CHAPTER 20

The Role of Valuation in Policy Formulation for Biodiversity Conservation

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INTRODUCTION

Environmental economics as a developing and growing discipline plays a role in the identification of efficient natural resource management options for sustainable development (Munasinghe, 1993). It is an essential bridge between the traditional techniques of decision-making such as cost-benefit analysis and the environmentally sensitive approach now emerging. The goals of environmental economics include the incorporation of ecological concerns into the conventional framework of human society. Specifically, environmental economics:

a. explains the causes of environmental degradation;

b. identifies policies in the cost-benefit analysis framework relevant for the sustainable management and resilience of ecosystems;

c. monitors environmental progress or changes through natural resource accounting (NRA), which is subjected to the genuine saving analysis (like GNP) and finally;

d. plays a role in the valuation of environmental assets, specifically those that are not priced.

Valuation is a tool for organising information in an efficient way. Most specifically, valuation is defined as the assignment of a monetary value to economic goods and services and in particular to environmental resources (Maler 1997, Dixon et al 1994). For most conventional goods and services, valuation is done by pricing boards (agricultural pricing) by trade unions and Central banks. However, there exist a substantial number of goods, services and factors of production that are not assessed an economic value at all.

The purpose of the valuation technique is to identify "the correct prices for these goods and services. The value attached to a good is measured from the people's preferences for these goods and services provided by the environment in question which can be expressed in monetary terms. Not all environmental services can be

economically valued at present. For example, environmental degradation like pollution which spans across borders: how much worth is it? Another example is the effect on community co-operation from environmental programmes like the Mgahinga Bwindi Impenetrable Trust Fund in south-western Uganda. The value from co-operation and participation as such cannot be valued and should not be valued because of arbitarity of the resulting value.

This paper looks at why valuation is important and goes further to discuss the valuation techniques that are relevant in policy formulation and analysis of projects and decisions made in biodiversity conservation.

Why is valuation important in policy formulation?

The reasons why valuation is important in policy formulation include:

a. The determination of a precise value on environmental and natural resources is an important step in incorporating the costs and benefits of using such resources into the conventional calculus of economic decision-making.

b. The outcome of valuation enables projects and policies to be re-defined to mitigate harmful environmental and social effects.

c. Valuation contributes to the analysis of impacts of macroeconomic policy changes as well as developing the evolving concept of natural resource accounting, so-called "green accounts" (Sinden and Worrel, 1979, Hufschmidt et al 1983; Dixon 1986; Winpenny 1991; Munasinghe 1993).

d. It demonstrates in economic terms the value of biological resources to a country's social and economic development (McNeely, 1993). This would provide a justification for more effective government action, often through the use of economic incentives for conserving resources (McNeely, 1988).

e. The values derived from the valuation process help in the identification or approximation of the optimum either at the *ex ante*, that is to say before deciding on a type of regulation, or *ex post* after a regulation has been imposed, to see if the regulation has achieved the desired optimum (Turner and Pearce, 1993). The optimum being defined as that level of welfare where society is as well off with a change in environmental quality as they were before the change, thus achieving economic conditions of pareto efficiency (Varian, 1993).

f. Valuation demonstrates the importance and effectiveness of environmental policy. For instance, how relevant is the introduction of the multiple-use policy or revenue-sharing in the conservation efforts of the Uganda Wildlife Authority (UWA)? The question is difficult to answer because many of the benefits of such policies do not show up in the form of immediate gain. The benefits may be found in the local community's quality of life rather than in any increment to a nations economic output. Alternatively, it may be found in the improved park relationship between the local community who were once denied access to the park and the park management authorities.

g. The notion that the environment is a "free good" is eliminated because of the absence of markets in them. Placing values on the goods and services produced by Bwindi Impenetrable Naional Park (BINP), Mt. Rwenzori, Semuliki and Kibale national parks helps societies learn that natural environments are not free goods; they have bounds to what they can provide (OECD, 1992). Not valuing them perpetuates the "free good" syndrome and anything that is free tends to be over-exploited. Valuation in this case corrects the economic distortion in the market-place.

h. Valuation serves the quasi-political end of demonstrating that natural environments matter. This is important in countries where development activities, including agriculture and the building of highways have sometimes been implemented to the detriment of the tropical rainforests and other natural environments (Grainger, 1993). What is even important is the need to demonstrate the value of these resources to the local governments living in and around these natural environments. "Importance " is often best demonstrated by putting the environment on the same economic footing as the benefits of economic development, that is to say by using money values.

