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Improving coherence of ecosystem service provision between scales

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ABSTRACT

High-level consensus about safeguarding ecosystem services for optimal benefits to society is not yet matched by transposition to field scale. Various ‘societal levers’ – markets, statutory legislation, common/civil law, market-based instruments and protocols – have evolved as a fragmented policy environment of incentives and constraints, influencing the freedoms of resource owners. This has produced mosaic landscapes reflecting both natural conditions and landowner aspirations. The Principles of the Ecosystem Approach serve as a framework to consider three case study sites: an English lowland estuary and two in Scotland. Societal levers today safeguard some socially valuable services, but the present policy environment is neither sufficient nor sufficiently integrated to achieve coherence between the choices of resource owners and wider societal aspirations for ecosystem service provision. The heterogeneity of societal levers protects freedom of choice, enables adaptive decision-making related to the properties of the natural resource, and makes allowance for changes in societal preferences. Resultant mosaic landscapes provide flexibility and resilience in ecosystem service production. However, further evolution of societal levers is required to bring about greater coherence of ecosystem service production from local to national/international scales. This paper explores how issues of scale, regulation and variability manifest in the ecosystem service framework.

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1. Introduction

The need to maintain production of the subset of ecosystem services that are currently economically valued whilst also safeguarding or restoring the wider spectrum of services essential for continued wellbeing and system resilience has been well documented from planetary to sub-regional scales. This awareness has evolved from narrow consideration of food sufficiency by Malthus (1798) to the Club of Rome’s ‘Limits to Growth’ (Meadows et al., 1972), the concept of ‘ecological overshoot’ (Catton, 1980) and assessment of the consequences of the uneven and excessive

exploitation of habitats for production of just a few focal ecosystem services (Millennium Ecosystem Assessment, 2005a). Progressive expansion of focus from one or a few of the benefits provided by ecosystems towards broader recognition of the need to safeguard, and ideally restore, ecosystems and the full range of services that they provide marks a growth in ethical and economic, as well as scientific, perspectives (Everard, 2011a). Various studies underline that this pressing challenge is as applicable at national (UK NEA, 2011), catchment (Everard, 2012) and local landscape unit (Waters et al., 2012) scales as at global scales. Aspirations to protect and rebalance the production of all ecosystem services are articulated globally by bodies such as the United Nations (Millennium Ecosystem Assessment, 2005a) and through the Convention on Biological Diversity. At national scale, vehicles to embody these aspirations include the UK’s White Paper *The Natural Choice* (HM Government, 2011) and Scotland’s *Getting the best from our land: a land use strategy for Scotland* (Scottish Government, 2011a). At regional or wider landscape scales, the Cairngorms National Park Partnership Plan (CNPPP) is an example of a strategy that seeks to achieve sustainable progress across economic, social and environmental vectors. Catchment

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Management Plans, Integrated Water Resource Management strategies, Area of Outstanding Natural Beauty plans, regional development strategies and a wide range of other plans relating to EU Directive and other supranational designations as well as national-scale designations are examples of a diverse range of mechanisms to translate elements of this broad aim into increasingly local settings.

In 1995, the Convention on Biological Diversity (CBD: www.cbd.int) developed (with formal adoption in 2000) the Ecosystem Approach as an integrated framework to consider the multiple ways in which the functions of the natural world provide benefits to people. Integration of numerous pre-existing habitat- and region-specific classification schemes into a consistent and generically-applicable categorisation of ecosystem services by the *Millennium Ecosystem Assessment (2005a)* has since promoted uptake of the approach by governments and global bodies across the world. This has increased recognition of the value of and need for an integrated approach to the exploitation and conservation of socio-ecological systems to safeguard the full range of services they provide (TEEB, 2008; the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (ipBES: www.ipbes.net/); Everard, 2013).

However, converting aspirations for systemic management into fully integrated operational practice across multiple geo-political scales remains hugely challenging. This is to a significant degree due to a heterogeneity of perceptions and valuations of ecosystems and their benefits (Martín-López, 2009), the different scales at which services are produced and consumed (Fisher et al., 2010; UK National Ecosystem Assessment, 2011), disconnections between institutions charged with management of different environmental disciplines (Baldwin et al., 2009), as well as the intersection of resource rights and market economics (Everard, 2011a). Over time, this has resulted in localised anthropogenic manipulation, creating mosaic landscapes embodying both natural and cultural heterogeneity. Historically, for a variety of reasons including a general lack of clear understanding and oversight of market failure and distributional concerns, there has been little or no consideration of the overall functioning of landscapes to optimise service benefits for all in society and to ensure their long-term resilience.

