term or irreversible in nature. In standard analysis, past costs and benefits are treated as "sunk" and are ignored in decisions about the present and future. Future costs and benefits are discounted to their equivalent present value and then compared. In theory, in a perfect market, the interest rate reflects both the subjective rate of time preference (of private individuals) and the rate of productivity of capital.

Higher discount rates may discriminate against future generations. This is because projects with social costs occurring in the long term and net social benefits occurring in the near term, will be favored by higher discount rates.

It is often argued that discount rates should be lowered to reflect long-term environmental concerns and issues of intergenerational equity. However, this would have the drawback that not only would ecologically sound activities pass the cost-benefit test more frequently, but also a larger number of projects would generally pass the test and the resulting increase in investment would lead to additional environmental stress.

Many environmentalists believe that a zero discount rate should be employed to protect future generations. However, employing a zero discount rate is inequitable, since it would imply a policy of total current sacrifice, which runs counter to the proposed aim of eliminating discrimination between time periods—especially when the present contains widespread poverty.

In the case of projects leading to irreversible damage (e.g., destruction of natural habitats, etc.), the benefits of preservation may be incorporated into standard cost-benefit methodology using the Krutilla-Fisher approach. Benefits of preservation will grow over time as the supply of scarce environmental resources decreases, demand (fueled by population growth) increases, and possibly, existence value increases. The Krutilla-Fisher approach incorporates these increasing benefits of preservation by including preservation benefits foregone within project costs. The benefits are shown to increase through time by the use of a rate of annual growth. While this approach has the same effect on the overall CBA as lowering discount rates, it avoids the problem of distorted resource allocation caused by arbitrarily manipulating discount rates.

CONCLUSIONS

In order to achieve economically sustainable management of natural resources and environmental protection, one must effectively incorporate environmental concerns into decision making through the EIA process.

This presentation has reviewed concepts and techniques for economic valuation of environmental impacts within EIA procedures. The process of internalizing these environmental externalities can be facilitated by making rough qualitative assessments early on in the project evaluation cycle—the advantages of which would include:

- early exclusion of alternatives that are not sound from an environmental point of view;
- more effective in-depth consideration of those alternatives that are preferable from the environmental viewpoint; and
- better opportunities for redesigning projects and policies to achieve sustainable development goals.

In order to fully reflect society's values and preferences about environmental values, non-market methods of estimation can be used and will enhance commu-

nity participation through well designed and administered questionnaires and surveys. Research and training about EIA and embedded economic analysis methods is needed in Cuba. As developing countries learn to successfully apply EIA methodologies the goals of sustainable development will become more attainable.