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Analysis

Assessing the contribution of ecosystem services to human wellbeing: A disaggregated study in western Rwanda

Neil Dawson *, Adrian Martin

School of International Development, University of East Anglia, Norwich Research Park, Norwich, Norfolk NR4 7TJ, United Kingdom

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ABSTRACT

Lack of attention to social complexity has created a gap between current ecosystem service research and the kind of insights needed to inform ecosystem management in the tropics. To contribute to closing this gap, this study applies a methodology for exploring complex linkages between ecosystem services and human wellbeing. This builds on emerging frameworks for studying multiple dimensions of human wellbeing, drawing on Amartya Sen's capabilities approach to human development. The approach is applied to an empirical case study of three sites adjacent to native tropical forest in western Rwanda. The value of exploring social complexity in ecosystem services research is illustrated through its contribution to understanding a) different types of values; b) disaggregation of people; c) power relations and their influence on trade-offs; d) the importance of multiple land use types in the landscape; and e) changes and their drivers at multiple scales. The analysis reveals that the majority of services valued by forest-adjacent Rwandan inhabitants are not provided by tropical forests but by other habitats. We suggest that more integrated landscape governance may offer synergistic opportunities for conservation and development.

1. Introduction

Much ecosystem service research has attempted to recognise the economic value of nature to global stakeholders, assuming that fuller valuation of nature's services will lead to clearer specification of governance trade-offs, increased investment in natural resource conservation, and consequent gains for human wellbeing (Gómez-Baggethun et al., 2010; Norgaard, 2010). However, this direction has been criticised for failing to embrace the complexity inherent in social-ecological systems and, as a result, failing to find long-term solutions which might promote the achievement of social as well as ecological objectives (Carpenter et al., 2009; Ostrom and Cox, 2010; Lele et al., 2013). Combining both objectives is already well enshrined in policy. For example almost three quarters of international financial aid directed towards biodiversity conservation explicitly details joint conservation and development aims (Miller, 2014). Furthermore, there is a widely held view that social outcomes should be equitable, as is now specified in formal conventions such as the Nagoya Protocol of the Convention on Biological Diversity and voluntary agreements such as the Conservation Initiative on Human Rights (Sikor and Stahl, 2011; Martin et al., 2013).

This paper makes a contribution towards better understanding the linkage between ecosystem services and human wellbeing, as a necessary step towards more effective and equitable integration of ecological and social objectives through ecosystem service governance. It unpacks some of the local realities of these linkages through the application of a multidimensional wellbeing approach. In doing so, it responds to five current weaknesses that are common in ecosystem service analysis. We refer to these weaknesses as five (interrelated) instances of socio-ecological reductionism, as summarised in Table 1:

a) Failure to consider different types of values: The way in which people value ecosystem services are often represented as monetary values. This fails to recognise that different people may value a similar ecosystem service differently based on how it contributes to their wellbeing (Jax et al., 2013). For example collection of food from a forest may be important for the very survival of one person, provide a source of income for a second, and provide a way of caring for ancestors for a third. Those three people may react quite differently to changes in governance of that resource. Each individual may themselves value a resource in multiple ways, making different claims about value in different social contexts (Sen, 2007). Understanding this plurality of ways of valuing ecosystem services is critical to identifying suitable ways to manage trade-offs and to promote adaptive management of complex social-ecological systems (Folke et al., 2005; Norgaard, 2010).
b) Aggregation of people and their preferences: Simplified approaches to complex human-environment problems may lack policy relevance due to a tendency to aggregate people across large scales (Ostrom and Cox, 2010; Duraiappah, 2011). For example average statistics may suggest that the population of an entire region are

* Corresponding author.
E-mail address: Neil.Dawson@uea.ac.uk (N. Dawson).

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Table 1
Simplifications of social complexity common to ecosystem services research.

	Problem to be addressed	Illustration of problem	Lesson for ecosystem service framing
Failure to consider different types of values	Assumed singularity of value and under-emphasis of some value types, such as non-material and subsistence values	Under-emphasised values are more likely to be priorities for less powerful groups, and also a cause of their marginalisation	Investigate subjectivity and plurality
Aggregation of people	Assumed homogeneity of values and interests within and between stakeholder groups.	Potential winners and losers of intervention or change are not recognised	Need for fine-scale, differentiated understanding of stakeholders and impacts upon them
Oversight of power relations	Assumed power symmetry among stakeholders. Interests of marginalised remain invisible	Attempts to alleviate poverty or reconcile needs of marginalised groups unsuccessful	Specific attention to be paid to relative power between identified stakeholders
Focus on single land use type (e.g. native forests)	Narrow focus only on core areas of interest to ecosystem managers	Poor assessment of use of wider landscape; oversight of threats and opportunities for synergy and trade-offs	Research into matrix of habitats in wider landscape as deemed important by local populations for wellbeing
Lack of attention to changes and their drivers at multiple scales	Links between ecosystem and wellbeing considered as operating in isolation, treated as closed to external influence	Unforeseen changes in wellbeing which represent threats or opportunities for ecosystem management	Research into multiple factors affecting wellbeing of stakeholders

