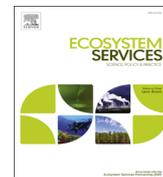




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# The current and future value of nature-based tourism in the Eastern Arc Mountains of Tanzania



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## ABSTRACT

The financial benefit derived from nature-based tourism in the Eastern Arc Mountains (EAMs) of Tanzania has never been assessed. Here, we calculate the producer surplus (PS) related to expenditure on accommodation in the EAMs. This estimate is based on the number of visitor bed-nights collected from a representative sample of hotels, coupled with spatially explicit regression models to extrapolate visitor numbers to unsampled locations, and adjusted to account for how far visits were motivated by nature. The estimated annual PS of nature-based tourism is ~US\$195,000. In order to evaluate the future impact of different forest management regimes on PS over a 25 year period, we compare two alternative scenarios of land use. Under a 'hopeful expectations' scenario of no forest loss from protected areas, the present value of PS from nature-based tourism is ~US\$1.9 million, compared with US\$1.6 million under a 'business-as-usual' scenario. Although the value of nature-based tourism to the EAMs is lower than that generated by Tanzania's large game reserves, these revenues, together with other ecosystem services provided by the area, such as carbon storage and water regulation, may enhance the case for sustainable forest management.

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## 1. Introduction

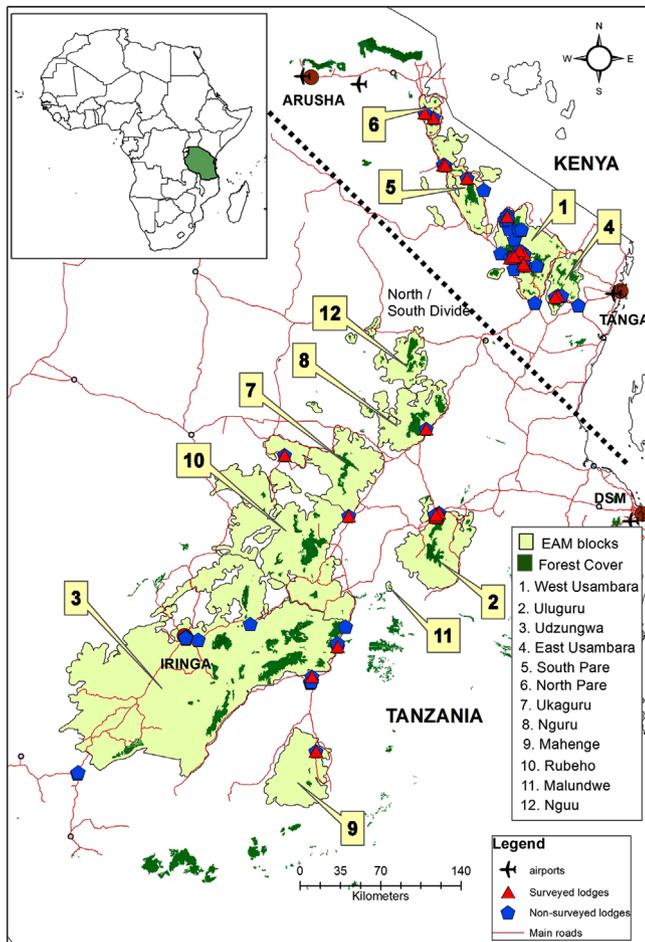
The relationship between nature-based tourism and biodiversity conservation has been the focus of considerable attention in recent years (Yu et al., 1997; Christ et al., 2003; Stem et al., 2003; Naidoo and Adamowicz, 2005a, 2005b; Adamowicz et al., 2010; Kirkby et al., 2011; Lui et al., 2012; Peh et al., 2013; Sekar et al., 2014). It is widely posited that, if well managed, nature-based tourism can promote conservation of protected areas (Ceballos-Lascurain, 1996; Damania and Hatch, 2005; Alpizar, 2006; Mitchell et al., 2009; Kasangaki et al., 2012). The effectiveness of nature-based tourism in providing

incentives for sustainable ecosystem management often depends inter alia on sufficient returns to neighbouring communities through profit-sharing mechanisms (Bookbinder et al., 1998; Walpole and Goodwin, 2000; Kiss, 2004; Coria and Calfucura, 2012).

Tanzania is globally recognised as a popular tourist destination for its 'Big Five' savannah safaris, the spice island of Zanzibar, and the highest mountain in Africa, Mt. Kilimanjaro. Tanzania has over a quarter of its land area allocated to protected areas of various kinds (World Bank, 2010), and boasts seven UNESCO World Heritage Sites. Nature-based tourism to protected areas and overall tourist volume are both increasing annually, in line with other developing countries (Balmford et al., 2009; Karanth and DeFries, 2011). For example, from 2000 to 2010 there was a 56% increase in recorded numbers of international visitors (from ~501,000 to ~782,000; MNRT, 2012). Consequently, tourism has increased its contribution to GDP, from US

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**Fig. 1.** The Eastern Arc Mountain blocks in Tanzania (light green), ranked according to Producer Surplus (1, high; 12, low), in terms of nature-based tourism. The map depicts mountain extent, lodge distributions, forest cover (dark green), and the north-south divide between the two main tourist circuits. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

\$615 million in 2005 to US\$1.75 billion in 2010, making it the largest source of foreign exchange and constituting about 8% of the Tanzanian GDP (Mitchell et al., 2009). International tourism is regarded as a means for alleviating poverty in Tanzania (Nelson et al., 2009) and is included in the development plans for the country (Nelson, 2012). Domestic tourism in Tanzania remains small, with low household income indicated as the primary constraint (Mariki et al., 2011).

