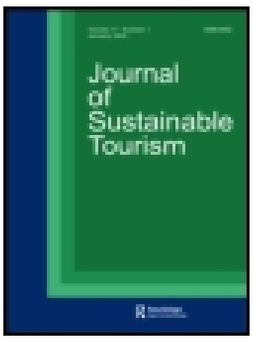

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Economic impacts of tourism in protected areas of Brazil

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ABSTRACT

Protected areas (PAs) are globally considered as a key strategy for biodiversity conservation and provision of ecosystem services. Economic impact analyses generate quantifiable estimates of the tourism interdependencies which provide a tangible understanding of effects on local and regional economies. Federal PAs of Brazil are the object of the research based on the Money Generation Model2 (MGM2) methodology along with modifications to address particular issues in a developing country context. The significance of this research is to assist managers, inform policy-makers, conservation and commercial stakeholders, local communities, and the public at large of the value that PAs serve for conservation as well as engines for benefit-sharing. Results identified that each dollar Brazil invested in the PA system produced $7 in economic benefits. Also, the total economic contributions generated more than $1.3 billion in total sales, $342 million in personal income, $473 million in value added to the GDP, and supported 43,602 jobs nationally. The study reinforced the view that economic impacts of tourism influences PAs as well as indirectly to other businesses and the local communities.

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Recreation; visitation; national parks; national forests; visitor expenditures; MGM2

Introduction

The creation of protected areas (PA) is an effective strategy for biodiversity conservation and provision of ecosystem services. PAs offer a spectrum of outdoor recreation opportunities that attract visitors as well as assist to raise societal awareness and support for conservation (Viveiros de Castro, Souza, & Thapa, 2015). Globally, the number of visits to terrestrial PAs is estimated to be 8 billion per year and they generate approximately $600 billion[1] in direct in-country expenditures. Such economic impacts are considerably positive, and it has been argued that it could be even greater if $10 billion per year were applied to safeguard the PAs (Balmford et al., 2015). The importance of tourism to generate revenues for management has been advocated, but yet, conservation priorities have consistently experienced budgetary constraints (Eagles, 2002; Thapa, 2013). In addition, since tourism is interdependent with other stakeholders (e.g. businesses, services, governments and local communities), visitor expenditures that permeate within and outside PAs stimulate job creation and entrepreneurial activities (e.g.: tour operations, hospitality business, etc.). Moreover, as most PAs are located in rural and remote regions, the economic impacts of visitor expenditures aid in the creation of alternative

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income and poverty alleviation sources for local communities (Emerton, Bishop, & Thomas, 2006; Ferraro & Merlin, 2014).

Consequently, the economic, social and environmental benefits and costs of can ultimately affect entire regions. Hence, examination of the positive and negative impacts is warranted in order to mitigate costs and formulate sustainable tourism initiatives within a PA and adjacent communities. Nevertheless, within the tripod of sustainability, the economic perspectives have increasingly witnessed interest among policy-makers and decision-makers with regards to investment decisions at PAs (Balmford et al., 2015). As a result, more countries are developing visitor expenditure analyses at site and system levels: USA (Cullinane & Koontz, 2016), Canada (The Outspan Group, 2011), Australia (Driml, 2010), Finland (Huhtala, Kajala, & Vatanen, 2010), Namibia (Turpie, Barnes, Lange, & Martin, 2010), South Africa (Saayman, Rossouw, & Saayman, 2010), and Brazil (Medeiros & Young, 2011).

Furthermore, the positive economic impacts based on visitations and expenditures are also used to increase public opinion and support for PAs. For example, since 1969, the U.S. National Park Service (NPS) has formally estimated the economic contributions of outdoor recreation – 140 million visits generated $6.4 billion in spending and $4.7 billion in personal income (Stynes, 2001). The visitation continued its increase with 307 million visits in 2015 along with $16.9 billion in spending. Based on the data, the estimated contribution to the national economy was $32 billion in output and $11.1 billion in labor income, and created 295,000 jobs (Cullinane & Koontz, 2016). Such periodically formulated estimations have been instrumental for NPS to advocate for fiscal support and negotiate budget allocations through the years.

Other national agencies have also followed the same strategy. Parks Canada documented 20 million recreation visits in 2008–2009, and reported the economic significance of $2.24 billion, with 41,720 full-time jobs and tax revenues of $163 million (The Outspan Group, 2011). Furthermore, even developing countries such as Namibia have also evaluated the economic importance of their PA system. Results estimated that 180,000 recreation park visits were recorded with an overall expenditure of $176 million. The direct contribution to the GDP was $80 million along with a total contribution of $147 million[2] (Turpie et al., 2010).

In Brazil, the first attempt to evaluate the economic impacts of tourism in the National PAs system was conducted in 2010 via the Money Generation Model2 (MGM2; Medeiros & Young, 2011). Based on visitation numbers in 2009 (3.8 million visits), the impact was estimated to be approximately between $144 and $163 million in tourist spending[3] (see Table 1). Such estimates reflect the importance to the economy since the PAs organizational entity's (Chico Mendes Institute for Biodiversity Conservation [ICMBio]) budget spent for the management of the whole system was only $69 million in 2010 (ICMBio, 2011). Subsequently, Semeia (2014) used an indirect approach based on demographic census analysis to evaluate the economic potential of tourism in PAs. Results identified that investments in infrastructure and services in the PAs at all levels (national, state, and local) would result in an increase of 55,800 jobs and $1.6 billion in total sales supported by tourism in the gateway communities. Furthermore,

Table 1. Comparative analysis between Brazil, USA and Canada.