poor smallholder farmers (Vedeld, 2004; Shackleton et al., 2007) who all share the same interest in maintaining forest cover to provide regulating services to maintain their agricultural output (Byron and Arnold, 1999). However, similarly to point 'a)' above, such simplification may result in a lack of recognition of winners and losers, whether materially or socially and culturally (Daw et al., 2011). Understanding differences in people's land use preferences and how they may be impacted by environmental management requires finer-scale social understanding (Long and Ploeg, 1989; Wollenberg and Springate-Baginski, 2009).

c) Oversight of power relations: Failure to understand the power and politics surrounding ecosystem trade-offs can lead to the assumption that conflicting objectives of different interest groups can be easily managed, for example through material redistribution (Wegner and Pascual, 2011). To understand the nature of trade-offs, both at local and wider scales, requires methods which embrace both plurality of interests, and differences in power (Edmunds and Wollenberg, 2001). Power is exercised through individual agency, formal and informal institutions, and cultures of discrimination. Through these channels it determines who may control or benefit from ecosystem services, who suffers from ecosystem disservices, which services may be considered legitimate and whose values and perspectives are acknowledged and accounted for (Armitage et al., 2009; McShane et al., 2011). These factors are critical in finding long-term solutions for environmental management (Leach et al., 1999; Ribot and Peluso, 2003), and in securing just outcomes for marginalised groups (Naidoo and Adamowicz, 2006; Sommerville et al., 2010).

d) A focus on single land use types: In order to find locally-relevant solutions to conservation and development issues, it is essential to consider multiple habitats beyond core areas of biodiversity and to differentiate between different uses and users across those habitats (McNeely and Scherr, 2005; Termorshuizen and Opdam, 2009). Landscapes which may be partially forested also consist of agricultural land, wetlands, scrub, fallows and perhaps commercial crops and tree plantations which provide numerous and likely complementary services to local inhabitants. Rural people in developing countries often perceive the environment as consisting of a diverse landscape with numerous connected habitats which change over time and with the seasons, and which may have different meanings, importance and uses to people based on experience, knowledge and culture (Leach and Fairhead, 2000a; Cheng et al., 2003; de Groot et al., 2010).

e) Lack of attention to changes and their drivers at multiple scales: The relationship between ecosystem services and wellbeing is not only affected by environmental change but also social, demographic, political, economic and technological changes which may impact demand for ecosystem services (Leach et al., 2010). Such changes operate at different spatial and temporal scales. People's wellbeing may be influenced by microsocial processes but equally may be impacted by global economic fluctuations. Some changes may be slow and gradual such as climate or traditional practices, whereas others may be rapid shocks such as political unrest, outbreaks of a communicable disease, or earthquakes. While tropical ecosystems and their inhabitants are commonly subject to increasing global influences and to rapid changes, people's values and longstanding practices may prevent rapid behavioural modification (Smith and Stirling, 2010). We define drivers of change very broadly, as factors which directly or indirectly cause changes to the wellbeing of the participants, and those changes include perceived changes in the uncertainty and risk people face.

The capabilities approach to understanding human wellbeing (Sen, 1984) has been recognised as a promising framework for exploring connections between ecosystem services and wellbeing (Costanza et al., 2007; Polishchuk and Rauschmayer, 2012; Forsyth, 2015). This paper draws on a capabilities approach to help address the five forms of reductionism described above. Sen objected to utilitarian aggregation of both values and people, recognising that different people will achieve different outcomes, even with a similar set of resources. This is partly due to the set of capabilities they have to choose what to do with those resources (their power of agency to convert resources into desired ends) and partly due to their subjective preferences for what ends they most value (Sen, 1984).

While a capabilities and wellbeing framing can help us to disaggregate values, people and some aspects of power, we also find it suitable for a more holistic approach to understanding landscape level ecosystem service contributions to wellbeing. Our empirical study in Rwanda details the multiple ways in which ecosystem services contribute to human wellbeing from the perspective of rural populations living alongside tropical forests. By incorporating a relatively holistic definition of wellbeing, the question being addressed is not simply 'what are the links between forest ecosystem services and wellbeing?' but 'what changing role do ecosystem services from the landscape play in different people's wellbeing?' In this respect this study is not only concerned with the ecosystem services which stem from tropical forests and the impacts of protected area governance. Instead it takes a more holistic view of rural inhabitants' wellbeing and of the habitats contained within the wider landscape which influence their wellbeing.

1.1. Conceptualising Wellbeing

The wellbeing approach used in this study draws on Sen's, (1999) ideas about capabilities to conclude that "wellbeing arises from what a person has, what they can do and how they think and feel about what