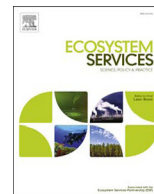




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# Tracing the cost/benefit pathway of protected areas: A case study of the Kruger National Park, South Africa

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## ABSTRACT

The sustainability of protected areas is dependent on societal support. Protected area relevance (meaning and value) to society is based on vested interest grown through conservation related benefit accrual that outweighs costs. Protected areas generally don't report on their total societal impact in part due to a lack of an appropriate framework that accounts simultaneously for positive and negative, tangible and intangible components. We develop a framework and pathway that (1) includes ecosystem dis-services provided by protected areas, and (2) provides a tool for protected area managers to report on benefit sharing as a whole towards managing cost-benefit trade-offs. Ecosystem services and products from Kruger National Park were classified into themes, followed by a quantitative inventory of cost/benefit processes for the KNP. We demonstrate the skewed nature of costs versus benefits, with most beneficiaries living far from the park. Most local residents receive few benefits and are often recipients of costs. The framework highlights the need to understand the impact of benefit sharing on human well-being; the lack of an understanding of the outputs and outcomes from direct ecosystem service flows from parks; and the need for an understanding of the links between benefit accrual and conservation-related outcomes.

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## 1. Introduction

Protected areas are established and maintained across the world for various reasons, including for their ecological, cultural, social and/or economic values. However, the purpose of many protected areas has evolved with time, and in cases where these areas were originally set up primarily for biodiversity conservation (Brockington, 2002), recent expectations are for these areas to provide more direct benefits and fewer costs to society than they have before (UNDP, 2010). The Convention of Biological Diversity (CBD) was an early driver of this change, promoting sustainable use and benefit sharing (CBD, 2011). Benefits are impacts that make a positive contribution to human well-being. They are diverse in type, nature, tangibility and value and often go hand in hand with costs, conservation-related impacts that have a negative impact on human well-being (Swemmer et al., 2015). The sustainability of protected areas is dependent on societal support at various levels, but being relevant (having positive meaning and value) locally is

required for building vested interest through conservation-related benefit accrual that outweighs costs, most of which are felt locally (Pimbert and Pretty, 1994; Hutton and Leader-Williams, 2003; CBD, 2011; Swemmer et al., 2015). Understanding perceptions of conservation and the drivers for these among stakeholder groups promotes effective implementation of benefit sharing, although this understanding is inadequate for most protected areas globally (Guerbois et al., 2013; Bragagnolo et al., 2016). Sectors of society that benefit from conservation usually support it (Muchapondwa et al., 2009) but differences in socio-cultural preferences for biodiversity benefits requires context-appropriate approaches for ensuring relevance (Martin-Lopez et al., 2012). Those not benefitting sufficiently feel either neutral or negative towards it, especially people who have experienced conservation-related costs (Anthony, 2007). Understanding these tradeoffs between costs and benefits at various levels can contribute towards more effective sharing of benefits from conservation (Swemmer et al., 2015). It is widely believed that local support built through effective benefit sharing will have positive impacts on reducing poaching (Biggs et al., 2013). The recent increase in rhino and elephant poaching in southern Africa (Lunstrum, 2014) not only threatens individual species and impacts negatively on

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local communities (Greer, 2014) but also places the economic viability of protected areas at risk through predicted losses related to reduced tourism visitation (Naidoo et al., 2016). As such, there has been an increased interest in understanding the scale and scope of benefits and costs that are accrued locally (Emslie and Brooks, 2003; Biggs et al., 2016).

