THE INDEX OF SUSTAINABLE ECOTOURISM IMPACTS: THE CASE OF WADI EL GEMAL, PROTECTED AREA OF EGYPT

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Abstract

Purpose: Ecotourism is a concept defined by its positive impacts encompassing biodiversity, conservation and community wellbeing. The identification and measurement of ecotourism impacts using mono-disciplinary approaches has proved to be deficient and detrimental. This paper contributes to the debate on ecotourism and sustainable tourism by proposing a conceptual framework for ecotourism activities in protected areas that sets the stage for the development of the Index of Sustainable Ecotourism Impacts.

Design/methodology/approach: The conceptual framework is verified in the case of Wadi El Gemal National Park in Egypt, using content analysis methodology, whereas the Index of Sustainable Ecotourism Impacts is constructed following the model of alternative measures of welfare. The construction and uses of the index are illustrated using the information extracted from the case study.

Findings: The results highlight the sustainability risks and opportunities in Wadi El Gemal National Park and shed light on important data deficiencies and lack of integration of social, economic and ecological statistics.

Limitations: The validation of the conceptual framework would have been improved if the study had undertaken multiple-case studies. However, the framework was perceived to serve the development of the index.

Social implications: Capturing the developmental impacts of ecotourism calls for the integration of data on ecological and social trends in economic measures.

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Originality/value: The paper illustrates the use and application of a comprehensive measure of ecotourism impacts in the case of Wadi El Gemal National Park in Egypt.

Keywords: *Ecotourism, Protected areas, Protected Area Ecotourism Sustainability Framework, Alternative measures of welfare, Indicator of Sustainable Ecotourism Impacts*

INTRODUCTION

Ecotourism gained wide support at the global and local levels in recent years. It is described as a sub-set of sustainable tourism, and, accordingly, it was recognized as an agent of sustainable development. Defined by its positive effects, ecotourism is perceived as a low impact economic activity that strives to contribute to biodiversity conservation and the wellbeing of local populations. Its impacts include the provision of a learning experience about culture and nature.

Ecotourism was introduced in protected areas as a way to generate the long advocated symbiotic relationship between tourism and environment (Budowski, 1976). However, through the different platforms of tourism knowledge, academics came to recognize the ambivalent nature of the tourism sector (Jafari, 1990, 2001). This was substantiated by the threats of biodiversity loss, habitat fragmentation, deforestation, desertification, soil erosion and climate change.

The few sound ecotourism practices capable of striking a balance between economic viability, visitor fulfillment, community wellbeing, social equity, biodiversity conservation, physical integrity, cultural richness and resource efficiency seem to be hardly distinguishable from others in the absence of comprehensive conceptual frameworks describing sound ecotourism systems and rigorous measurement of activity impacts. The partial views, abstraction, segregation and reductionism applied to ecotourism has resulted in the prevalence of minimalist approaches that fail to capture the activity's impacts. Comprehensive approaches, on the other hand, are preferred for their capacity to integrate business practices with ecosystems while underpinning the human influence in a manner that advances understanding of the transformation of participants' attitudes and behaviours (Weaver, 2005).

The present paper seeks to contribute to the debate on ecotourism and sustainable tourism by conceptualizing the Index of Sustainable Ecotourism Impacts (ISEI) that capture the comprehensive impacts of ecotourism in highly sensitive natural environments. The paper starts by examining ecotourism activities in highly sensitive natural areas that require conservation efforts through a conceptual framework that embodies the relations between ecotourism systems components and the mechanisms of sustainability. The Index of Sustainable Ecotourism Impacts (ISEI) is subsequently developed to evaluate the economic, ecological and socio-cultural impacts of the activity comprehensively. Both the framework and the Index were applied to a factual case study, the case of Wadi El Gemal National Park in Egypt.

LITERATURE REVIEW

Early attempts to examine the relationship between tourism and sustainable development date back to the seventies. Budowski (1976) was first to address the relationship between tourism and the environment, whereas MacCannell (1976) highlighted the socio-cultural factors underlying the activity. In contrast, Krippendorf (1982) introduced the philosophy of Alternative Tourism, which established the links between the tourism sector and sustainable development as described by the Brundtland report (WCED, 1987). In his writings, Jafari (1990, 2001) elucidated the evolution of tourism knowledge through its four platforms and concluded by recognizing the ambivalent nature of tourism. However, it was Ceballos-Lascurain (1987) who coined the term "ecotourism" for the first time.

