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The economic impact of tourism in six German national parks

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ABSTRACT

Tourism in protected areas can create considerable income for adjacent communities. Based on face-to-face visitor surveys, the present study measures the structure, size and economic impact of tourist expenditure in the six German national parks *Niedersächsisches Wattenmeer*, *Bayerischer Wald*, *Eifel*, *Müritz*, *Hainich* and *Kellerwald-Edersee*. We find that mean daily expenditure per person of national park visitors is considerably below the national averages for tourists in Germany: day-trippers spend between EUR 7 and 13 per day (national average: EUR 28), whereas overnight visitors spend between EUR 37 and 57 (national average: EUR 120). The proportion of visitors with high national park affinity varies between a maximum of almost 46% in *Bayerischer Wald* and a minimum of nearly 11% in *Niedersächsisches Wattenmeer*. Between 49% and 51% of tourist expenditure is captured as direct and indirect income. The total impact of tourism ranges between EUR 525 million in *Niedersächsisches Wattenmeer* and EUR 1.9 million in *Kellerwald-Edersee*, reflecting the national parks' distinct trajectories as tourist destinations. In order to increase the economic benefits accruing from national parks regional policy could aim at a qualitative upgrading of tourist services, increased marketing of the unique national park label and the promotion of a diverse regional supply base.

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1. Introduction

For national parks, the 2007 guidelines of the International Union for the Conservation of Nature (IUCN) stipulate both the protection of the ecological integrity of ecosystems and opportunities for recreation and tourism as primary goals (IUCN, 2008). Given this double mandate of use and protection, national parks have the potential and perhaps even the obligation to actively promote sustainable rural development through outdoor recreation and tourism (Jarvis, 2000). Traditionally located in peripheral areas, national parks can represent unique tourist attractions (Bushell and Eagles, 2007; Wall Reinius and Fredman, 2007) and may therefore serve as rare engines of economic development in otherwise often weak regional economies by attracting spending from outside the region.

In Germany, the primary legal mandate of national parks is to protect endemic species and ecological integrity on large-scale ter-

ritories of mostly pristine character. As long as this mission is not compromised, national parks are open to scientific research, environmental education and to the experience of nature for the general public (German Federal Nature Conservation Act BNatSchG, 2002, §24). Beyond this legal priority of protection, however, the designation of national parks more often than not also follows political rationales of attracting tourism to peripheral regions and promoting regional development. This regional development mission is reflected in the founding charters of ten of the existing 14 national parks in Germany. The designation of Eifel National Park in 2004, for example, explicitly addressed “the regional development of the local economy and of sustainable tourism in accordance with the conservation mission of the national park” as a primary goal (MUNVL, 2003, p. 2).

Economic benefits resulting from national park tourism offer a potential compensation to the local population, who has to bear the majority of indirect costs resulting from land use restrictions associated with the protection status of a particular area. Local opposition is a common feature in designations of new national parks, particularly in densely populated areas in Europe (Buijs, 2009; Liebecke et al., 2008; Stoll-Kleemann, 2001). This opposition occurs notwithstanding the amenity benefits for local communities such as easy access to pristine nature via bike paths and hiking trails for the purpose of recreation, improved environmental quality and scenic beauty. Economic benefits accruing from national park tourism, while highly dependent on tourists' disposable income,

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may facilitate the conservation mission by demonstrating the value of parks for people's livelihoods.

The potential economic effects have brought national parks into the focus of policy makers and social scientists alike. The significant scholarly and political interest notwithstanding, comparatively few quantifications of the economic impact of national parks exist. "Worldwide," Eagles et al. (2000, p. 62) state, "there is a low emphasis placed on the collection, compilation, and distribution of coordinated park-use data". Particularly in Germany, the majority of studies in this field fail to provide comprehensive primary data, probably because the free access policy in German national parks makes it difficult and costly to gauge visitor numbers and draw representative visitor samples. The present study is the first attempt to estimate the economic impact of tourism in a sample of six of the fourteen German national parks, based on a comprehensive survey of visitors. In particular, we were interested in visitor numbers, the structure and size of tourist expenditure and the economic impact of tourist expenditure.

2. Research design

2.1. Methods

We follow Watson et al. (2007) in defining economic impact as the net changes in new economic activity associated with a national park. In general, studies of economic impact model the recursive effects on income, output and employment caused by the injection of cash into an economy by a new activity. The initial round of expenditure triggers subsequent rounds, which create indirect effects of the initial cash injection in supplying businesses. Input–output models are currently the most common method for economic impact studies of tourism. They incorporate the sectoral interdependencies in an economy and allow disaggregating the economic impact of tourist expenditure across sectors (Fletcher, 1989; McDonald and Wilks, 1986). As an improvement to input–output models, several authors (e.g. Dwyer et al., 2004) have proposed computable general equilibrium (CGE) models which are able to include resource constraints and feedback effects.

