Land Use Policy 70 (2018) 232–246

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Mainstreaming ecosystem science in spatial planning practice: Exploiting a hybrid opportunity space

Alister Scott[a,*], Claudia Carter[b], Michael Hardman[c], Nick Grayson[d], Tim Slaney[e]

[a] Department of Geography and Environmental Sciences, Northumbria University, United Kingdom
[b] Environmental Governance, Centre of Resilient Environments, Birmingham City University, United Kingdom
[c] Geography and Environmental Management, Salford University, United Kingdom
[d] Birmingham City Council, United Kingdom
[e] South Downs National Park Authority, United Kingdom

ARTICLE INFO

Keywords:
Ecosystem science
Ecosystem approach
Spatial planning
Nature
Ecosystem services
Environmental governance
Mainstreaming

ABSTRACT

This paper develops a framework for improved mainstreaming of ecosystem science in policy and decision-making within a spatial planning context. Ecosystem science is advanced as a collective umbrella to capture a body of work and approaches rooted in social-ecological systems thinking, spawning a distinctive ecosystem terminology: ecosystem approach, ecosystem services, ecosystem services framework and natural capital. The interface between spatial planning and ecosystem science is explored as a theoretical opportunity space to improve mainstreaming processes adapting Rogers' (2003) diffusion model. We introduce the twin concepts of hooks (linking ecosystem science to a key policy or legislative term, duty or priority that relate to a particular user group) and 'bridges' (linking ecosystem science to a term, concept or policy priority that is used and readily understood across multiple groups and publics) as translational mechanisms in transdisciplinary mainstreaming settings. We argue that ecosystem science can be embedded into the existing work priorities and vocabularies of spatial planning practice using these hooks and bridges. The resultant framework for mainstreaming is then tested, drawing on research funded as part of the UK National Ecosystem Assessment Follow-On programme (2012–2014), within 4 case studies; each reflecting different capacities, capabilities, opportunities and barriers. The results reveal the importance of leadership, political buy in, willingness to experiment outside established comfort zones and social learning as core drivers supporting mainstreaming processes. Whilst there are still significant challenges in mainstreaming in spatial planning settings, the identification and use of hooks and bridges collectively, enables traction to be gained for further advances; moving beyond the status quo to generate additionality and potential behaviour change within different modes of mainstreaming practice. This pragmatic approach has global application to help improve the way nature is respected and taken account of in planning systems nationally and globally.

1. Introduction

Ecosystem Services (ES) are widely used to identify and assess the value of the natural environment through the quantification and qualification of the multiple societal benefits from finite stocks of Natural Capital (NC) (Bateman et al., 2013; Likens, 1992; Hubacek and Kronenberg, 2013; Raffaelli and White, 2013). They have gained increasing traction as a policy-shaping framework, largely through the Millennium Ecosystem Assessment (MEA) (2003), TEEB (2010) and Ecosystem Services Poverty Alleviation (ESPA) programme which all have exposed significant and ongoing declines in most ES as a consequence of human interventions and actions (see also Costanza et al, 2014; Douglas and James, 2014; Guerry et al., 2015; WWF, 2016). This has catalysed significant global, EU and national responses with ES mainstreaming increasingly evident within dedicated national ecosystem assessments (e.g. Schröter et al., 2016; UKNEA, 2011); new environmental markets in the form of payments for ecosystem services programmes (e.g. Reed et al., 2017); multi-criteria assessments to inform strategic policy guidance and priority setting (e.g. Bryan et al., 2011); green accounting methods (e.g. World Bank, 2010) and improved communication on the importance of ecosystems and biodiversity to human well-being (e.g. Luck et al., 2012).

Mainstreaming can be defined as a process that "*involves taking a specific objective of one issue domain and declaring that this objective should*

* Corresponding author.
E-mail addresses: Alister.scott@northumbria.ac.uk (A. Scott), Claudia.Carter@bcu.ac.uk (C. Carter), M.Hardman@salford.ac.uk (M. Hardman), nick.grayson@birmingham.gov.uk (N. Grayson), tim.slaney@southdowns.gov.uk (T. Slaney).

http://dx.doi.org/10.1016/j.landusepol.2017.10.002
Received 23 June 2016; Received in revised form 10 July 2017; Accepted 1 October 2017

Table 1
The 12 principles of the ecosystem approach (CBD, 2010: 12) mapped against spatial planning principles as defined by UNECE (2008).

