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How Useful Is Ecosystem Valuation?

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How do we know when something, such as an ecosystem, is worth conserving? Many people, including many non-economists, would probably agree with the general proposition that we should conserve things when the benefits of doing so exceed the costs. Even those who assert that ecosystems have intrinsic worth, when pressed, are unlikely to agree to devote all available resources to conservation. Of course, while the cost of conservation is generally relatively easy to measure (which does not mean that it is not often mis-measured, with opportunity costs, in particular, often left out), the same is generally not true of the benefits.

Valuation of environmental benefits promises to fill this gap and guide conservation decisions. Accordingly, there has been a proliferation of valuation studies in recent decades, with a wide variety of methodologies being developed and refined.

Such valuation studies have considerably increased our knowledge of the value of ecosystems. Their usefulness has often been undermined, however, by a failure to properly frame them so as to address the specific question of interest. Moreover, even when the valuation is done right, it rarely seems to result in increased conservation, as knowledge of ecosystem value seldom results in a corresponding increase in conservation financing.

Much more useful than valuation studies in actually conserving ecosystems is the establishment of mechanisms which seek to capture at least part of ecosystem value and channel it to conservation. Although valuation can help guide the establishment of such mechanisms, many mechanisms will reveal the relevant values as part of their operation.

Quite aside from the frequent misuse (not to say abuse) of valuation techniques (replacement cost, contingent valuation, and benefit transfer are particularly egregious in this regard), valuation is most often done wrong because the analysis is not framed correctly. The seemingly simple question, "how valuable is an ecosystem?", can be interpreted in many different ways. It could be interpreted as asking about the value of the current flow of benefits

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provided by that ecosystem, for example, or about the value of future flows of benefits. It could also be asking about the value of conserving that ecosystem rather than converting it to some other use. These interpretations of the question are often treated as being synonymous, but they are in fact very different questions, and the answer to one will not be the correct answer to another.

Many people think that the relevant question in terms of valuation is *the value of the total flow of benefits from ecosystems*. This question is most often asked at the national level, but can also be asked at the local, regional, or global level (although, methodologically, answering the question becomes increasingly problematic at larger scales). It can either consider all benefits provided by an ecosystem or, more commonly, only one such benefit (say, recreation or carbon sequestration,). Such studies provide some important insights.

First, they can demonstrate that seemingly "worthless" land uses may in fact be quite important to the economy, and clarify the relative importance of ecosystem services to total economic output. Second, when all benefits are measured, the composition of benefits can provide an indication of how likely it is that ecosystems are being managed optimally. Land use decisions are generally made by groups who mainly receive direct use benefits. Such groups often have strong incentives to manage land so as to maximize direct use benefits, and pay little or no attention to the consequences for other benefits. Thus, the greater the share of an ecosystem's benefits provided by indirect, option, or existence values, the less likely it is that that ecosystem is being used optimally. In general, however, the answer to this question, even when value is measured correctly, provides very little guidance to policy. That an ecosystem is providing a flow of benefits worth a million dollars a year does not mean, as many seem to think, that we should be spending up to a million dollars a year to protect it. That would only be true if degradation would result in the total and instantaneous loss of all benefits, and if conservation were completely effective at preserving all ecosystem benefits. (Even then, spending close to a million dollars to preserve a million dollars worth of benefits would be a poor investment, with many other uses for that million dollars likely providing better returns.)

To assess whether a specific conservation intervention is worth undertaking, we must know two things: what would happen if we did nothing? And, what would happen if we did intervene in a specific way? A much more useful way to frame the valuation question, then, is to ask *how the net benefits of an ecosystem change in response to interventions that alter ecosystem conditions*. This question differs fundamentally from the previous question in that it asks about *changes* in flows of costs and benefits, rather than the sum total value of flows. This approach

can be applied to assess the likely results of a deliberate intervention, or to examine the consequences of on-going trends such as deforestation. The scale of the analysis is determined by the scale of the intervention being considered. Estimating changes in ecosystem benefits and costs is sometimes easier than estimating the value of the total flow of benefits of an ecosystem, because the analysis can focus on only those benefits and costs which are affected by the proposed conservation action.

The main challenge in getting the right answers to this question is not usually one of valuation per se—rather, it is the difficulty in estimating the changes in the quantities of services that would result from the intervention. Valuation techniques can tell us how much an extra cubic meter of water is worth, but cannot tell us how many more or less cubic meters we will get if a watershed is deforested or reforested. It is this lack of suitable scientific information, rather than limitations of valuation, that usually prevents this question from being answered. Rather than spending considerable efforts fine-tuning valuation techniques that may never be applied satisfactorily, economists might more usefully be working with natural scientists to ensure that the latter are providing information in ways that are useful to economic analysis. Alas, that is not how incentives are structured for environmental economists. A tweak of a theoretical model will get one published and tenured, while much multidisciplinary work will seem pedestrian to other economists and languish in the grey literature. Thus, the recent-concluded Millennium Ecosystem Assessment struggled to attract any economists at all to its conditions and trends working group, while economists flocked to the sexier scenarios working group.

