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EDITORIAL

Ecosystem services and poverty alleviation: assessing the constraints and opportunities

Adrian Martin, Andrew Blowers and Jan Boersema

The ways in which human relationships with nature are framed are in part a product of the social conditions of the day (Glacken 1967). We have mentioned in previous editorials that these conditions can also influence society's receptivity to scientific agendas and it should perhaps be no surprise then that essentially market-based conceptualizations of human connections to nature have flourished in recent decades. Some argue that the Ecosystem Services (ES) scientific framework, as popularized through the Millennium Ecosystem Assessment (MA 2005) is itself a hybrid of scientific synthesis and political context. Norgaard (2010) goes further than most in arguing that its central scientific axioms are supported by neither state of the art ecological nor social sciences, and are bolstered by blind faith in market mechanisms. Despite such criticism, the ES framework has in a fairly short period of time become heavily used as a means of supporting market-based approaches to conservation and development. Because of this influence, it is timely to ask questions about how useful the framework currently is and what research agendas can contribute to improvement. In doing so we raise some weighty concerns about current knowledge of ES and these cautionary words are in part aimed at those implementing large ES-based programs such REDD, and suggestive of a research agenda that needs to accompany and support this and future ES initiatives.

We are particularly interested in the effectiveness of the ES framework at integrating objectives of environmental conservation and social welfare. We are not in a position to empirically assess the impacts of ES projects because so few actually measure change in service production (Tallis et al. 2008: 9464). This is due to difficulties and expense in measurement, and also we should add because there is not a strong tradition of rigorous impact evaluation in conservation, especially in developing countries. However, we can try to respond to more general frustrations expressed by practitioners about the gap between progress in science and in practice: why has work on the theory and measurement of ES value progressed faster than activities to realize that value for the rural poor who in theory have much to gain from being cast into service provision roles. Following a brief summary of the ES framework and its potential utility, we consider two main weaknesses and opportunities for progress: first, the need to engage with complexity through understanding the relationships between multiple services (this issue problematizes the assertion that ES approaches are inherently pro-poor) and second, the need to more thoroughly understand the role of institutions in mediating drivers of change

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and in determining the possibilities of markets (this issue problematizes the assertion that ES approaches are inherently cost-efficient).

The ecosystem services framework

The ES approach is less a departure from and more an extension of previous ways of conceptualizing the dependence of human wellbeing on natural functions and resources. In environmental studies, for example, the "four capitals" model of sustainable economic development (Ekin 1992) highlighted the role of human, social, manufactured and natural capital, whilst in international development, the "sustainable livelihoods" framework has at its heart an asset pentagon that also includes the more liquid "financial capital". Such conceptualizations have gone hand in hand with concerns about natural assets not having market values, the corresponding failure of markets to sustain the contributions of these assets to human wellbeing, and the need for economic techniques to measure natural capital as a pre-requisite for solving the problem. The ES framework follows this work in the sense that it highlights the crucial role of natural capital in securing human wellbeing. It identifies a typology of benefits that humans get from natural functions: provisioning services such as fuels, foods and medicines; regulating services such as climate and river flow regulation; cultural services such as spiritual and recreational benefits; and supporting services such as nutrient cycling and pollination. Biodiversity is conceived as underpinning many of these services and one of the contributions of the ES framework is to describe more specifically, and make more tangible, the contribution of biodiversity to human welfare. The Millennium Ecosystem Assessment found that 15 out of 24 services studied were declining, as a result of multiple direct and indirect drivers. Direct drivers included land use change, changing agricultural practices, over-harvesting and climate change. In this way, the framework also provides an entry point for identifying priorities, such as the need to change behavior relating to direct drivers of change (e.g. reduce conversion of forest land to farmland), and the actions to achieve these priorities, including markets that foster service protection and provision (e.g. carbon offset markets that fund forest conservation or reforestation). The appeal of this analytical framework is enhanced by at least two further potential advantages. Firstly, the kind of interventions identified often have some potential for transfers of resources from the wealthy to the poor, on the basis that those who are willing to pay for ES tend to be wealthier (e.g. downstream farmers with irrigated land, hydro-electricity producers, urban consumers, long-haul tourists) whilst those capable of providing the service are often poorer (those living in proximity to stocks of natural capital such as biodiverse forests and wetlands). Secondly, there seems to be some expectation of efficiency gains arising from the belief that markets for service provision have lower transaction costs than governmental or other forms of provision.