Spatial Planning Principles	Ecosystem Approach Principles
The Governance Principle (e.g. authority. legitimacy, institutions power; decision making) (e.g. Tewdwr-Jones et al., 2010; Kidd, 2007),	1 The objectives of management of land, water and living resources are a matter of societal choice. 3 Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems. 9 Management must recognize the change is inevitable.
The Subsidiarity Principle (e.g. delegation to lowest level; shared responsibility; devolution) (e.g. Haughton and Allmendinger, 2014)	2 Management should be decentralized to the lowest appropriate level.
The Participation Principle (e.g. consultation; inclusion; equity; deliberation) (e.g. Albrechts, 2015; Gilliland and Lafolley, 2008)	11 The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices. 12 The ecosystem approach should involve all relevant sectors of society and scientific disciplines.
The Integration Principle (e.g. holistic; multiple scales and sectors; joined up) (e.g. Low, 2002; Mommaas and Janssen, 2008)	3 Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems. 5 Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach. 7 The ecosystem approach should be undertaken at the appropriate spatial and temporal scales. 8 Recognizing the varying temporal scales and lag effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term. 10 The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
The Proportionality Principle (e.g. deliverable viability; pragmatism; best available information) (e.g. Nadin, 2007)	4 Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. 9 Management must recognize the change is inevitable.
The Precautionary Principle (e.g. adaptive management; limits; uncertainty; risk) (e.g. Counsell, 1998)	6 Ecosystem must be managed within the limits of their functioning, 8 Recognizing the varying temporal scales and lag effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term. 10 The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity,

be integrated into other issue domains where it is not (yet) sufficiently addressed." (Karlsson-Vinkhuyzen et al., 2017: 145). For example, there was clear evidence from the UKNEA (2011) that government departments did not explicitly consider ES and their values in policy appraisal processes. Hence mainstreaming implies a process requiring improved translation, acceptance and usage of new idea(s) in line with classic diffusion of innovation theory (Rogers, 2003).

In contemporary spatial planning practice signs of mainstreaming are evident in developing ES mapping and baseline indicators as part of evidence bases for plans and programmes (Gómez-Baggethun and Barton, 2013; Söderman et al.,2012). However, as Posner et al. (2016) note, there is limited research demonstrating how policy- and decision-makers use such evidence in their decision-making processes. Indeed, tracing the impact of ES and their additionality remains an unexploited research gap (see also Daily and Matson, 2008; Laurans et al., 2013).

Within this paper we propose the term "ecosystem science" to capture the collective body of work, approaches and tools located within a social-ecological systems perspective. It is an 'umbrella term' incorporating Natural Capital (NC), Ecosystem Approach (EcA), Ecosystem Services (ES), Ecosystem Services Framework (ESF) and Ecosystem Services approach. These terms are often used interchangeably, uncritically and applied selectively ignoring the inter-relationships, thresholds and dependencies that position nature as a complex social-ecological system (Jones et al., 2016; Spash, 2008); although ideally these concepts should help to highlight those interdependencies and complexities. Within ecosystem science we contend that the EcA, with its 12 principles, offers a potential decision-making framework for improved sustainable use and management of nature (Waylen et al., 2014). Yet it has become increasingly marginalised and overlooked in favour of NC and ES, and associated market-based instruments and policy tools within a dominant neoliberal narrative of nature (Buscher et al., 2012; Jackson and Palmer, 2015). Waylen et al. (2014) speculate that this may, in part, be due to the intangibility of some EcA principles and the lack of guidance and case studies demonstrating success in policy- and decision-making (see also Posner et al., 2016).

Furthermore, ecosystem science has only gained partial traction in spatial planning processes and outcomes (UKNEA, 2011; McKenzie et al., 2014), partly due to an artificial separation between the governance for the built and natural environment; each with its own policy and legislative frameworks which arguably creates a wider 'disintegrated development' narrative leading to unnecessary duplication, inefficiency and conflict (Scott et al., 2013). There is, however, a pioneering strand of interdisciplinary research working at the interface between ecosystem science and spatial planning that has tried to exploit their potential synergies (e.g. Douvere, 2008; Scott et al., 2013; McKenzie et al., 2014; Cowell and Lennon, 2014; Ruckelshaus et al., 2015).

In this paper we undertake further exploration in order to develop stronger theoretical, policy and practice foundations for mainstreaming robust ecosystem science in spatial planning practice arguing, in particular, that the ECA – SP interface is a key opportunity space for effective ecosystem science knowledge integration across planning and environmental governance domains (Natural Capital Committee, 2015; Ruckelshaus et al., 2015; Dennis et al., 2016; Jones et al., 2016). Table 1 exposes this potential through a preliminary mapping exercise of the 12 Malawi principles (EcA) against six spatial planning principles advanced by the UNECE (2008). This reveals significant points of intersection with opportunities to maximise social learning and knowledge exchange across the built and natural environment divides.

Similarly, when definitions for the EcA and spatial planning are compared, the synergies become apparent. For example, the UN Convention of Biological Diversity's definition of the EcA (CBD, 2010: 12) as *"a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way*", accords with Allmendinger and Haughton's (2010: 83) definition of SP as "*shaping economic, social, cultural, and ecological dimensions of society through 'place making' with a shift towards more positive, integrated*