Country	Brazil[a]	USA[b]	Canada[c]
No. of PAs considered	310	360	129
Visitor numbers	3.8 mi	307 mi	20 mi
Budget	U$ 69 mi	U$ 2.6 bi	U$ 545 mi (2015)
Visitor revenues	U$ 6.2 mi	U$ 430 mi	U$ 90 mi
Revenues/% of the budget	(9%)	(17%)	(16%) (2015)
Economic significance	U$ 144/163 mi	U$ 32 bi	U$ 2.5 bi
Visitor spending	–	U$ 16.9 bi	U$ 2.0 bi
Added value	–	U$ 18.4 bi	–
Labor income	–	U$ 11.1 bi	U$ 1.44 bi
Jobs	–	295,000	41,720
Year	2010	2015	2008/2009

[a] Medeiros and Young (2011).
[b] Cullinane and Koontz (2016).
[c] The Outspan Group (2011).

Muanis, Serrão, and Geluda (2009) estimated that national PAs would need $209 million from Brazilian government in investments to consolidate infrastructure in all federal system.

The ICMBio is the federal agency responsible for the management of the Federal PAs in Brazil. ICMBio manages a system of 325 federal PAs in a total of 79 million hectares (ICMBio, 2016a). Despite the enormous size of the PAs system along with its important biodiversity, the associated budget has not been fully substantiated in Brazil. Additionally, it is still ambiguous with respect to the impact and value added of tourism via visitors' spending due to lack of empirical research. Therefore, the purpose of this research was to estimate the economic impacts of tourism in the federal system of PAs of Brazil. More specifically, the following objectives were formulated and examined:

(1) Assess local expenditures of visitors in select PAs.
(2) Examine the current income, value added, and jobs generated by each PA.
(3) Estimate the current income, value added, and jobs generated by the entire PA system.
(4) Estimate the income, value added, and jobs generated by the entire PA system in a forecasted improved scenario.

To accomplish the objectives, this study adapted a framework methodology based on the MGM2 (Stynes, Propst, Chang, & Sun, 2000) along with minor modifications to address contextual issues for developing countries. Economic impact analyses generate quantifiable estimates of the tourism interdependencies which provide a tangible aspect of the industry effects, and ultimately the importance of the services provided by the PAs to the region and country (Stynes et al., 2000). The results of this research can assist in decision-making for managers and policy-makers, inform conservation and commercial stakeholders, and local communities, as well as the general public about the economic values and subsequent conservation importance of PAs.

Economic impact analysis

Economic impact is part of a group of analyses that can be used to evaluate tourism in PAs (other analyses include: fiscal impact analysis, financial analysis, demand analysis, benefit cost analysis, feasibility study and environmental impact assessment) (Stynes, 1997). Since each type of analysis is somewhat specific, the problems to be addressed may require more than one method. For example, an economic impact evaluation may request a prior demand analysis to forecast potential increase in volume of tourism activity.

Economic impact analysis describes the interrelationships between economic sectors, and creates estimates of the possible changes in a certain economy due to actual or future scenarios. For example, visitors spend money in PAs and gateway communities, and their expenditures create and support local economic activity. Economies are interconnected systems where producers and consumers interact (Cullinane & Koontz, 2016). Raw material processed by producers and manufacturers is combined with inputs from other economic sectors to generate output. This, in turn, is the input for yet other economic sectors which add value to the intermediate goods and generate their own output until the goods and services reach the final consumer. Consequently, if demand for a product changes, a ripple effect will be experienced at multiple levels and sectors of an economy (Cullinane & Koontz, 2016). This impact is described in terms of direct effects, indirect effects, and induced effects of the initial consumer spending:

- Direct effects are the changes caused by visitor spending in the businesses that sell directly to visitors (i.e. lodges, campgrounds, restaurants, grocery stores, etc.). However, for the trade-sector businesses (i.e. grocery and sporting goods stores, fuel stations, etc.), the direct output effects need to consider only the capture rate, which is the percentage of spending that stays in the region by first round sellers (retailers), local wholesalers, as well as manufacturers/producers (Crompton, 2010; Stynes, 2001).

- Indirect effects are the changes generated when lodges and other directly affected businesses buy goods and services from other businesses within the local region (Crompton, 2010). For service-sector businesses, the indirect output effect includes all items purchased and fixed operating expenses associated with operating a business (e.g. office supplies, electricity, maintenance, etc.). For trade-sector businesses, indirect output includes only the fixed operating expenses, and not the cost of items purchased for resale.
- Induced effects are the changes generated through household spending of personal income received directly or indirectly from tourist spending. For example, spending by employees of tourist lodges on meals, gas, etc. supports additional jobs in non-tourism businesses, and therefore allows additional rounds of local spending across a broad range of economic sectors (Cullinane & Koontz, 2016).