VALUATION TECHNIQUES

From the economic standpoint, the total economic value of a resource (TEV), or when considering projects which involve considerable change in land-use (Irreversible), it may be useful to consider the total economic value of the area, both prior to the development and subsequently after the development. The determination of the total economic value of the environment should enable more rational decision-making as planners and politicians will be able to compare like with like (money with money) and they will be able to see the true value of biodiversity or environment. TEV includes both the marketed and non-marketed goods. The total economic value is categorised into the following values:

Use values

a. ***Direct-use values***: Direct-use values are the resources and services provided directly by the resource. These include the use of forests and wetland for timber and for recreation or fishing, respectively.

b. ***Indirect-use values***: These are the benefits derived from ecosystem functions such as a forest's function in protecting the watershed, nutrient cycling, air pollution reduction and carbon. These have monetary values which, if included by planners in their plans, will serve to protect the environment.

c. ***Option value***: This relates to the amount individuals would be willing to pay to conserve a resource or some part of it for future use (I don't use it now, but I may in the future). This is like an insurance premium, value or bond.

Non-use values

These values are difficult to describe but several authors have recognised the following divisions:

a. ***existence value***: The value associated with the knowledge that the resource exists. Existence value is unrelated to current use or option values. For example, the people from the western world who make monetary contributions for the conservation of certain ecosystems or species of animals and plants like the Mt. Gorilla in Bwindi Impenetrable National Park in Uganda and yet they will never see them. They will be satisfied to know that the Mt. Gorilla exists.

b. ***Vicarious use value***: This represents the enjoyment received by people from the picture, print and broadcast media.

c. ***Bequest value***: The satisfaction derived from protecting a resource for future generations.

d. ***Stewardship values***: The value derived from guarding or protecting a resource.

e. ***Cultural value***: The satisfaction derived from religions or cultural beliefs.

f. ***Intrinsic value***: This refers to the resources value "in and of itself" (some say this is equivalent to existence value).

In summary, we may write: TEV = UV + NUV or,
TEV = [DUV + IUV + OV] + [NUV]

Figure 1 shows the categories of economic values attributed to environmental assets. From the left-hand side, values are highly tangible and become progressively less towards the right-hand side. This determines the valuation technique that is most appropriate in each case.

Critique of total economic value

a. Not all values of any ecosystem can be captured; what is valued is merely economic values. What valuation does is to capture instrumental values.

b. Ecologists believe that TEV is not the whole economic story. Some underlying functions of ecological systems which are prior to the ecological functions that have not been discussed fully such as watershed protection, recycling of nutrients and biodiversity conservation are not captured. These are called primary values (Turner, 1992). These are systems characteristics upon whichall ecological functions are contingent. There cannot be a watershed protection function, but the underlying value of the system as a whole. There is a glue that holds everything together and it has an economic value. If this is plausible, then thee is a total value to an ecosystem/ ecological process which exceeds the sum of the values of the individual functions.

TECHNIQUES USED TO DETERMINE UNPRICED VALUES

Table 1 categorises valuation methods according to which type of market (conventional, implicit, or constructed) they rely on, and by considering how they make use of actual potential behaviour. Each of the techniques is briefly described under the conventional, implicit, and constructed markets.

1. Conventional market

Under this category we have the effect on production, effect on health and defensive or preventive cost. They are based on the actual market behaviour.

a. ***Effect on production***: Externalities associated with projects may affect the output, costs and profitability of producers through their effect on their environment and the welfare of consumers through changes in the supply and price of what they consume, thus altering the consumer surplus. The value of the change in output may be taken as a measure of the environmental impact

which caused that change. For example, denied access of forest resources to the local communities may cause a rise in price of the products due to a decline in the quantities harvested from the ecosystem. Another example is water pollution, which may effect the value of fish caught from a fishery. This is a widely-used and intelligible technique.

b. ***Effect on human health***: In this approach, humans are treated as units of economic capital and their earnings as returns on investments. The technique focuses on the impact of bad environmental conditions on human health, and values this as being equivalent to the reduction in earnings it causes the individuals and society. It determines the economic costs of environmental-induced illness. The assumption that output is related to labour will not be realistic in all situations.

c. ***Preventive or defensive costs***: The value that people place on their environment may be inferred from what they are prepared to spend to prevent its degradation (preventive expenditure).