Ecotourism definitions identified elements such as non-consumptiveness, education, romanticism in trips to undisturbed areas of natural beauty, cultural and historical value as key constituents (Sirakaya *et al.*, 1999). The definitions described the areas where the activity takes place as natural and cultural areas (Ceballos-Lascurain, 1987; Kutay, 1989; Boo, 1990; Anderson, 1996; Ayala, 1996; Valentine, 1992; The International Ecotourism Society, 1990; Hunt, 1992; Blamey, 1997; Fennell 2003). Some texts made a pronounced reference to national parks (Boo, 1990), protected areas (Boo, 1990; Valentine, 1992) and rural areas (Wallace and Pierce, 1996). Similarly, the activity's advocated impacts included biodiversity conservation (Ziffer, 1989; Butler, 1991; Boo, 1991; Ashton, 1991; Blangy and Eplerwood, 1992; Wight, 1993;

Anderson, 1994; Lindberg and Johnson, 1994; Buckley, 1994; Orams 1997; Sirakaya *et al.*, 1999; Quebec Declaration, 2002; Fennell 2003), education (Ceballos-Lascurain, 1987; Boo, 1990; Fennell and Eagles, 1990; Williams, 1992; Young, 1992; Buckley, 1994; Wallace and Pierce, 1996; Orams, 1997; Quebec Declaration, 2002; Fennell, 2003), and generating socio-economic benefits to the local communities (Ziffer, 1989; Fennell and Eagles, 1990; Boo, 1991; Place, 1991; Blangy and Eplerwood, 1992; Fennell, 2003).

Nonetheless, in the absence of tools to measure impacts, Blamey (1997) and Liu (2003) concluded by describing sustainable tourism and ecotourism as elusive and dispatched concepts, with no operational applications that distinguish their sustainability. Similarly, Weaver (2005) warned against segregation of ecotourism impacts, reductionism and minimalist approaches. Guided by the model of the general tourism product presented by Smith (1994), the present paper developed the Protected Area Ecotourism Sustainability Framework as an adaptation to the specificity of the ecotourism sub-sector. Finally, the development of the Index of Sustainable Ecotourism Impacts followed the propositions of the Index of Sustainable Economic Welfare devised by Daly and Cobb in 1989 by adapting its methodology to the questions pertinent to ecotourism in protected areas.

THE METHODOLOGIES

The complexity of ecotourism systems called for the adoption of inter-disciplinary approaches to capture all the impact dimensions of the activity simultaneously. The present research has therefore drawn upon psychology, geography, political sciences, anthropology, management and marketing to the extent deemed necessary, while systematically stressing the socio-economic and ecological approach. The paper starts by setting the stage for the development of ecotourism activities in highly sensitive natural environments requiring conservation through a conceptual framework that provides the theoretical propositions. The Protected Area Ecotourism Sustainability Framework was developed by revisiting the general tourism product model, adapting it to the ecotourism sub-sector and to sustainability imperatives. Furthermore, the researcher applied inductive thinking to the literature review to outline the main constructs of ecotourism systems in protected areas and depict the sustainability mechanisms.

Following this, a critical review of the indicators of ecotourism and sustainable tourism was conducted to evaluate their adequacy against the framework. The review focused on impact indicators that had applications in the field of sustainable tourism and focused on indicators' background, objectives, structure, applications, advantages and disadvantages. The review revealed the shortage of mono-disciplinary approaches in addressing ecotourism impacts, hence, a multi-disciplinary approach was advanced to construct a composite impacts index that balances the triple-bottom-line of sustainability. A close application of this approach was found in the alternative measures of welfare originally developed to correct for the fallacies of the GDP and to integrate the social and environmental dimensions in the reporting on economic activities. The proposed Index of Sustainable Ecotourism Impacts (ISEI) was therefore modelled after the guiding principles of the Index of Sustainable Economic Welfare (ISEW) developed by Daly and Cobb in 1989.

To verify and demonstrate the propositions of the conceptual framework, the paper examined a single-case study focusing on a protected area in the Egyptian territories: the case of Wadi El Gemal National Park. The field procedure included a visit to the park and a course of direct observations, a review of archival records, as well as a number of in-depth interviews conducted with selected stakeholders. Direct observation aimed at assessing the quality of the ecotourism experience, the state of the protectorate's natural and man-made physical plant, site accessibility and ease of internal transportation. It also helped in the evaluation of the attributes of the services pertinent to hospitality and comfort. Finally, the field visit provided the researcher with an insight on visitors' engagement in the experience and tourism management practices. Observation took place in a continuous period that lasted for several days spent at the destination during the high season, during which, the researcher recorded observations by means of detailed notes, still photography and audio-visual records.

Interviews were used to probe stakeholder's subjective awareness of ecotourism impacts and explore the issues that were not covered by other data sources. Interviewed stakeholders were drawn from the major stakeholders' classes as identified by a previous study carried out in the protectorate. The identified classes included tourism authorities, the business sector, the parks management and staff, whereas interviews with the locals included both those involved, and those who were not

involved in the tourism activities. Interviews were conducted using a semi-structured format covering stakeholder's general views about tourism development, perceptions of the protectorate's visitors, the park's elements of attraction and attributes, the impacts of increased visitations, management measures applied to the protectorate, and the nature of stakeholders' involvement in the ecotourism system. When interviewees showed unwillingness to discuss certain issues, the interviewer used different sources at different times. Interviews were conducted in Arabic and later translated by the researcher into English to allow their analysis. Post-interview recording was purposefully practiced to avoid any feeling of unease among interviewees.