Tanzania is less recognised as a destination for forest-based nature tourism. The country has relatively small areas of moist forest, mainly within the protected areas of the Eastern Arc Mountains (EAMs) – part of a global Biodiversity Hotspot (Myers et al., 2000; Mittermeier et al., 2004; Burgess et al., 2006, 2007). Tanzanian forests, supporting endemic monkeys, birds and reptiles, offer different attractions to the adjacent game parks, being mostly visited for hiking and as a challenging destination for natural history enthusiasts. Nature-based tourism and recreation are categorised as cultural ecosystem services (e.g. Haines-Young and Potschin, 2011; UK National Ecosystem Assessment, 2011; de Groot et al., 2012; Egoh et al., 2012). They include both market and non-market benefits and are part of a larger set of ecosystem services provided by the natural habitats of the EAM (Fisher et al., 2011a, 2001b).

Our objective is to assess the market benefits of nature-based tourism in the EAMs (Fig. 1) in Tanzania. We use scenario analysis to explore how these benefits might plausibly change under alternative policies of future development in the region.

## 2. Methods

### 2.1. Study region

The EAMs comprise 13 blocks from south-eastern Kenya (one block; Taita Hills) to southern Tanzania (Fig. 1) and cover an area of 5.2 million hectares with an associated watershed of 33.9 million hectares (Platts et al., 2011). They were formed at least 30 million years ago (Schlüter, 1997; cf. adjacent volcanoes Mts. Kilimanjaro and Meru, c. 2 million years ago). The EAMs are globally recognised as a centre of species endemism and diversity, with hundreds of endemic plants and animals (Myers et al., (2000); Burgess et al., 2007). Besides biodiversity, the EAMs provide a suite of ecosystem services (Swetnam et al., 2010) beneficial at local to global levels, including carbon storage (Willcock et al., 2012) and the regulation of river flows for drinking water, irrigation and hydropower. The total population of the EAM blocks is estimated at 2.3 million people (Platts et al., 2011), most of whom rely on farming as their main source of income (NBS, 2002). People living in the EAMs depend on the forests and woodlands for firewood, charcoal, timber and building poles (Schaafsma et al., 2014). Other non-wood products obtained include thatch, honey, bushmeat, fruits, vegetables and medicines. As is the trend across the African continent (Fisher, 2010), small-scale agricultural expansion, logging, and the extraction of biomass for fuel and construction are considered to be the main causes of forest degradation and deforestation, resulting in a considerable loss of forest and woodland over many years (Hall et al., 2009; Green et al., 2013).

Tourist destinations on mainland Tanzania can be divided into the northern and southern circuits (Fig. 1; Mariki et al., 2011). The northern circuit is more popular and consists of Mt. Kilimanjaro, Ngorongoro crater and the Serengeti and associated parks within easy reach of Arusha and Moshi (Sekar et al., 2014), while the southern circuit includes the Selous Game Reserve, Mikumi and Ruaha National Parks. There are also smaller tourist flows to destinations in the far west, such as Gombe, Mahale and Katavi National Parks. The EAMs straddle the northern and southern circuits and are accessible to tourists arriving in the major cities of Arusha, Tanga, Dar es Salaam, Morogoro and Iringa.

**Table 1**

Distribution of 120 surveyed and non-surveyed hotels across the Eastern Arc Mountains study region.

	Mountain block	Mt. Area (ha) <sup>a</sup>	Number of hotels within 30 km of the EAMs			
			Surveyed	Unsurveyed	Low cost	High cost
Northern Circuit	North Pare	51,030	3	1	4	0
	South Pare	232,750	5	7	9	3
	West Usambara	294,520	19	25	29	15
	East Usambara	114,500	3	3	4	2
	Usambara					
Southern Circuit	Nguu	156,290	0	0	0	0
	Nguru	256,490	1	0	1	0
	Rubeho	798,440	2	0	2	0
	Ukaguru	324,260	2	0	2	0
	Uluguru	305,730	6	8	4	10
	Udzungwa	1,937,530	4	27	23	8
	Mahenge	260,640	3	1	4	0
Malundwe	3280	0	0	0	0	
<b>All Eastern Arc Mountains</b>		<b>5,083,252</b>	<b>48</b>	<b>72</b>	<b>82</b>	<b>38</b>

<sup>a</sup> Areal extent from Platts et al. (2011). For forest area under current and future scenarios, see Appendix 1

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