Both input–output and CGE models require data about the sectoral supply linkages between firms. Unlike the IMPLAN system in the US, for example (e.g. Bonn and Harrington, 2008; Hjerpe and Kim, 2007), these data are not available at the sub-national level in Germany and many other European countries (see, e.g. Huhtala, 2007). It is generally possible to construct the models entirely from survey data (e.g. Walpole and Goodwin, 2000) or from a mix of survey and secondary data as so-called hybrid input–output models (cf. Lahr, 1993), but this becomes prohibitively costly if it has to be done in several different regions with thousands of businesses as in our case.

In view of the limited practicability of the above models for our study, we draw on the Keynesian multiplier approach instead (see Archer, 1977; Archer and Fletcher, 1996; Armstrong and Taylor, 2000 for reviews and critiques). The most common type of Keynesian multipliers is the income multiplier which is a measurement of the "amount of income generated in the economy concerned by an additional unit of tourist expenditure" (Archer, 1984, p. 517), i.e. tourism expenditure minus leakage (Hjerpe and Kim, 2007, p. 145). Regional income here is not equal to the gross regional product, since, in accordance with the system of national accounts, it only includes salaries and wages paid as well as income from operations and investment but not depreciation or subsidies.

The significantly reduced empirical costs to calculate this multiplier from secondary sources have contributed to its widespread use in studies of the economic impact of tourism at the local and regional level in several European countries (e.g. Berwert et al.,

2002; Küpfer and Elsasser, 2000; Metzler and Job, 2007; Rütter et al., 1995).

While capital investment into tourism infrastructure such as hotels, restaurants, shops or visitor centres is also part of the economic impact of tourism in national parks, in line with the majority of similar studies we consider only expenditure by tourists in this paper. Tourist expenditure, however, provides the income with which a sizable portion of capital investment is funded. We calculate the annual economic impact, denoted as I , of tourism in national parks in the following steps:

- (1) Gross tourist spending R^g

$$R^g = V \sum_{s=1}^k e_s \quad (1)$$

where V is the total number of visitor days per year, e is the mean daily expenditure per visitor and s denotes the different sectors of the economy (1, 2, ..., k).

- (2) Net tourist spending R^n

$$R^n = \sum_{s=1}^k (R_s^g - VAT_s V e_s) \quad (2)$$

where VAT_s is the value-added tax applicable to a particular economic sector.

- (3) Direct regional income (from tourism spending) I^d

$$I^d = \sum_{s=1}^k (R_s^n m_s^d) \quad (3)$$

where m_s^d is the direct multiplier for sector s , i.e. the proportion of income generated in a sector in the first round of the cash injection.

- (4) Indirect regional income (from tourism spending) I^i

$$I^i = \sum_{s=1}^k (R_s^n - I_s^d) m^i \quad (4)$$

where m^i is a flat indirect multiplier, equal for all sectors, i.e. the proportion of income generated in the second round of the cash injection.

- (5) Total regional income (from tourism spending) I

$$I = I^d + I^i \quad (5.1)$$

If we substitute through the equations above we get

$$I = \sum_{s=1}^k V e_s (1 - VAT_s) [m_s^d + m^i (1 - m_s^d)] \quad (5.2)$$

The total income multiplier m for a particular region then derives as

$$m = \sum_{s=1}^k (1 - VAT_s) [m_s^d + m^i (1 - m_s^d)] \quad (5.3)$$

Substituting with the above terms we get:

$$I = \sum V e_s m \quad (5.4)$$

In order to account for the considerable interregional differences in per capita income in Germany, we adjust the total regional income from tourism with the regional average income per capita in a final step to calculate income equivalents. In the absence of any job multiplier, this step calculates a hypothetical number of people who would be able to live off the income from

tourist expenditure (including, for example, children and pensioners without any job). The number of jobs would be lower than the number of income equivalents, since the income from just one job often supports more than one person.

(6) Total income equivalents IE

$$IE = \frac{I}{RI^c} \quad (6)$$

where RI^c denotes the regional average income per capita.

This method calculates the economic impact of *all* tourist expenditure in the national park regardless of whether it is motivated by the presence of the national park or not. In order to determine the unique economic impact of a national park, i.e. to account only for the tourist expenditure created *in addition* to the expenditure that would have occurred in the region anyway (cf. Loomis and Caughlan, 2006), we have to adjust the above values with the share of visitors with high national park affinity a for whom the national park was the primary reason to come to the region (Wall Reinius and Fredman, 2007).

2.2. Data collection and extrapolation

In order to compute the economic impact of tourism in national parks according to the above method the following variables need to be obtained:

- the total number of visitor days per year V ,
- the mean daily expenditure per visitor by economic sector e_s ,
- the direct and indirect multipliers m for different sectors,
- the regional average income per capita RI^c and
- the share of visitors with high national park affinity a .