The limitations of "mono-service" science

It is a decent rule of thumb that the poor are vulnerable to any change in environmental management however benign it may appear on the surface. So let us premise our first concern, regarding the need to investigate relations among multiple services, by stating that an ES evaluation framework can have both positive and

negative outcomes for the wellbeing of the vulnerable. ES are descriptors of benefits to humans: they are anthropocentric values. Conversely, they are not objective entities lying in wait to be described and measured: they are socially constructed. This is important because it means there are choices about what to value, how to value it, over what temporal and geographical scales, and indeed whose value systems count. These choices have impacts that quickly go beyond academic citations, through policy uptake in environmental NGOs, governments and global institutions. And the impacts of these choices are not homogenous across society, they are disaggregated by location in time and space, by livelihood activities, gender and many variables besides. Thus, for example, the choice to measure the value of a landscape for international nature tourism may lead to a management regime that privileges this over other services that are more important to local livelihoods: the rural poor often have more immediate demand for provisioning services. Similarly, the measurement of carbon stock in a forest as a proxy for climate regulation, may lead to a form of management that privileges global concerns over local ones, further marginalizing vulnerable forest-dependent people.

The ES approach has to grapple with some important issues related to value, including the scientific capacity to understand value, the choice of what to value, and choice of procedure. Regarding scientific capacity, Nelson et al. (2009) state that there have been two main approaches to ES evaluation: first, there have been broad assessments of multiple services at the large scale, assigning values to types of habitat and large systems up to planetary level. Second, an emphasis on modeling single services at smaller scales to understand the ecological production function. What is really needed, they argue, is a combination of the breadth of the multi-service approaches with the rigor of the mono-service assessments. Regarding choice of what to value, there are different takes on the bias that is introduced here. Historically it is fair to say that there has been greater emphasis on provisioning services and that many current environmental problems are the result of the failure to predict or prevent how this would detract from the provision of other types of service. More recently, there is a shift towards measuring regulating services, in particular climate, hydrological and soil conservation services, and a corresponding proliferation of programs to incentivize land uses that support these, such as China's Sloping Land Conversion Program and Mexico's system of payments for hydrological services. There is some evidence that a focus on regulating services might be a good compromise (given issues of scientific capacity) because the regulating services tend to underpin system resilience and are supportive of other services (Bennett et al. 2009). However, compromise driven by uncertainty is still not an ideal outcome due to the strong potential to privilege the wealthy over the poor, and also the possibility of privileging the current generation over the future. The latter issue might arise where provision of regulating services trades off against provision of supporting services such as soil formation that typically occur over longer time-scales. Regarding choice of procedure, one concern is that market-based approaches privilege services that can be valued through real or proxy markets, and privilege those groups of people whose economies are market rather than subsistence oriented. Arguably, valuation systems based on preferences revealed by markets, or expressed via hypothetical markets, are inherently biased against the "subsistence poor" in developing countries and incapable of representing their interests. This suggests that the challenge of understanding multiple ES not only involves the integration of values that accrue and are held at different scales, but also potentially

the refinement of alternative systems of valuation that incorporate market and non-market values.

There is currently an active research effort to better understand the tradeoffs and synergies among different ES. Some studies have found spatial concordance between different services, suggesting synergies and win–win management scenarios, but others have found that most services are not good surrogates for other services (Bennett et al. 2009). This has profound management implications and highlights the potential significance of decisions already being taken. This includes the current emphasis on climate change which has driven both the science and financing of managing carbon/climate services across a variety of landscapes. To state the problem bluntly: we do not know what the relationships between services are and yet interventions proceed as if we do, or at least as if no undesirable tradeoffs exist; we do not know whether there are variables that serve as good surrogates for provision of a range of services, and yet interventions typically employ land use in precisely this way, for example assuming that measuring conversion of farm to forest is a surrogate for measuring a range of ES; and we certainly do not know whether relationships are linear, but we act as if they are.