The secondary effect is the sum of the indirect plus the induced effects. The sum of direct, indirect, and induced effects is termed the total effects of visitor spending (Crompton, 2010). These interactions between consumers and producers are described by economic input–output (I-O) models that capture the effects of visitor spending by regional economic multipliers. To measure economic effects, it is necessary to obtain multipliers and ratios from I-O models. I-Os are matrices that describe the interdependencies and flows of money between different sectors within a certain economy (Cunha et al., 2008). I-O captures how much each industry demands from all the others. It also presents the proportion of sales that is used to pay salaries income, benefits, proprietors' income and taxes, as well as the number of employees in each sector. The basic calculations for the I-O matrix, coefficients, effects and multipliers are noted in the following (Guilhoto, 2011).

The multiplication of visitor expenditures by regional multipliers is used to calculate the economic effects of tourist spending to regional economies. There are two possible metrics to present economic effects of tourism in PAs: economic impacts and economic contributions (Cullinane & Koontz, 2016). Economic contribution analysis captures the gross economic activity generated in the regional economy by the total number of visitors in the PA. Economic contribution studies include expenditures by local visitors (the ones who live in the gateway community) and non-local visitors (the ones who come from outside). Economic impact analysis reports the economic net changes in the regional economy generated by the new money brought in to the local economy by visitors from outside the community. Economic impacts exclude spending by local visitors based on the assumption that if they decide not to visit the PA, they would spend in another recreation activity within the local community.

Furthermore, economic significance analysis is more geared to measure the relative importance and magnitude of the total contribution of tourism in PAs to regional economies. However, economic impact analysis is more indicated to measure the inflow of visitors and spending in a local community generated by non-local visitors (Crompton, 2010). Economic impacts are estimated by the following equation (Stynes et al., 2000):

$$\text{Economic effects} = \text{number of visitors} \times \text{average spending per visitor} \times \text{economic multipliers}.$$

The variables in the equation require the following information:

(1) Collect or estimate the number of tourists that visit the PAs and surrounding area.
(2) Estimate average spending per visitor in the region.
(3) Apply economic multipliers to measure the ripple effects of the visitor expenditures.

The three inputs on the right side of the equation are derived in several ways, dependent on resources available for the study and degree of desired accuracy. The NPS in the USA developed a model called "Money Generation Model2" (MGM2) as the first attempt to estimate the impacts of visitation in the PAs. This initial approach only presented aggregated data (U.S. Dept. of Interior, National Park Service [USDI-NPS], 1990). Following MGM2, two applications were available for tourism economic research: Regional Input–Output Modeling System (RIMS II) from the US Bureau of Economic

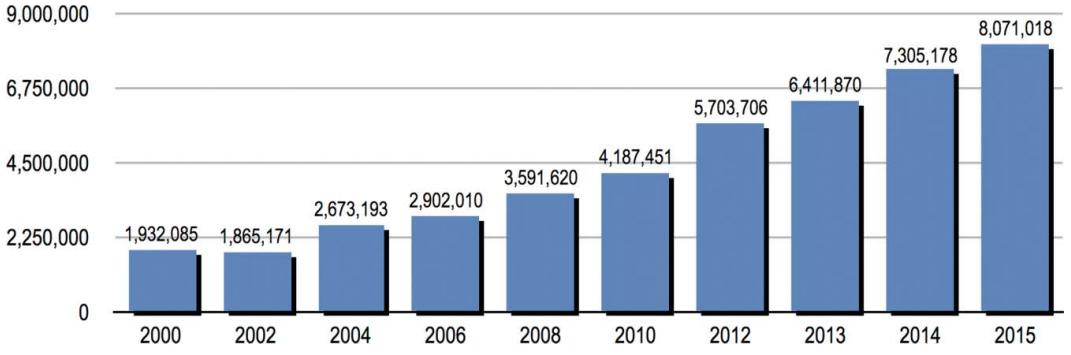

Figure 1. Total visitation/year in protected areas of Brazil.

Analysis (U.S. Dept. of Commerce, Bureau of Economic Analysis [USDC BEA], 1992), and Micro-Implan Recreation Economic Impact Estimation System (MI-REC/IMPLAM) (Stynes & Propst, 1992, 1996). Both systems provided improvements with the option to desegregate spending per industry sector and visitor segments in application that could be manipulated; however, both required the purchase of multipliers. Stynes et al. (2000) developed the second generation of the MGM called MGM2 for the NPS, which also offered desegregated spending sectors and option for visitor segments. MGM2 was released as an open version (non-proprietary) for state and local agencies with the option to use with generic multipliers (Chang, 2001). This required no acquisition of specific local multipliers, hence facilitated and reduced the cost of analysis, and likely made MGM2 as the preferred approach in economic analysis in other countries too, such as Australia, Finland and Brazil (Buultjens & Luckie, 2004; Cui, Mahoney, & Herbowicz, 2013; Huhtala et al., 2010; Medeiros & Young, 2011). There are two other systems that should also be noted: Travel Economic Impact Model developed by the US Travel Data Center (1997), and the Tourism Satellite Account by the World Travel and Tourism Council (WTTC, 1996), both of which that are more focused to estimate national impact levels.

Methods

MGM2 methodology (Stynes et al., 2000) was chosen to calculate the economic contributions of the PAs to the Brazilian economy. This method requires three inputs: number of visitors, visitor expenditures, and multipliers, all of which were collected from different sources.