The Ecosystem Approach is defined by the Convention on Biological Diversity (www.cbd.int) as ‘...a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way’. The twelve ‘complementary and interlinked principles’ (<http://www.cbd.int/ecosystem/principles.shtml>) defining the Approach cumulatively recognise that humans and cultural diversity are integral components of ecosystems, for which the ‘balance’ of ecosystem services produced is necessarily socially influenced and, in some landscapes, substantially socially constructed.

However, differential awareness and contested demands across societal groups, power balances, particularly relating to the freedoms of landowners, market forces, and complex institutional and regulatory arrangements create tensions between private and public decisions. Rarely, perhaps never, do these different interests align to balance the continued provision of all ecosystem services and to secure the potential of landscapes to support the current and future needs of all in society. Nonetheless, management for equitable and sustainable outcomes remains particularly important for land use and other natural resource policies due to the biophysical interconnectedness of landscapes (e.g., water flow, transport links) with their often conflicting economic implications (Helming et al., 2011). The current fragmented management of ecosystems at all scales highlights the need for the design of alternative mechanisms in pursuit of sustainable development (Ostrom et al., 1993).

2. Societal levers to balance provision of ecosystem services

In a UK context, as indeed in much of the industrialised world, the freedom of choice of owners of land and other natural resources is legally protected. However, it has also become increasingly bounded by a number of socially-agreed limitations and inducements to protect or favour at least some beneficial services. We refer to these as ‘societal levers’ (or just ‘levers’), recognising their action as external forces to shift the inertia of established norms.

Markets exert a significant, indeed sometimes an overwhelming influence over choices about the management of natural resources. Markets most commonly favour provisioning services, but generally fail to recognise that their production is heavily dependent on the underpinning support of a wide range of additional ecosystem services (Power, 2010). Some market failures are beginning to be addressed, for example the recent evolution of carbon markets and the institution in the UK of an Aggregates Levy on mined substances. However, most ecosystem services remain external to current markets, and their value to society is therefore inadequately incorporated into policy and business calculations. Agriculture has been the foremost pressure leading to the degradation of wetlands and many other semi-natural habitats worldwide, largely driven by consumer pressure (Millennium Ecosystem Assessment, 2005b) reinforced by governments through a food security agenda (Everard, 2011a) as well as favouring short-term economic growth over long-term consequences. Securing adequate food and maintaining economic growth for a growing population are pressing and legitimate priorities for governments and individuals, but exploitation of ecosystems at the expense of longer-term and wider societal needs not only conflicts with stated commitments to sustainable development but also represents short-termism, a substantial market failure and the consequent creation of multiple vulnerabilities.

Statutory legislation and associated regulatory obligations represent formalised ‘rules’ agreed by society. Some protect the rights of resource owners, but many act to constrain actions that infringe the freedoms of other sectors of society. These agreements may be supranational (such as EU Directives), national (Acts of Parliament and subsidiary Regulations) or local (for example by-laws). Some statutory protections have yielded significant successes for ecosystems and selected services, for example through various wildlife, water resource, air quality and landscape protection legislation. Society has therefore been progressively evolving a body of legislation as leverage to address some of the more acute adverse impacts of land use and other development decisions on ecosystems, though generally to date on a largely issue-by-issue basis as adverse consequences manifest strongly enough to prompt legislative response. The bulk of legacy legislation does not require integrated assessment of impacts across whole ecosystems and their multiple services and beneficiaries. However, notwithstanding practical shortcomings at the implementation phase, systemic assessment is an intent of some more recent requirements such as Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) (Partidário, 2000), whilst protection or restoration of ecosystem structure and functioning is a key goal of the EU Water Framework Directive (2000/60/EC) (EU, 2000). We can expect to see an increasingly systemic approach in emerging legislation, though the vast bulk of legacy instruments remain often focused on narrow outcomes.

English common law is founded on the protection of rights, evolving since Roman times through a less formalised body of case law to uphold the rights of individuals or communities potentially infringed by the actions of others.⁴ Case law relating to rights to

⁴ Scotland has a civil law, rather than a common law, jurisdiction and thus, while many of the same private law protections have developed, they have done so

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