Bennett et al. (2009) suggest that ES relationships can be investigated along two axes: the interactions between different services, and the way in which different services respond to the same driver of change. In the long-term, understanding such relationships could make the ES framework considerably more powerful as an analytical tool and as a basis for selecting projects and policies which pursue multiple objectives. Firstly, such understanding would help to identify opportunities for synergies between services which could lead to cost-efficiencies. For example, Asquith et al. (2008) describe payments for ES scheme in Bolivia in which two different services (bird conservation and hydrological services) are purchased by two different buyers from the same service providers. In this particular case, the synergy is only assumed to stem from a common surrogate of maintaining forest cover land use; a stronger scientific basis is likely to increase such possibilities for cost saving partnerships. Secondly, such ''bundling'' of multiple values may serve to empower the poor through more inclusive procedures, and serve the poor through attracting greater income transfers. Thirdly, it may help to identify and monitor emerging tradeoffs as a means of supporting adaptive management.

Institutions

The second weakness we identify in existing ES science is the limited understanding of the role of institutions in the governance of both science and policy. We have noted that the rapid rise of the ES framework and its policy uptake should be understood in the context of dominant political economic orthodoxies and especially market ideologies that see commodification as the best way of (re-)connecting individuals to nature. The idea that we can adopt market-based approaches divorced from close attention to institutional context is fanciful at any scale of analysis and is a particular risk for international ES programs such as REDD which will operate across diverse political economies and institutions. Any approach that underplays the importance of institutions ignores the history of disappointment and injustice that has too often characterized attempts at environmental conservation in developing countries. We need to ask questions about what institutional arrangements, and what broader systems of governance, can support the transition from understanding

the values of ES to capturing those values and distributing them equitably and sustainably. And as Norgaard (2010) pleads with respect to ES research and application, we need to overcome the current separation of the science of ecosystems from the science of social organization.

Regulating and supporting ES are often common pool goods and therefore government policy is often needed to create institutional conditions that enable individuals (or collectives) to receive the benefits for services they provide, including appropriate institutions of tenure and property. In Brazil, for example, it was necessary to pass federal laws to recognize ES as legitimate services for state procurement (Hall 2008). At a more local scale, it is typically acknowledged that local institutional arrangements are needed for ES approaches, and especially so if they are to be pro-poor. Even with improved understanding of relationships between multiple services, and the possible tradeoffs among the interests of different stakeholder groups, there will still be a case for government to play a role in social protection because the most vulnerable members of rural communities often have least to gain initially from the incentivization of conservation oriented activities, and the most to lose. For example, in many cases, land ownership is a condition for benefiting from payments for ES schemes and in some cases the creation of such schemes trigger a tightening up land tenure claims, with the potential to further marginalize the poor (Asquith et al. 2008). In many other cases, it is the poor who are most dependent on common property resources such as firewood and grazing. Furthermore, participation as beneficiaries is not just about access criteria and opportunity costs, but about community institutions that can mobilize participation and subsequently implementation: effective collective action amongst service suppliers can be a key to success (Bulte et al. 2008). In practice, projects to incentivize ES provision involve time-consuming, complex and often pragmatic engagement with formal and informal institutional contexts from local to international scale. This is not restricted to government and civil society, but also to the private sector, with for example banking systems that are not always well disposed to providing credit, for example planting trees. There is also a need to look at the dynamics across institutions (Corbera et al. 2009), for example to ensure that programs of agricultural subsidies do not directly contradict programs to subsidize forestry. That is the reality of what ES driven projects and policies require if they are to even get off the ground and succeed in the long term. Whilst much of the understanding that informs this work must be context specific, there are also possibilities for learning more generalizable lessons regarding what works in what context and what are likely institutional conditions for "success", however that is defined.

By way of an ending, it is worth noting that much of the interest in ES and payments for ES is currently directed towards developing countries and is tied to poverty alleviation agendas. This geographical focus very much underlines the importance and urgency of the limitations we identify, because here they are often at their most acute. Environmental governance institutions are often weak, have failed to support previous approaches to conservation (such as fences and fines and community-based natural resource management) and are often poorly resourced. The science is often weak and extremely costly to construct owing to the lack of existing datasets relating to single services, let alone relations between them. Valuation faces stronger methodological challenges owing to the lack of market

integration and the bias of market-based approached. Securing poverty alleviation alongside ecosystem service provision is complicated by differences of interests within local communities which require deep and fine-grained analysis if anything like a useful understanding is to be achieved. This is not intended as a negative message, but a frank assessment of the learning challenge in front of us, and reading between the lines, the importance of interdisciplinary approaches.

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