Multipliers m were acquired from the *Deutsches Wirtschaftswissenschaftliches Institut für Fremdenverkehr* (dwif), a private consultancy collecting long-term economic data on tourism and tourism businesses in Germany, including inter-firm linkages. This consultancy conducts and synthesizes primary surveys of internal cost structures and regional supply linkages of firms within the accommodation, catering, retail and transport sectors (dwif, 2007) which allows to calculate direct and indirect income multipliers. m_s^d was available for different sectors of the economy in different regions, while m^i was estimated to be an average of 30% across all sectors based on studies on cost structures and business linkages. RI^c for different regions are available from the state offices for statistics (Statistische Ämter des Bundes und der Länder, 2007).

Data for the remaining variables were collected through on-site visitor surveys in the six national parks in 2004 and 2007. In total 78,064 face-to-face interviews were conducted of which 67,586 were short interviews in which only the duration of the stay, visitor type (day-tripper vs. overnight visitor) and the type of accommodation as the most important determinants of tourist expenditure (Fredman, 2008; Kastenholz, 2005) were recorded. The remaining 10,478 long interviews focused on the structure and size of tourist expenditure by economic sectors and the affinity with the national park. When surveying tour groups, expenditure data was collected for only one person in the group, but the number and age of all group members were logged.

The share of visitors with high national park affinity a in every national park was defined as the percentage of visitors that answered affirmatively to the three successive questions in Fig. 1.

Census points were selected in cooperation with national park management to coincide with the main access points to the national parks so as to record park visitation. In every national park, 20 census days were chosen to reflect variations in visitation by season, day of the week and weather conditions in order to obtain representative visitation data for the whole year (Niedersächsisches

Fig. 1. Decision tree to determine visitors with high national park affinity.

Wattenmeer is an exception here, because reliable visitation figures could be obtained from the local authorities and official tourism statistics). The number of visitor days per year was extrapolated according to the formula below:

$$V = \sum_{d=1}^{365} v \alpha_d \varepsilon_d \kappa_d \eta_d \quad (7)$$

where v is a constant and denotes the average visitor count obtained from the 20 census days. Subscript d represents the days of the year and Greek letters represent variables: α is the adjustment factor to account for visitors outside the survey time on a census day. For every day of the year we calculate a seasonal adjustment factor ε (high season/low season), a weather adjustment factor κ (good weather/bad weather) and a day-of-the-week adjustment factor η (weekday/weekend) from our census data. Weather data to calculate κ were retrieved from the *Deutscher Wetterdienst* (DWD). When compared against visitor data from automated counting machines, which were available at some census points, deviations were found to be within a tolerable range of 10–15%, thus validating our approach to gauge visitation figures (for a detailed exposition of the research design see, Job et al., 2009).

3. Survey areas

The six national parks in our sample range in size from 5724 ha (Kellerwald-Edersee) to 32,200 ha (Müritz)—or 277,700 ha if including the tidelands and water areas of *Niedersächsisches Wattenmeer* (see Fig. 2). All parks are listed as IUCN category II protected areas in the 2009 *World Database on Protected Areas*. Fig. 3 illustrates that the parks are either located in the outer periphery along the national border or in the inner periphery of the low mountain range in the sparsely populated former borderlands of the divided Germany. It is important to note that the six parks represent different stages and trajectories of development as a tourist destination (see Job, 2008; Job et al., 2009).

Niedersächsisches Wattenmeer has long been an established holiday destination, even before the national park was created in 1986, and is currently one of the most important tourist destinations in

Fig. 2. Total visitor days, share of visitor days with high national park affinity and visitor density.

Germany (Beckmann, 2003). Covering an extensive part of the German North Sea shoreline, including six populated islands, visitors have flocked to the beaches and health resorts on the coast since the rapid development of spa tourism at the end of the 18th century (Kulinat, 1969). The designation as a national park thus occurred in the mature stage of Butler's tourism area lifecycle model (Butler, 1980). This explains why the national park plays a minor role in the tourism marketing of the region and cooperation between the national park and the tourism industry remains at a low level (Job et al., 2009).

In contrast, when *Bayerischer Wald* was designated in 1970 as the first national park in Germany, its primary mission was to stimulate tourism development in an economically depressed region adjacent to the Iron Curtain, which had acquired notoriety as the "poorhouse of the nation" (Haug, 1993). In the first two decades of the park's existence, the area experienced a rapid rise in inbound tourism, putting the region on the domestic tourist map. Although the tourism boom has petered out since the mid-1990s, the national park still serves as the primary attraction in the region and has made considerable efforts in creating relationships with tourism. At the same time, however, a regional bark beetle epidemic has been putting a strain on the public image of the national park since the mid-1990s as large swathes of the Norway spruce forest have turned into dead wood areas (Liebecke et al., 2008; Flint et al., 2009).