Number of visitors

PAs in Brazil report visitor arrival statistics annually to the central office of ICMBio. Since 2000, visitation has grown from 1.9 million to more than 8 million in 2015 (see Figure 1) (ICMBio, 2016a). Visitation is allowed in most types of PAs (all of them if environmental education is considered) (ICMBio, 2016a) (Table 2). From the 8 million visitors in 2015, national parks and forests received 93% of total. The research collected data from 58 national parks and 36 national forests managed by the federal agency ICMBio. Of the 94 PAs that responded the survey, 62 reported visitation in 2015 (Souza, 2016).

The study considered two scenarios: (1) actual reported visitation for 2015, and (2) improved scenario of 13.4 million visitors computed based on a demand analysis.

First scenario

The Brazilian PAs were distributed in recreation opportunity classes to develop visitor segments (see Souza, 2016). The recreation opportunities are derived from activities in different settings and have three different attributes: Physical, Social, and Managerial. The combinations of these attributes create classes or zones where recreation opportunities may occur. The classes vary from Primitive Use

Table 2. Reported visitation in PAs of Brazil in 2015.

IUCN categories	Brazilian categories	Total No. of PAs	PAs that reported visitation	Visitation
(1a) Strict nature reserve	Biological reserve	31	1	2375
	Ecological station	32	1	154
(1b) Wilderness area	No equivalence			–
(2) National park	National park	72	38	7,149,112
(3) Natural monument or feature	Natural monument	3	0	–
	Wildlife refuge	7	0	–
(4) Habitat/species management area	Relevant ecological interest area	16	1	3294
(5) Protected landscape/seascape	Environmental protected area	33	3	394,744
(6) Protected area with sustainable use of natural resources	National forest	67	17	371,339
	Extractives reserve	62	1	150,000
	Fauna reserve	0		–
	Sustainable development reserve	2		–
Final total		325	62	8,071,018

Note: Correspondences based on a Ministry of Environment Report (Ministério do Meio Ambiente [MMA], 2007).
IUCN: International Union for Conservation of Nature.
Source: ICMBio (2016b).

where PAs offer few or no recreation options, facilities or services. The Primitive PAs are generally located in remote locations (e.g. Jatuarana National Forest in Amazonia) with difficult access and low demand. Conversely, Highly Intensive PAs offer a great variety of attractions, facilities, and services. They are located close to state capitals or large cities with high population density, easy access and high usage rates (e.g. Tijuca National Park in Rio de Janeiro). Between the spectra, there are other classes such as Semi-Primitive, Extensive and Intensive.[4] Since most visitations are located in PAs of Extensive, Intensive and Highly Intensive Use, this study focused the collection of visitors' expenditures from these three classes (see Figure 2).

Second scenario

A prediction of the visitation potential of the PA system based on the recreation classes was used (see Souza, 2016). Basically, the indicators from the physical, social and managerial attributes were correlated to the number of visitors at the respective PA. The results were used to perform an estimation for the entire PA system of 325 units in a scenario where all PAs would offer basic facilities and services based on their class of recreation use. Results illustrated that the entire federal system could likely receive substantially more visitors – 13.4 million instead of the 8 million reported in 2015.

Visitor expenditures

The second input for the economic analysis – average spending per visitor – was collected via two different techniques: on-site interviews and emails (see Crompton, 2010) during January–February 2016. The study focused on visitors at three PAs from the most visited based on recreation class use (Extensive, Intensive, and Highly Intensive), with the purpose to develop an average visitor spending for each class (Driml & McLennan, 2010; Huhtala et al., 2010). The three selected PAs were: São Franciso de Paula National Forest, Chapada dos Guimarães National Park and Tijuca National Park.

São Francisco de Paula National Forest (*Extensive Use*) – the manager provided an email list of 365 visitors. Based on email contact requests and subsequent reminders, a total of 131 visitors completed the questionnaire (28% response rate). Of which, 108 were deemed useable. Chapada dos Guimarães National Park (*Intensive Use*) – the manager provided an email list of 4134 visitors. Similarly, based on email contact and reminders, 329 visitors responded (8% response rate), while 229 were useable.

