



The relevance of cross-scale connections and spatial interactions for ecosystem service delivery by protected areas: Insights from southern Africa



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ABSTRACT

The ecosystem services (ES) concept can frame the value of protected areas (PAs) to society and identify management actions that bridge biodiversity conservation and human benefits. In this special issue on ES flows to and from southern African PAs we consider two themes: (1) water as a biophysical and social-ecological connector; and (2) cross-scale interactions and connections as influences on cultural ecosystem service (CES) provision. Freshwater flows have supporting, regulating, and cultural elements, leading to complexities in governance as well as place attachment, intellectual, and recreational services. Scale dependence in CES creates trade-offs that challenge the usefulness of the ES framework for PA management. Ecosystem service production can potentially create political support for PAs and helps to build connections and feedbacks that increase PA resilience. Papers in the feature highlight a need to understand trade-offs in optimising for biodiversity vs. particular bundles of ES; impacts of investment in built infrastructure on ES use; how managers facilitate ES; scale and heterogeneity as influences; the role of adaptive monitoring of PAs as social-ecological systems; and services and benefits from PAs that are not well-articulated in ES classifications. PA research can thus add nuance, depth and substance to broader thinking around CES.

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1. Introduction

The creation and management of protected areas (PAs) is one of society's core strategies for biodiversity conservation (Watson et al., 2014). At the same time, PAs are human constructs that reflect human desires and needs and are intended to govern and regulate human actions (Cumming, 2016; Cumming and Allen, 2017; Palomo et al., 2014). Their creation and maintenance thus depend on the social acceptability and economic feasibility of dedicating a specific parcel of land to the specific purpose of nature conservation.

Recent discourse explores how PA regulation and management influences their contribution to societal well-being, a connection that is often made in policy and research through the ecosystem services (ES) concept (Balmford et al., 2002; Cumming, 2016; Martín-López et al., 2011; Saunders et al., 2015). This linkage has

been one response to the increasing pressure on PAs to not only achieve ecological goals but also to meet social and economic needs (Cumming, 2016; Watson et al., 2014). In many developing nations, PAs are now explicitly expected to fund their own management costs through tourism-generated revenue and to justify their own existence relative to alternative forms of land use (Blackman et al., 2015; Lindsey et al., 2014; Watson et al., 2014; Whitelaw et al., 2014).

Whilst many researchers have looked to the increased incorporation of the ES concept into national and global policies as a potential win-win solution to achieving both development and conservation goals (Braat and de Groot, 2012; Guo et al., 2010; Tallis et al., 2008), others have questioned its usefulness, pointing to the challenges in its operationalisation (Boerema et al., 2017; De Groot et al., 2010; Lele et al., 2013; Muradian et al., 2013; Wainger et al., 2010). Although the ES concept itself is now ubiquitous in PA policy in many places, it is not yet well-incorporated in practice, particularly in developing countries (Boulton et al., 2016; Egoh et al., 2007; Egoh and Maes, 2013). This can, at least in part, be attributed to the fact that PAs are complex adaptive social-ecolog-

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