Despite the need for protected areas to benefit broader society, defining and reporting on these benefits and costs remains challenging. Reporting on protected area benefits is variable across the globe with the aim of the assessment dictating the tools that are used giving rise to both opportunities and risks (Dudley et al., 2013). In many cases, costs are down-played or ignored. Generally studies focus on a specific set of stakeholders (Franks and Small, 2016), at a particular scale (Dudley and Stolton, 2009) or on specific benefits that have indicators that are easy to measure or compare (TEEB, 2010). Assessing the economic impact of parks is widespread (Saayman and Saayman, 2006; Hubert, 2008), with such assessments focusing on regional or national levels, rarely including local impacts, often not accounting for the multiple-dimensions of social (non-economic) costs and benefits and often facing methodological challenges (Daniel et al., 2010; de Groot et al., 2010; Chan and Rucklehaus, 2010; Thomas and Huber, 2014). Ecosystem services are referred to as the goods from nature that benefit humans, and traditionally include provisioning, regulating, supporting and cultural service categories (MEA, 2004). However this concept has received much critique, mostly attributed to ethical concerns with the commodification of nature and methodological challenges in assigning legitimate financial values to intangible benefits of biodiversity (Schroter et al., 2014). Most ecosystem service audits focus on natural capital, excluding benefits such as employment and capacity building and not taking costs into account. Other assessments focus on ecotourism-related benefits or cultural services (Muller, 2007; Buckley, 2009; Strickland-Munro et al., 2010; Daniel et al., 2010; Hernandez-Morcillo et al., 2013), benefits to local communities (Igoe, 2006; Adams et al., 2004; Waylen et al., 2010) or social impact (Fortin and Gagnon, 1999; Franks and Small, 2016) not accounting for the collective contribution of all ecosystem services. Revised definitions for ecosystem services propose that supporting or intermediate services (eg. woodland habitat or net primary productivity) provide the foundation for final services (eg. flood protection or harvestable products) from which benefits flow (eg. contribution to human well-being) giving rise to the value of biodiversity (Hains-Young and Potschin, 2012). However, these classification systems focus on the services, not the products that are derived from the services, nor the actual benefit (Hains-Young and Potschin, 2012). In some cases, costs (some of which are intangible) can outweigh the economic or financial benefits (Botha et al., 2007) with the accrual of one type of benefit to one stakeholder group resulting in a net loss to another group. Without a collective framework for mapping ecosystem services and dis-services (the ecosystem products that result in societal costs), their associated products and the subsequent benefits and costs that accrue, the role that protected areas play in societal well-being is undermined, and the tradeoffs and gaps in benefit and cost accrual are seldom acknowledged and almost never managed for.

Our study aimed to use societal benefit and cost data collected from the Kruger National Park (KNP) to explore the concept of ecosystem services and disservices in the context of protected areas. In so doing, we develop a holistic framework for conducting a quantitative inventory of the suite of ecosystem services and dis-services flowing from protected areas, and the associated products, costs and benefits that are derived from them. We use our inventory to compare the scale of ecosystem products, benefits and costs that flow to stakeholders and to reflect on what this means for protected area conservation going forward. Having been developed in

KNP, one of the largest and most complex protected areas in the world, we believe that the lessons learnt in this study will contribute to the global discourse on ecosystem services, and will be useful to managers of other protected areas wishing to reflect on the collective social relevance of their parks and to market their societal contributions at various scales towards building conservation constituency.

## 2. Materials and methods

### 2.1. Study area

The KNP comprises 20,000 km<sup>2</sup> of relatively intact conservation land, described as semi-arid to arid wooded savanna with an annual rainfall ranging between 400 mm and 600 mm. The park is home to many mammal, bird, reptile, fish, amphibian and plant species (Du Toit et al., 2003). The KNP is a world renowned tourism destination with approximately 1.6 million visitors annually (SANParks, 2014). It is a globally important, iconic national park with a significantly large regional economic impact (Saayman and Saayman, 2006). Despite the conservation successes of KNP, the early establishment of the Park involved forced removals of people from within the KNP boundaries, supported by policies that restricted access to certain sectors of society (Carruthers, 1995). This was at a time when the South African *apartheid* government was moving thousands of people into culturally homogenous “Bantustan” homeland areas, some of which bordered the KNP. Currently, approximately 2 million people reside in the 7 South African municipalities bordering KNP, many of whom rely on subsistence agriculture and social grants due to high regional unemployment rates (municipal level unemployment rates range from 28.1% to 52.1%) (Stats SA, 2015). The area is typified by low agricultural potential (Lahiff and Cousins, 2009) and employment within KNP is very sought after. The 1073 km of KNP periphery abuts private and government conservation land, rural and urban towns and villages, agriculture and industry – the diversity of which would be hard to meet anywhere else in the world. Together with the rich history of the park, this provides a complex context which poses new challenges to access and benefit sharing models and community based natural resource management (Fig. 1).

### 2.2. Data collection methods

Unstructured interviews were held in November 2014 with four high level managers from various departments in KNP (stakeholder relationships; community beneficiation and facilitation; tourism and public relations; research) to discuss (1) expectations regarding the development of a benefits framework and (2) to get ideas about the spatial and temporal scale and scope of the subsequent KNP benefit inventory process and (3) to begin drafting a benefits inventory list. Following from these interviews, a management meeting constituting an expert workshop was held (23 November 2014) with 11 middle to senior level SANParks managers working in KNP to further build on the KNP benefit inventory process. A minimum of one representative was chosen from each relevant department based on their expertise and knowledge on conservation related benefit distribution and accrual. Representatives included individuals from veterinary services, game capture and sales (1), stakeholder relationships (2), community beneficiation and facilitation (4), research (2), and tourism and public relations (1). During the workshop, participant’s knowledge, opinions and perceptions on the range of tangible and intangible benefits accrued at various levels from KNP were captured using participatory methods (round-robin idea generation and informal plenary discussions) building on the list of benefits that was generated

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