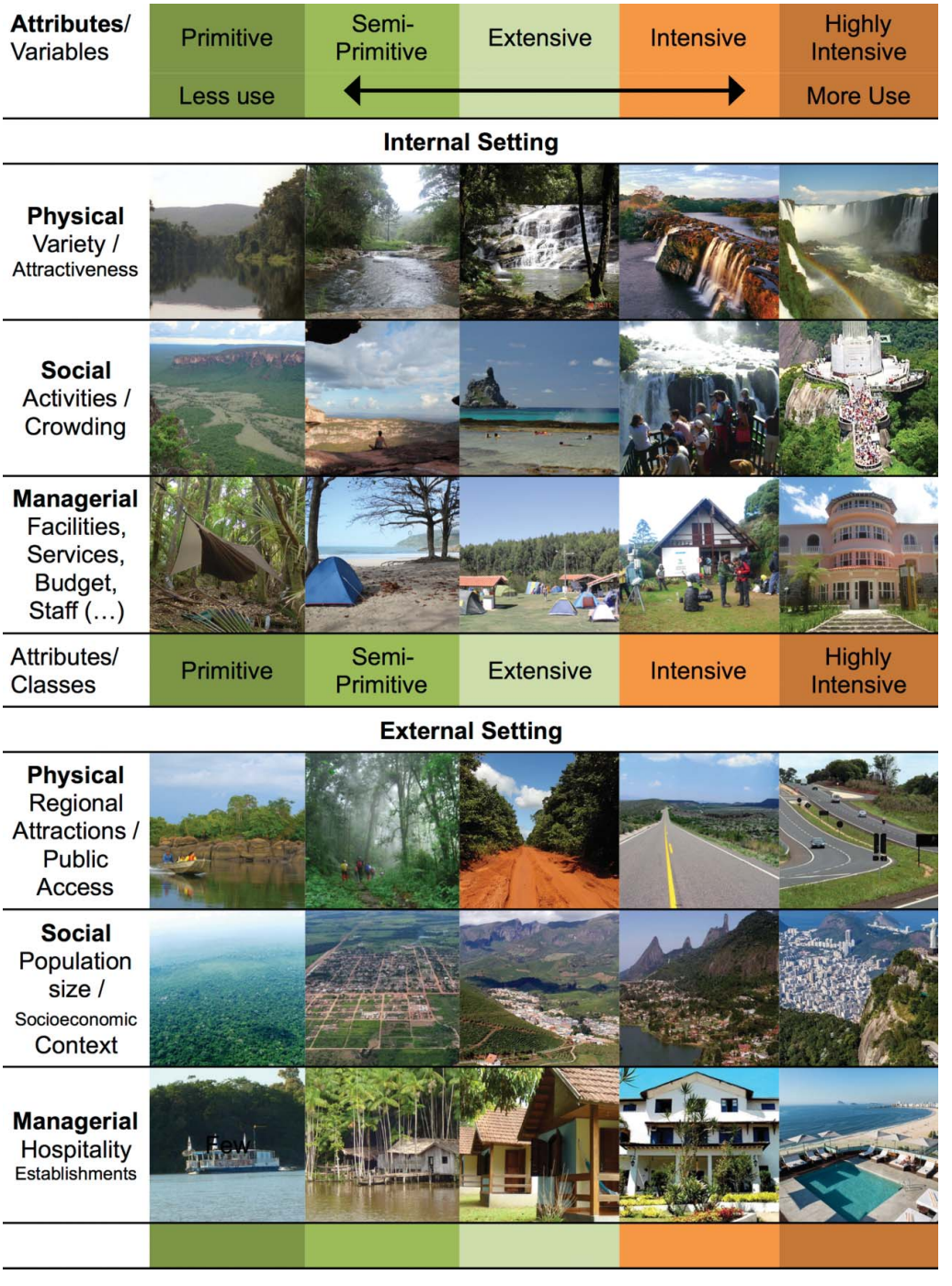

Figure 2. Recreation opportunity classes of use in national parks and forests of Brazil. Source: Souza (2016).

Tijuca National Park (*Highly Intensive Use*) – for this park, visitors were interviewed on-site using a systematic sampling process (Crompton, 1999) at two different access points. Data collection occurred during the week and weekends for a period of 30 days. A total of 116 responses were collected, and 97 were included in the study.

The questionnaire was one-page in length with only essential data requested for this research. Due to field logistics and response issues, the questionnaire was developed in a digital (Qualtrics software) and a standard paper version in English and Portuguese languages. The survey collected origin (ZIP code) to identify internationals, locals, and non-local residents. The relevant questions included length of stay, party size of the group, and the amounts spent in specific categories: accommodation, meals, gas and oil, local transportation, retail stores, activities and guided tours and other expenses. In addition, questions were also included to identify multiple destination visitors.

Visitor expenditures need to be carefully analyzed as it can be a potential source of error (Crompton, 2010). Hence, researchers (Cook, 2013; Crompton, 2010; Cullinane & Koontz, 2016; Huhtala et al., 2010) have enumerated several issues that need to be performed to derive an accurate participation of visitors for the analysis: definition of visitor and visit, proper spending region, definition of local visitors and zero spending visitors and multiple destination trips, which were considered in the data analyzes.

Multipliers

National ratios and multipliers were derived from the I-O Table of Brazil 2013 – 68 sectors (Guilhoto, 2015). The premise is that the national economy did not have significant changes between the year of the I-O table (2013) and the year of the visitor survey (2015). A closed matrix inclusive of families' expenditures was developed to calculate the Type II multipliers. Type II multipliers were used to calculate secondary effects (indirect and induced).

Following the MGM2 methodology, this study focused mainly on the direct effects with greater attention to income and value added as the more reliable impact measurements. The direct effects were presented by spending categories. Impacts were presented in terms of sales, value added, personal income and jobs (Stynes et al., 2000):

(1) Sales are the sales of business within the region to visitors after considering the capture rate.
(2) Jobs correspond to the number of jobs supported by tourist expenditures. Job effects consider full-time, part-time and seasonal jobs.
(3) Personal income refers to proprietor's income, salary income and wages.
(4) Value added is a contribution measurement of a region or industry to the gross product, national or state. Rents and profits, personal income and indirect business taxes summed are included in Value Added. It corresponds to the final price of the product or service after removal of the costs of production minus non-labor.