Established in 2004, *Eifel* is among the most recent national park designations in Germany and was established for the conservation of endemic beech forests. Unlike all other national parks, it is situated close to major agglomerations such as Cologne, Bonn, Aachen (in Germany) and Maastricht (in the Netherlands). This proximity taps a large market base of visitors, since it makes for easy access for day trips. Notwithstanding its short history, *Eifel* occupies an important place in regional tourism marketing and is actively promoted in a cooperation between national park management and tourism organisations (Job et al., 2009).

Müritz is situated in a structurally weak and sparsely populated lake district in East Germany. The designation of the national park in 1990 coincided with the start of market-based tourism. The label 'national park', it was hoped, would provide a competitive edge in marketing the destination for nature tourism and give a stimulus to the regional economy. Since then, tourist arrivals have indeed

increased significantly and the park continues to be the main attraction in the region (Leibenath, 2007; Job, 2008).

Covering 7513 ha, *Hainich* is one of the smaller German national parks and protects the largest area of contiguous deciduous woodland in Germany. It is situated in the west of the state of Thuringia, in the former border zone between West and East Germany. National park management has been active in trying to develop this depressed region. Designated in 1997 in an area with rudimentary tourist infrastructure, the park has since built numerous hiking trails and opened a highly popular tree-top walk. It cooperates closely with actors from the tourism business and since the park is the only major point of attraction in the region, it features prominently in regional marketing campaigns (Job et al., 2009).

Kellerwald-Edersee, together with *Eifel*, is the youngest of German national parks. Designated in 2004, it covers an area of only 5724 ha comprising predominantly beech forests. The national park is close to the spa town of Bad Wildungen and includes the popular Edersee lake. Although the tourist potential of the national park has been recognised by regional tourist organisations and the national park management, up to now attempts to leverage the national park for nature tourism have remained few and far between (Job et al., 2009).

4. Results

4.1. Visitation and national park affinity

With a total of more than 20 million visitor days in 2007 *Niedersächsisches Wattenmeer* received almost 10 times more visits than the rest of the sample combined and more than 30 times more than *Bayerischer Wald* as the immediate runner-up (Fig. 2). National park affinity, however, was lowest in *Niedersächsisches Wattenmeer*, reaching only 10.9%, whereas *Bayerischer Wald* at 45.8% was at the high end of the scale, closely followed by *Müritz* (43.7%) and *Hainich* (40.7%).

At more than 900 visitor days per hectare and year, visitor density is also considerably higher in *Niedersächsisches Wattenmeer* than in any of the other reserves. It surpasses the value of *Müritz*,

Fig. 3. Map of national parks in Germany.

the reserve with the lowest visitor density, by a magnitude of 75. The other four reserves receive between 30 and 45 visitor days per hectare and year.

4.2. Visitor characteristics

Table 1 shows that the share of men and women visiting the national parks in our sample is more or less equal across all parks. The mean age of visitors differs significantly between most parks: *Bayerischer Wald* and *Kellerwald-Edersee* receive the youngest visitors ($M = 40.5$ and $M = 40.2$), whereas *Eifel* has the oldest visitors at a mean age of 47.6. Mean group size ranges between 2.4 persons per party in *Eifel* and 2.8 persons in *Hainich*. The most frequent group size is two persons, which accounts for between 36.4% (*Kellerwald-Edersee*) and 62.6% (*Müritz*) of visitors.

There are marked differences in the split between day-trippers and overnight visitors in different national parks. More than 85% of visitor days in *Niedersächsisches Wattenmeer* can be attributed to overnight visitors, whereas the same figure stands at only 24% for

Eifel and *Hainich*. In general, overnight visitors mostly prefer private lodgings such as holiday apartments. Only in *Eifel* and *Hainich* does the share of visitors staying in hotels exceed the share of visitors staying in private lodgings. Staying overnight with friends or relatives is not uncommon. In *Hainich* more than 30% of all visitors stay with friends or relatives. Camping is also popular as an accommodation option, especially in *Müritz* where it reaches a proportion of 18.1%.

4.3. Structure of expenditure

Table 2 illustrates that spending for accommodation and catering is roughly similar in size and makes up the largest parts of the budget for overnight visitors. Expenditure for accommodation varies between 45.8% of the total budget in *Müritz* and 36.6% in *Bayerischer Wald*. The share of expenditure for catering services ranges from 42.7% for *Eifel* and 32.4% for *Müritz*. With a mean daily expenditure of EUR 56.87 for overnight visitors and EUR 12.83 for day-trippers, visitors were most generous in *Niedersächsisches Wat-*

Table 1
Visitor characteristics in six German national parks in 2007.