Ultimately, however, a well-executed valuation is no more likely to affect conservation policy than a poorly-executed one. (Indeed, a cynic may well believe the opposite to be true.) The literature is by now full of studies that, sometimes reliably and sometimes not, tell us how much an ecosystem is worth, or how much that value will change if it degrades, and yet those ecosystems continue to degrade. Knowing that ecosystem services are valuable is of little use if it does not lead to real investments in conserving the natural ecosystems that provide them. Simply knowing that a protected area provides valuable watershed protection benefits, for example, does not pay the salaries of park rangers. If economists had but a tenth of the influence that non-economists imagine them to have, the world would be a very different place.

To have a concrete impact on conservation, it is thus much more useful to find ways to capture and internalize at least some of the ecosystem benefits that are currently outside markets. Here valuation can provide guidance, even if it is only partial. In particular, examining *how the costs and benefits of ecosystems are distributed* can provide very important insights.

Understanding which groups are motivated to conserve or destroy an ecosystem, and why, can help to design more effective conservation approaches. From an equity perspective, the impact of degradation or conservation on particular groups, such as the poor or indigenous peoples, is also often of significant concern in and of itself. Understanding the distribution of costs and benefits can also help *identify potential financing sources for conservation.* Valuation can help identify the beneficiaries of conservation and the magnitude of the benefits they receive and, thus, help design mechanisms to capture some of these benefits and make them available for conservation.

Note that, in many cases, even a crude and unquantified assessment of who receives what benefits and bears what costs may be sufficient. Consider, for example, a payment for environmental service (PES) mechanism, in which the users of an ecosystem service, such as clean water, compensate the managers of the ecosystem that provides that service for managing it appropriately. To determine whether such a mechanism could work, it is sufficient to have a very rough idea of the relative costs and benefits. To ensure that there is "room for a deal", the benefits received by the service users must exceed the costs borne by service providers plus the transaction costs of the mechanism. Very rough order-of-magnitude estimates of costs and benefits are more than enough because, ultimately, the parties who actually bear the costs or receive the benefits are at the table and are more than able to look after their own interest. The service providers will not accept a payment that is below their cost of providing the service (including opportunity costs plus any out-of-pocket costs), while service users will not offer a payment that is higher than the value of the service to them (minus the transaction costs of the mechanism). Moreover, because a PES mechanism is, by its very nature, an on-going arrangement, there is plenty of scope for both to learn about their true costs and benefits over time and revise their willingness-to-accept or willingness-to-pay accordingly.

To actually convince service users to pay for services, valuation is actually not necessary. Water users know perfectly well how much an extra cubic meter of water is worth to them and do not need an economist to tell them. (Besides, economists are only likely to have this information if they asked the users in the first place!) What water users need to know is how many more cubic meters they will receive if the PES mechanism works. So again, the main limitation is one of scientific knowledge rather than valuation. (An important caveat here is that when PES is based on government funding or on mandatory user fees—i.e., "supply-side" PES—rather than voluntary payments by service users, then getting valuation right becomes very important indeed, as only then will the PES mechanism have any chance of being efficient.)

Valuation can thus play a very important role in enhancing conservation decisions, if properly employed, although ironically, in practical terms, obtaining actual numbers is seldom the most useful part of the exercise.

Approaches to Valuation

Approach	Why do we do it?	How do we do it?
Determining the total value of the current flow of benefits from an ecosystem	To understand the contribution that ecosystems make to society	Identify all mutually-compatible services provided; measure the quantity of each service provided; multiply by the value of each service
Determining the net benefits of an intervention that alters ecosystem conditions	To assess whether the intervention is economically worthwhile	Measure how the quantity of each service would *change* as a result of the intervention, as compared to their quantity without the intervention; multiply by the marginal value of each service
Examining how the costs and benefits of an ecosystem (or an intervention) are distributed	To identify winners and losers, for equity and practical reasons	Identify relevant stakeholder groups; determine which specific services they use and the value of those services to that group (or changes in values resulting from an intervention)
Identifying potential financing sources for conservation	To help make conservation financially sustainable	Identify groups that receive large benefit flows, from which funds could be extracted using various mechanisms

Source: Pagiola, von Ritter, and Bishop, 2004

Further Reading

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