Direct effects

Multipliers and economic ratios were multiplied to each sales category from the local economy. Specific multipliers for five economic sectors were developed, in order to captures the economic differences of each industry (Crompton, 2010). Direct effects are estimated for each category of expenditure with the following formulas (Stynes, 2001):

$$\begin{aligned}\text{Direct jobs} &= (\text{direct sales} \times \text{capture rate}) \times \text{jobs/sales ratio}\\ \text{Direct personal income} &= (\text{direct sales} \times \text{capture rate}) \times \text{personal income/sales ratio}\\ \text{Direct value added} &= (\text{direct sales} \times \text{capture rate}) \times \text{value added/sales ratio}\end{aligned}$$

Total effects

The procedure for total effects is similar to direct effects via the Type II multipliers for each sector. They represent the variation in sales, income, jobs and value added for each additional unit of sales. Indirect effects are estimated in an aggregate form with the following formulas

(Stynes et al., 2000):

$$\begin{aligned}
\text{Total sales} &= (\text{direct sales} \times \text{capture rate}) \times \text{Type II sales multiplier} \\
\text{Total jobs} &= (\text{direct sales} \times \text{capture rate}) \times \text{total jobs/sales ratio} \\
\text{Total personal income} &= (\text{direct sales} \times \text{capture rate}) \times \text{total income/sales ratio} \\
\text{Total value added} &= (\text{direct sales} \times \text{capture rate}) \times \text{total value added/sales ratio}
\end{aligned}$$

National multipliers

Multipliers and ratios were developed for the Brazilian economy from the I-O Table of 2013 – 68 sectors (Guilhoto, 2015). The data were formulated from National Accounts based on the methodologies described in Guilhoto and Sesso Filho (2005) and Guilhoto and Sesso Filho (2010) (see Table 3).

The sectors from the I-O matrix used to extract the multipliers correspond to the spending categories in the visitor survey (see Table 4). The table contents also show the equivalent International Standard Industrial Classification (ISIC) Revision 4 and the Brazilian CNAE (Código Nacional de Atividades Econômicas). Creative, arts and entertainment activities sector was the closest sector to extract Organized Activities multipliers due to its similar classification under the ISIC section R—Art, Entertainment and Recreation. The category Other Expenses used the average from all sectors.

Results

Visitors were divided into two segments for each recreation class: local and non-local. Sufficient data were not available to statistically define an international segment. On average, based on visitor spending survey data, 20% were local and 80% were non-local. Also, locals spent one day at the PA while non-locals spent three and four days in the region. From the sampled 94 PAs (national parks and forests), a total of 7,273,684 recreation visits were allocated to the three recreation opportunity classes based on these two visitor segments (see Figure 3). The same proportion was kept to include visitors in other PA categories to calculate total economic contributions of the entire system.

Visitor expenditures

The questionnaire collected information about expenditures inside the PAs and within the region. The expenditures were divided by number of days in the region, and per group size if responses were on behalf of an entire group. Then, based on how important (1–10), the PA was for their decision to visit the region, only the percentage informed by the visitor was considered as final spending per visit per day. The expenditure averages were organized per segment (recreation class and local/non-local) on a visit per day basis (see Table 5). On average, local visitors spent $10.42 per visit, and non-local visitors accounted for $50.74. Local visitors spent more money on meals, local transportation, and activities

Table 3. National multipliers and ratios developed from the Input–Output (I-O) Table for Brazil (2013) – 68 sectors.

Sector	Direct effects ratios				Total effects multipliers (II)			
	Jobs/MM sales	Personal Income/sales	Value added/sales	Sales II	Jobs II/MM sales	Income II/ sales	VA II/ sales	Sales I
Accommodation	61.59	0.45	0.58	4.50	145.69	1.21	1.70	1.62
Eating and drinking	76.78	0.41	0.50	4.63	165.54	1.20	1.64	1.79
Creative, arts and entertainment activities	94.31	0.50	0.57	4.71	178.85	1.31	1.78	1.59
Terrestrial transport	40.16	0.35	0.45	4.58	117.10	1.10	1.52	1.97
Wholesale trade and retail trade, except motor vehicles	60.74	0.46	0.64	4.36	138.47	1.20	1.71	1.53
Average	55.60	0.36	0.46	3.80	124.27	1.00	1.39	1.42

Source: Souza (2016) spreadsheet attached.

Table 4. Corresponding I-O table sectors to the spending categories.

Categories in the questionnaire	Corresponding sectors IOM	Corresponding sectors CNAE
Gas and oil	Wholesale trade and retail trade, except motor vehicles	46/47 – Wholesale trade and retail trade, except motor vehicles
Local transportation	Terrestrial transport	49 – Terrestrial transport
Retail stores	Wholesale trade and retail trade, except motor vehicles	46/47 – Wholesale trade and retail trade, except motor vehicles
Meals	Food processing	56 – Food and beverage service activities
Accommodation	Accommodation	55 – Accommodation
Activities and guided tours	Creative, arts and recreation activities	90 – Creative, arts and recreation activities
Other expenses	Average	–

and guided tours. Non-locals spent more on accommodation, meals, gas and oil, activities, and guided tours. It should be noticed that the visitor expenditures were collected after the travel based on post-visitor memory, which often results in lower than actual levels of expenditure.