Variable	n	Niedersächsisches Wattenmeer		Bayerischer Wald		Eifel		Müritza ^a		Hainich		Kellerwald-Edersee	
Sex	26,241	♂ 46.8%	♀ 53.2%	♂ 50.9%	♀ 49.1%	♂ 50.5%	♀ 49.5%	♂ 49.9%	♀ 50.1%	♂ 49.2%	♀ 50.8%	♂ 51.9%	♀ 48.1%
Age	26,569	42.1 ($\sigma=22.0$)		40.5 a ($\sigma=20.3$)		47.6 ($\sigma=20.2$)		44.5 b ($\sigma=17.8$)		43.9 b ($\sigma=20.5$)		40.2 a ($\sigma=21.2$)	
Mean group size	10,364	2.5 c ($\sigma=1.2$)		2.6 a,b ($\sigma=1.5$)		2.4 c ($\sigma=1.5$)		2.5 b,c ($\sigma=1.4$)		2.8 d ($\sigma=1.5$)		2.7 a,d ($\sigma=1.7$)	
Group size = 1		17.4%		17.6%		23.9%		11.5%		13.3%		24.3%	
Group size = 2		48.5%		45.6%		47.3%		62.6%		43.5%		36.4%	
Visitor type	67,586	Day 15.0%	Overnight 85.0%	Day 32.6%	Overnight 67.4%	Day 75.7%	Overnight 24.3%	Day 39.0%	Overnight 61.0%	Day 76.0%	Overnight 24.0%	Day 58.7%	Overnight 41.3%
Accommodation	6292												
Hotel			22.8%		31.9%		36.8%		24.2%		20.7%		16.1%
Guesthouse			8.9%		21.0%		12.4%		10.2%		15.8%		15.8%
Private lodgings			47.7%		36.8%		18.5%		36.8%		11.9%		35.5%
Camping			7.5%		1.5%		12.9%		18.1%		6.7%		14.6%
Friends/relatives			5.9%		4.4%		11.9%		4.3%		30.4%		11.2%
Other			7.2%		4.4%		7.5%		6.4%		14.5%		6.8%
Mean overnight stays	6302		8.8 ($\sigma=11.0$)		7.1 a ($\sigma=5.5$)		4.5 b ($\sigma=5.3$)		7.4 a,c ($\sigma=12.3$)		4.0 b ($\sigma=4.7$)		6.5 a,b,c ($\sigma=14.6$)

Any two means in a row that do not share a letter are significantly different at $p < 0.05$ according to the Tamhane test.

^a 2004 data.

Table 2
Structure of tourist expenditure per person per day in six German national parks in 2007 [EUR].

	Niedersächsisches Wattenmeer				Bayerischer Wald		Eifel		Müritza ^a		Hainich		Kellerwald-Edersee	
	Day ^b	Overnight ^b	Day ^b	Overnight ^b	Day ^b	Overnight ^b	Day ^b	Overnight ^b	Day ^b	Overnight ^b	Day ^b	Overnight ^b	Day ^b	Overnight ^b
n	337	1576	445	619	1160	284	188	1182	796	173	662	381	662	381
Mean daily expenditure	12.83 ($\sigma=10.71$)	56.87 ($\sigma=35.88$)	10.10 ($\sigma=13.34$)	49.60 ($\sigma=30.46$)	10.50 ($\sigma=11.78$)	46.88 ($\sigma=31.20$)	8.05 ($\sigma=12.73$)	51.10 ($\sigma=31.26$)	9.42 ($\sigma=10.88$)	41.84 ($\sigma=23.27$)	6.88 ($\sigma=9.22$)	37.25 ($\sigma=23.14$)	6.88 ($\sigma=9.22$)	37.25 ($\sigma=23.14$)
Accommodation	72.3%	42.3%	66.7%	36.6%	75.2%	40.3%	68.2%	45.8%	63.9%	37.7%	81.3%	42.2%	81.3%	42.2%
Catering	12.7%	34.1%	21.7%	20.1%	11.9%	42.7%	20.0%	32.4%	10.6%	41.3%	12.0%	39.1%	12.0%	39.1%
Retail	15.0%	15.9%	11.6%	7.0%	12.9%	10.5%	11.8%	13.6%	25.5%	9.5%	6.7%	12.0%	6.7%	12.0%
Other services		7.7%				6.5%		8.2%		11.5%		6.7%		6.7%
Total mean daily expenditure	50.37 ($\sigma=36.91$)		34.59 ($\sigma=31.51$)		19.31 ($\sigma=22.61$)		34.32 ($\sigma=32.92$)		17.25 ($\sigma=18.66$)		19.48 ($\sigma=21.52$)			

^a 2004 data.

^b Visitor type

Table 3

Mean daily expenditure of overnight visitors per day by accommodation type [EUR].