d. ***Replacement cost***: This is the cost incurred to restore the environment to its original state after damage has already occurred. For example, the recent three (3) giraffes transported from Nakuru national park, Kenya to Kidepo valley national park in north-eastern Uganda is a good case in point.

e. ***Shadow projects***: Shadow projects are a special case of replacement costs in which the expected environmental damage is offset by the inclusion of a project that would replace the lost environmental service (e.g. planting new trees to make up for those chopped down during a development). This offsetting project can be real, in which case it is an actual cost to the original scheme or notion, where it serves as an appraisal device and establishes that there would be sufficient resources generated by the project to provide compensation if desired. The recent degazetting of 1,000 ha from Namanve by the Forest Department about 10 km to the east of Kampala is a very good example. The degazetting was for industrial development and an equivalent amount of land is supposed to be bought somewhere else and planted with trees.

2. Implicit market

The techniques in this category are all based on actual behaviour. These include travel cost, wage differential, property values and surrogate goods.

a. ***Travel cost method (TCM)***: The value people place on a good's environmental location is inferred from the time and cost they incur in travelling to it. This approach derives values by studying the recreationist's behaviour, particularly costs in relation to travel. Although this is a widely used technique, there are a number of shortcomings:
   (i) assumes a single purpose trip;
   (ii) assumes that the cost of travel is equivalent to entrance fees in its ability to limit use;
   (iii) assumes that the same amount of wealth in each travel zone;
   (iv) gives the value of particular recreation site, but does not allow alternatives to be analysed;
   (v) takes no account of option value or existence value;
   (vi) requires a lot of data collection expensive to collect and analyse;
   (vii) difficult to determine the shadow value of a recreational traveller's time;
   (viii) TCM tends to provide estimates near the upper limit of indications of willingness to pay;
   (ix) difficult to identify and model changes in environmental quality.

b. ***Hedonic pricing/surrogate market***: In the absence of a direct market for environmental quality, the value may be derived from the prices of surrogate goods the most common of which are property and labour.

(i) *Land value approaches*: This technique values an environmental good on the basis of an inferred market value for properties. The demand for property is affected by its characteristics from which consumers derive utility. Supply is affected by the opportunity cost of providing properties with such characteristics. A change in the price of a property may result from a change in any one of the property's characteristics or in the opportunity cost of providing the alternative.

(ii) *Wage differential approach*: This is applied to derive value placed on pollution or degree of risk of a job. The differences in wage levels for similar jobs can be expressed as a function of different levels in job attributes that relate to working and living conditions in the area where the job is. For example, a higher wage is necessary to induce workers to work in areas affected by air pollution or to work with radioactivity. However, the limitations of the surrogate market approach include:

(a) there are large data requirements and needs statistical competence in generating and interpreting results;

(b) the estimating equations are highly sensitive to decisions about specification and estimation;

(c) the environmental variable must be capable of being measured (both to the scientist and to the population as a whole).

3. Constructed markets

Contingent valuation method (CVM) falls into this category. It is also referred to as survey based methods. CW uses survey methods to measure benefits by estimating either the consumers willingness to pay (WTP) for a good or service or consumer willingness to accept compensation (WTA) for the prospective loss of a good or service. The CW has problems including:

A. Bias: There are four (4) types:

1. strategic – over or understate case deliberately to influence result;

2. information – WTP may be affected by amount of information available onto which to base valuation;

3. instrument – choice of bid payment (i.e. tax or entrance fee) or initial bid level;

4. hypothetical – the situation one is reacting to is completely hypothetical and unrealistic and therefore leads to bogus responses.

B. CVM does not use observations of actual market behaviour, and does not test consumer's effective demand by requiring them to back up their opinions with cash.

C. Grossing up from a survey to the relevant population (what is the relevant population).

D. As no cash changes hands, there is no constraint on what people can bid in successive WTP exercises.

CONCLUSION

Environmental economics and the valuation of environmental effects on biodiversity play a critical role in providing a common numeraire or basis for comparing a variety of different outcomes, from the viewpoints of many sectors. Furthermore,

they also play a key role in facilitating pragmatic and efficient trade-offs among alternatives and policies. The limitation of economic methods have to be understood and continually kept in mind if they are to be used successfully in valuation processes. Value judgements about distribution and irreversible effects are unavoidable, but quantification in monetary terms of as many variables as possible is important in crystallising those issues involving implicit value judgements, which may otherwise be ignored.

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