Tourism economic contributions and impacts – national effects

National direct and total contributions of visitor expenditure attributed to PAs

National direct contributions consider the direct effects of the expenditures attributable to the days spent in the PAs for all visitors. It also considers a capture rate of 100% with the assumption that all goods are produced nationally. Based on this notion, visitors' expenditures in PAs generated more than $347 million in Direct Sales, $153 million in Personal Income, $194 million in Value Added to the GDP, and supported 23,813 direct jobs. These values consider only local expenditures without considering transportation from the origin to the destination. Furthermore, national total contributions consider the direct plus indirect plus induced effects. Hence, visitors' expenditures generated more than $1.3 billion in total sales, $342 million in personal income, $473 million in value added to the GDP, and supported 43,602 jobs nationally.

Based on recreation class of use, the Extensive classification represented 24% of visitation and 14% of the direct effects. PAs with Intensive Use noted 34% of visitation and 51% of the direct effects. The Highly Intensive classification was responsible for 39% of the visitation and 35% of the direct effects. Due to different expenditures in spending categories, Highly Intensive PAs had more direct effects, but Intensive Use had more total direct effects (see Table 6).

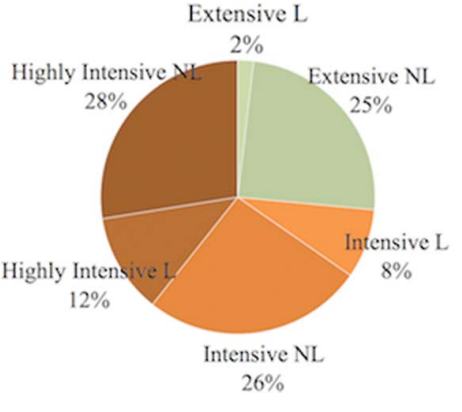

Figure 3. Percentage of visitors in each recreation class segment (L-local, NL-non-local).

Table 5. Average expenditures per recreation class.

	Recreation classes (L – local, NL – non-local)					
	Extensive		Intensive		Highly Intensive	
Spending categories	L	NL	L	NL	L	NL
Accommodation	$0.32	$5.39	$0.00	$18.49	$0.00	$15.65
Meals	$0.63	$8.01	$6.06	$12.33	$3.97	$11.86
Gas and oil	$0.00	$7.26	$5.33	$9.09	$0.16	$12.52
Local transportation	$0.32	$1.36	$0.35	$5.99	$6.28	$6.91
Activities and guided tours	$0.00	$0.69	$6.37	$14.70	$0.50	$12.52
Retail stores	$0.00	$0.82	$0.47	$2.90	$0.16	$3.75
Other expenses	$0.00	$0.38	$0.35	$0.82	$0.00	$0.76
Total expenditure per tourist/day	**$1.26**	**$23.91**	**$18.93**	**$64.32**	**$11.07**	**$63.97**

Only the total expenditure per tourist/day are in bold. They are the sum of column.

National total contributions attributed to PAs in the improved scenario

Based on the aforementioned improved scenario, the results in total effects would result in more than $2.8 billion in Total Sales Captured, US $752 million in Personal Income, US $1 billion in Value Added to the GDP, and support 94,180 jobs for the country (see Table 7).

Discussion

The results contribute academically to the economic impacts analysis literature as it relates to developing countries. This study collected primary visitor expenditures data in three different PAs to develop generic expenditures profiles for the most expressive recreation classes with local and non-local visitor segments. Additionally, based on the 2013 I-O matrix of the Brazilian economy, eight specific multipliers and ratios for each spending category were developed for the national level. Using this approach, it was possible to estimate not only sales, but also value added, income and jobs. Overall, this methodology improved the reliability of the results based on primary data collection and rigor of analysis (Stynes et al., 2000).

The economic impacts identified were higher than the estimations from Medeiros and Young (2011). Instead of the $144/$163 million in total sales generated via spending by 3.8 million visitors in 2010 (Medeiros & Young, 2011), this study found that the 8 million visitors in 2015 economically contributed towards $1.2 billion in total sales captured. It should be noted that the ICMBio Central Office provided visitor numbers for both studies, and the variance on total sales are due to differences on expenditures and multipliers. In addition, Medeiros and Young (2011) used total expenditures and separated visitors in three spending profiles between $12 and $34, while the current study used seven categories (i.e. accommodation, meals, gas and oil, local transportation, activities, retail stores and other expenses) and separated PAs visitors in six profiles between $1 and $64. The use of more visitor spending profiles and spending categories offered a more comprehensive account with regard to the capability to further analyze

Table 6. Economic contributions of visitor spending to the national economy.

Spending category	Sales captured	Jobs	Personal income	Value added
Accommodation	$84,310,383	5,193	$37,939,672	$48,900,022
Meals	$76,042,342	5,838	$31,177,360	$38,021,170
Gas and oil	$64,984,842	3,947	$29,893,027	$41,590,299
Local transportation	$36,875,676	1,481	$12,906,486	$16,594,054
Activities and guided tours	$64,745,257	6,106	$32,372,628	$36,904,796
Retail stores	$16,523,036	1,004	$7,600,596	$10,574,743
Other expenses	$4,384,808	244	$1,585,838	$2,002,395
Total direct effects	**$347,866,345**	**23,813**	**$153,475,610**	**$194,587,482**
Secondary effects	$946,109,299	19,789	$189,397,361	$279,103,778
Total effects	**$1,293,975,644**	**43,602**	**$342,872,971**	**$473,691,260**

Only the total expenditure per tourist/day are in bold. They are the sum of column.