	Niedersächsisches Wattenmeer		Bayerischer Wald		Eifel		Müritz*		Hainich		Kellerwald-Edersee	
<i>n</i>	1576		619		284		1182		173		381	
	<i>M</i>	σ	<i>M</i>	σ	<i>M</i>	σ	<i>M</i>	σ	<i>M</i>	σ	<i>M</i>	σ
Hotel	87.43	38.11	64.82	34.48	61.42 a	33.38	72.73	34.62	56.03 a	25.11	65.01	24.98
Guesthouse	61.19	27.91	50.77 a	24.35	46.88 a,b	24.68	54.41	21.70	54.00 a	16.11	48.74	19.06
Private lodgings	49.56	28.03	41.10 b	25.86	37.74 b,c	19.03	47.21 a	23.96	37.72 b,d	15.57	31.58 a	13.30
Camping	25.56 a	16.85	31.71 a,b,c	20.56	28.60 c,d	18.01	30.21 b,c	21.67	27.08 b,c,d	23.65	21.60 b,c	12.10
Friends/relatives	30.09 a	18.91	22.62 c	18.74	29.45 b,d	39.36	20.90 c	17.22	16.23 c	12.18	15.73 b	13.81
Other	35.83 a	28.48	28.76 b,c	21.54	39.19 b,d	17.68	40.00 a,b	28.81	36.02 d	10.09	32.82 a,c	20.88
Mean daily expenditure	56.87	35.88	49.60	30.46	46.88	31.20	51.10	31.26	41.84	23.27	37.25	23.15

Any two means in a column that do not share a letter are significantly different at $p < 0.05$ according to the Tamhane test.

* 2004 data.

tenmeer, whereas Kellerwald-Edersee received the thriftiest visitors spending an average of EUR 6.88 on a day trip and EUR 37.25 if staying overnight. A sizable proportion of day-trippers do not spend any money at all: in Müritz 46.0% of day-trippers do not have any expenditure, compared to a rather low share of 18.3% in Niedersächsisches Wattenmeer.

With the notable exceptions of day-trippers in Eifel (ANOVA, $F = 6.33$, $p < 0.05$) and overnight visitors in Müritz (ANOVA, $F = 10.00$, $p < 0.01$) there was no significant difference between the expenditures of visitors with high national park affinity and normal visitors if we distinguished between day-trippers and overnight visitors. In Bayerischer Wald and Eifel, however, visitors with high national park affinity were significantly more likely to be overnight visitors (Bayerischer Wald: Cramér's $V = 0.088$, $p < 0.01$; Eifel: Cramér's $V = 0.087$, $p < 0.001$) and therefore had a higher overall expenditure. Due to the high proportion of overnight visitors Niedersächsisches Wattenmeer also had the highest mean daily expenditure across visitor types with EUR 50.37 per visit. In contrast, Hainich received the lowest expenditure with only EUR 17.25 per visit.

Visitors' overall expenditure differed significantly by accommodation type for most parks (Table 3). With the exception of Eifel and Hainich, hotel guests' expenditure was significantly higher than that of visitors choosing other accommodation. Hotel guests spent between 30% (Bayerischer Wald) and 74% (Kellerwald-Edersee) more than the average visitor. In contrast, the mean daily expenditure of visitors staying with friends and relatives was lowest and between 37% (Eifel) and 61% (Hainich) below that of the average visitor.

4.4. Economic impact

Table 4 gives an overview of the estimated economic impact of the national parks in our sample. Niedersächsisches Wattenmeer took a clear lead with more than EUR 500 million created through tourism in the park, of which almost EUR 60 million are created by visitors with high national park affinity. Due to their higher share of overnight visitors, Bayerischer Wald and Müritz also performed reasonably well with EUR 13.5 million and EUR 6.9 million, respectively, for all visitors and EUR 6.5 million and EUR 2.8 million for those with high affinity. With a total regional income of less than EUR 5 million each, the remaining three national parks lagged behind.

Between 32% and 35% of gross visitor spending is retained as direct regional income in all national parks. Another 16%, on average, is converted into indirect regional income. This translates into an income multiplier of between 49% and 51%. About half of the gross tourist revenue is thus converted into regional income. The regional income retained from tourism in all national parks in our sample corresponds to a total of 32,432 IE (2143 without Niedersächsisches Wattenmeer). If we consider visitors with high national park affinity only, this figure decreases to 4282 IE (922 without Niedersächsisches Wattenmeer).

5. Discussion

5.1. Explaining differences in visitation and national park affinity

Differences in visitor density and national park affinity can be attributed to the parks' differing development and position in the tourist destination market. Being an established tourist destination, Niedersächsisches Wattenmeer attracts visitors regardless of the presence of the national park. The minor significance of the national park for generating additional visitor influx is reflected in the low proportion of visitors with high national park affinity. Bayerischer Wald, by contrast, is a much stronger tourist attraction and, in relative terms, contributes more to the economic development of the region, as is evidenced in the sizable share of visitors with high affinity.

It appears obvious that younger national parks like Kellerwald-Edersee and Eifel, both of which were founded in 2004, still have generally low affinity rates due to their very recent designation and it can be expected that these rates will increase over the course of the next decade or two. The case of Hainich, however, proves that achieving high affinity ratings does not necessarily take decades. With a proportion of 40.7% of visitors with high affinity, Hainich demonstrates that the label "national park" can represent a key asset in the marketing and development of the destination from the very beginning. The designation of a national park alone, however, is not a panacea for attracting visitors. Despite its much longer history, Bayerischer Wald, for example, does not score much higher in the affinity rating than Hainich. This may be explained partly by a lack of acceptance and identification and, consequently, a lack of promotion and support by local stakeholders, especially tourism businesses (Mayer and Woltering, 2008). More generally, this suggests that a laissez-faire approach is not suitable for developing national parks as attractive labels for tourism marketing.

Comparing affinity rates from our study to national parks in other countries, the Swiss National Park turns out to have a rather large proportion of 42% of visitors with high affinity (Küpfer, 2000, p. 101). Yet, these rates are still low in comparison to national parks in the United States. Stynes (2006, 2007, 2008) reports that for at least 75% of visitors surveyed in a number of US national parks the presence of the reserve is the primary reason to visit the region. National parks like Yellowstone even achieve rates above 90%. It is important to realise, however, that the role of national parks as primary nuclei of touristic attraction (Leiper, 1990) is more salient in the US, where national parks are often the only major attraction in the region, than in most densely populated areas in Western Europe where national parks are just one of many other attractions. German national parks, for example, have, until recently, not been promoted as must-see attractions in the mass media or in guidebooks (Wall Reinius and Fredman, 2007).

Table 4
Economic impact of tourism in six German national parks in 2007 by national park affinity [million EUR].

	Niedersächsisches Wattenmeer			Bayerischer Wald			Eifel			Müritz ^a			Hainich			Kellerwald-Edersee		
	Total	High affinity only	Total	High affinity only	Total	High affinity only	Total	High affinity only	Total	Total	High affinity only	Total	Total	High affinity only	Total	Total	High affinity only	Total
Gross tourist spending R^g	1040.2	115.8	27.8	13.5	8.7	2.8	13.4	5.6	5.0	628	261	206	105	28	3.9	1.0	0.35	0.17
Direct regional income I^d	358.8	39.7	9.0	4.3	2.9	0.93	4.7	1.9	1.7	4.7	1.9	0.77	0.62	0.17	1.3	0.35	0.17	0.52
Indirect regional income I^i	166.3	18.5	4.5	2.2	1.4	0.45	2.2	0.9	0.77	6.9	2.8	2.5	1.9	0.52	0.62	0.17	0.17	0.52
Total regional income I	525.0	58.2	13.5	6.5	4.3	1.4	6.9	2.8	2.5	6.9	2.8	2.5	1.9	0.52	1.9	0.52	0.17	0.52
Income equivalents IE	30,289	3360	939	456	265	85	628	261	206	628	261	206	105	28	105	28	0.52	0.52

^a 2004 data.

5.2. Explaining differences in trip characteristics and expenditure structure

The varying split between overnight and day visitors between national parks is probably related to two main factors. First, national parks receiving a high share of day-trippers are usually located in the proximity of urban agglomerations, whereas national parks receiving a high share of overnight visitors, such as *Müritz* or *Bayerischer Wald*, are usually in more peripheral locations where day trips from the urban agglomerations are inconvenient. Second, more mature holiday destinations seem to attract a higher share of overnight visitors. This is the case with *Niedersächsisches Wattenmeer* and, again, with *Bayerischer Wald*, whereas destinations in the earlier stages of the tourist lifecycle such as *Hainich* attract more day visitors, often by way of special attractions or events such as adventure walks.

The mean daily expenditure of national park visitors in our sample is significantly below the national averages for tourists in Germany. The average day-tripper in Germany spends EUR 28 per day; the average overnight tourist spends EUR 131.60 in commercial accommodation (hotels, guesthouses) and EUR 72.40 in non-commercial accommodation (private lodgings, camping) (dwif, 2002; Harrer and Scherr, 2010). The downward deviation in our sample is primarily linked to reduced possibilities and a low propensity for consumption in national parks as compared to cities, where shopping tourism is prevalent. The majority of national park visitors want to enjoy nature's beauty and expenditure in retail is therefore often limited to food and souvenirs.

Accommodation choice and tourism infrastructure also play an important role in determining the size of expenditure. Visitors in our sample prefer camping or other cheaper accommodation options such as private lodgings, which are often more appropriate for activities like hiking, canoeing and so on. Upscale accommodation, at the same time, is frequently unavailable or considerably less expensive than in urban areas. The most important gateway community in *Hainich*, for instance, does not even offer hotel accommodation. What is more, the sometimes sizable proportion of visitors who take advantage of staying with friends or relatives also lowers the mean expenditure significantly.