Table 7. Economic contributions of visitor spending to the national economy: improved scenario.

Spending category	Sales captured	Jobs	Personal income	Value added
Direct effects	$621,680,792	42,725	$274,734,880	$347,625,218
Total effects	$2,821,185,706	94,180	$752,935,141	$1,045,872,259

economic impacts. Moreover, total expenditure differences (i.e. maximum values between $34 and $64) illustrated a variance in the market prices between the years of 2010 and 2015 that affected results. Finally, the other difference is that Medeiros and Young (2011) used generic multipliers adopted from the US economy, while this study developed the multipliers for each spending category based from an I-O matrix of the Brazilian economy. This further allowed to capture greater details in spending effects.

Nevertheless, both studies reinforce the idea that PAs are engines of economic development as expenses in conservation and recreation are actually investments to create and strengthen jobs, income, and gross domestic product (GDP). The total sales capture of $1.3 billion demonstrated to be almost eight times the ICMBio budget of $182 million in 2015 (ICMBio, 2016c). In essence, for every $1 that Brazil invests in the PA system, it generates $7 in economic benefits nationally. Moreover, it has also been noted that investments of approximately $220 million for infrastructure development in all federal PAs, as estimated by Muanis et al. (2009) would increase visitation to 13.4 million, and would generate another $1 billion in total value added. In fact, this potential economic impact is one-third of the $2.9 GDP of Brazilian State of Roraima during the same year.

The limitations of the estimates rely on the precision of the three inputs: number of visits, spending averages, and multipliers (Cullinane & Koontz, 2016). With respect to PAs visitation numbers, this data was based on the information provided via ICMBio headquarters. Basically, the total number of visitors compiled is based on counting procedures that vary from entry ticket sales, visitor counts at the entry gates, visitors signature book, estimations, appointments, and information from the tourist companies. Among such data collection methods, each PA uses one or more to compile the total visitors count as it is dependent on the settings and demand level. However, it is recommended that ICMBio could develop guidelines to increase scientific rigor in data collection, and define a standardized count procedure of visits and visitors. The importance of this is emphasized since the most significant input is estimate of visits, followed by the average spending figures, and distribution of visitors across segments (Stynes et al., 2000).

About expenditures, one limitation is that spending profiles were derived from just three PAs that represented the different recreation classes. Further studies should increase the number of PAs surveyed. Among the three surveyed PAs, visitor expenditure was subject to 6.5% +/− sampling error on average. Future research should focus on increasing the sample size of PAs as well as visitors' segments to include international tourists. It is also recommended to collect data during different times of the year, such as the high and low season in order to capture any potential differences. Interpretation of the results should consider that the survey conducted in Tijuca National Park was applied only during two months of summer. Chapada dos Guimarães National Park and São Francisco National Forest had list of emails that were collected over two years. In order to strengthen the visitor spending data and avoid inflation on total expenditures, the recommended potential sources of errors were treated with the differentiation of local visitors vs. non-local, zero spending visitors, local region and multi-purpose trip (Crompton, 2010). It should also be noticed that the visitor expenditures were collected after the trip based on post-visitor memory, which often results in lower than actual levels of expenditure.

Future research can continue to monitor economic impacts over the years for the federal PAs of Brazil. However, the prerequisite input variable – number of visitors – will need to be collected annually, since expenditures and multipliers can be used for a few years (Huhtala

et al., 2010). Since this study only analyzed the effects at the national level, it is recommended that development of local multipliers and the economic impact evaluations be conducted at local and state levels too. Hence, the next phase of this study is to further explore and examine at the state and local levels based on the data already compiled and calculations of local and state level multipliers.

Conclusion

The study revealed the economic magnitude of an important ecosystem service provided by PAs – tourism and outdoor recreation. Visitation at PAs demonstrated to be an impactful mechanism to develop local economies and the tourism industry in Brazil as each dollar invested in management generates $7 for the economy. The total economic contributions generated more than $1.3 billion in total sales, $342 million in personal income, $473 million in value added to the GDP, and supported 43,602 jobs nationally. The study reinforced that economic impacts of tourism influence the PAs as well as indirectly to other businesses and the local communities. Since a good proportion of the sampled PAs are located in remote areas, the economic effects can further generate greater economic benefits for local communities that have a higher household dependency on the surrounding natural resources. However, investments in PAs are a necessity to ensure conservation of the ecosystem services and quality of visitors' experiences. These results highlighted the importance of tourism in PAs and the adjacent regions for the Brazilian economy, and encourage increase in budget allocation for conservation. Such additional investments would stimulate the local economies and generate benefits for communities to ensure the development of sustainable destinations.

Notes

1. Monetary values are presented in US Dollars.
2. 1.00 US Dollar equals to 13.90 Namibian Dollars (9 September 2016).
3. 1.00 US Dollar = 3.17 Brazilian Real (15 August 2016) Conversion used for the entire document.
4. For more information about the recreation use classification, see Souza (2016).

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