A preference for simple accommodation such as private lodgings, as it is the case in *Niedersächsisches Wattenmeer* for example, is not necessarily reflected in a low daily expenditure however. Quite to the contrary, *Niedersächsisches Wattenmeer* has the highest daily expenditure among overnight visitors. This points to the conclusion that different price levels across regions also play an important role in determining the size of expenditure.

Expenditure of overnight tourists in our sample is somewhat below that of other national parks in Europe. Visitors of the Swiss National Park had a mean daily expenditure of EUR 59.44 (Küpfer, 2000, p. 107f, inflated to 2007 values for comparison), spending more on accommodation (52%), while spending considerably less on catering (21%). Berghäll (2005, p. 64) found for the Archipelago National Park (Finland) a similar overnight expenditure of EUR 58.39, where 46% went into catering but only 11.2% into accommodation.

5.3. Economic impact

Direct and indirect regional income from tourism in other national parks in Europe is in about the same magnitude as in our study. Küpfer (2000, inflated) reports EUR 10.6 million for the Swiss National Park, Huhtala (2007) EUR 12.1 million for the Pallas-Ounastunturi National Park in Finland and Berghäll (2005) EUR 3.3 million for the Archipelago National Park in Finland. This is in the order of regional income from tourism in *Bayerischer Wald* and *Hainich*, respectively.

If compared to national parks in the United States, however, the economic impact of tourism in German national parks is comparatively small. Direct regional income from Yellowstone and Yosemite national parks, for instance, is estimated at EUR 136 million and EUR 134 million, respectively, while even less popular parks like Joshua Tree derive a direct regional income from tourism of about EUR 12 million (Stynes, 2006, 2007). Unlike in Germany, parks in the US charge an entrance fee, are more geared towards motorised tourism, have a higher proportion of international visitors and often feature a wider range of consumption opportunities for memorabilia and other merchandise. The difference in the economic impact, however, is mainly due to the higher visitation, underscoring the salient position of national parks in the tourist attraction system of the United States as compared to Germany.

A sensitivity analysis shows that the economic impact reacts significantly more sensitively to changes in visitation than it does to changes in the multiplier. A variation of 10% in the total number of visitor days produces, *ceteris paribus*, a variation of 10% in the total regional income, because visitor days enter the equation as a simple factor. A 10% variation in visitor days is a common scenario in national parks, considering the fluctuations due to weather conditions or the general economic situation. To produce the same effect of variation in regional income, the direct multiplier, however, would have to vary by more than 20%. This would imply a massive change in firms' cost structures, tax rates or supply linkages in the regional economy—a highly unlikely event.

6. Conclusion

This study has been the first to present a comprehensive dataset on the economic impact of tourism in German national parks. In our sample, the size of the economic impact changes primarily due to variation in the total visitor days and the mean daily expenditure of national park tourists. This suggests two main avenues for regional policy makers to increase the economic leverage of national parks: the first is quantitative upgrading by attracting more visitors, which could lead to additional ecological stress in already heavily frequented parks. The second option is qualitative upgrading by inducing visitors to increase expenditure. Qualitative upgrading could include measures to increase the share of overnight visitors, particularly in hotels and guesthouses, and to enhance the quality and, thus, increase the price of services. It is this second avenue of qualitative upgrading which contributes to an ecologically responsible tourism while at the same time creating jobs and entrepreneurial income in local communities. In addition, regional economic policy could also aim at increasing linkages between businesses and creating a strong supply base, thereby increasing the income multiplier. Promoting regional products in catering or the regional arts and crafts sector as a supplier for the souvenir business would keep money within the regional economy.

The generally low proportion of visitors with high national park affinity leaves ample room for improving the position of national parks on the tourist market and promoting their truly unique selling proposition of pristine wilderness. The launch of the common brand name "Nationale Naturlandschaften" and a coordinated marketing campaign for German protected areas in 2005 was a first step in this direction. Because visitors with high national park affinity stay longer and therefore spend more money, this kind of visitor marketing is also a promising avenue for increasing the total economic impact of tourism in German national parks.

Improved visitor marketing has to be accompanied by improved visitor monitoring. This must include a systematic and continuous survey of use levels and of the economic impact of tourism in national parks. Constructing computable general equilibrium (CGE) models for individual parks, albeit costly, would allow making more precise claims about the economic impact than the

methodology used in our study. As Eagles et al. (2000, pp. 62–63) claim, it is politically dangerous not to have a monitoring system: "senior politicians, government policy-makers, and business planners make decisions based upon the available information. Those sectors with weak or incomplete information risk being undervalued when policy, planning, and management decisions are made."

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