Additional information regarding the protected area studied was collected from scientific studies, archival records, journal articles, marketing materials and visitors' comments on the internet. The data sources produced qualitative information that was examined using content analysis methodology to classify data into pre-defined structures. The content analysis followed the elements identified in the conceptual framework and was restricted to those data sources available in English and in electronic format. These sources were fed into Nvivo7 software. The analysis proceeded by delineating the main tree nodes and sub-nodes that allowed pattern-matching with the conceptual framework. Tree nodes segmentation was guided by the concepts, definitions and classifications of tourism statistics developed by the United Nations Statistical Commission, whereas cultural and natural heritage segmentation followed the European Spatial Planning Observation Network (ESPON). In contrast, the basic taxonomy differentiating between fauna and flora was used for biodiversity segmentation. The analysis of the coding results proceeded via a descriptive narrative of the park's ecotourism system. The analysis examined the composition of the nodes to identify: (1) the system of social goals from tourism development as expressed by stakeholders, and, (2) the elements of the ecotourism system present in Wadi El Gemal National Park.

THE PROTECTED AREAS ECOTOURISM SUSTAINABILITY FRAMEWORK

The tourism product model developed by Smith (1994) identified physical plant, services, hospitality, freedom of choice and involvement as the building blocks of all tourism products. The adaptation of the model to ecotourism and sustainability imperatives highlighted the

central role of the natural, cultural and fragile physical plant that justifies conservation, thus, implicating a strong sustainability stance that prioritizes the safeguard of the critical natural capital, regardless of the value of the foregone benefits of conservation. Defined as ***"…area(s) of land/or sea dedicated to the protection and maintenance of biological diversity, and of natural associated cultural resources…***", protected areas are considered the primary locus of conservation of fragile and/or highly sensitive natural environments. They also play an important role in sustaining the livelihoods of rural populations, strengthening social capital, and promoting leisure and tourism activities.

The re-visitation equally resulted in assigning a higher importance to tourism services relating to culture and nature interpretation, eco-efficiency measures in hospitality practices and constraints on the freedom of choice that require the management of visitors' expectations and involvement, calling for stakeholders' management. Accordingly, management is expected to be developed in several dimensions that integrate resource sustainability with tourism and stakeholders' management, in order to produce the normative impacts of conservation, education and the generation of socio-economic benefits for the local communities.

Figure 1 illustrates the Protected Areas Ecotourism Sustainability Framework, consisting of a system comprising an economic activity, highly reliant on a physical plant, and characterized by naturalness/

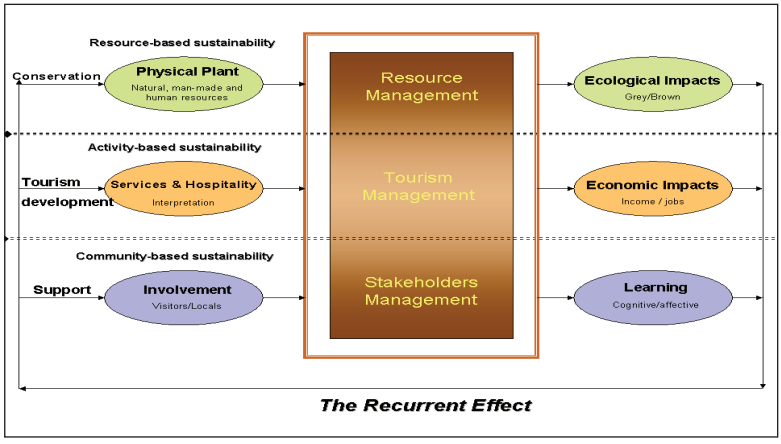

Figure 1. The Protected Area Ecotourism Sustainability Framework

Source: Author's elaboration

authenticity and uniqueness that motivate visits and tourism, whereas fragility and naturalness provide the justification for its conservation. Ecotourism services require the involvement of stakeholders, particularly visitors and local communities. Similarly, the system depicts the encounters of stakeholders that engage them in emotional and cognitive experiences, challenging their pre-existing values, and altering their perceptions, attitudes and behaviours.

Successful ecotourism practices are the product of a multi-dimensional organizational process addressing resources, business and stakeholders in an integrated management process. The result of such an integration is observed in three categories of impacts that encompass the biophysical changes occurring in the destination, socio-economic impacts and the cognitive/emotional effects of the experience on stakeholders. The blending of the three categories of impact is likely to produce both direct and indirect effects that shape the system's sustainability through cyclical actions relating to the three traditions of sustainability proposed by Saarinen (2006).

The Protected Area Ecotourism Sustainability Framework is transversally interpreted as a connector of all three traditions of sustainability. Resource sustainability, reflected in the minimization of negative biophysical impacts, rehabilitation and enhancement of the physical plant, is achieved through successful business management, generation of financial gains, employment, and provision of quality services and hospitality (activity sustainability). Similarly, stakeholders sustainability improved the livelihoods of local communities, engaged visitors, and stimulated supportive attitudes towards conservation.

THE CASE STUDY: WADI EL GEMAL NATIONAL PARK

Ecotourism was introduced in WGNP following its declaration as a marine and terrestrial protectorate in 2003. The park is classified as management category II according to the IUCN classification, thus putting forward tourism and recreation as one of its main goals. In 2005, a group of private investors started the first official ecotourism activities and set up the "Fustat Wadi El Gemal camp" in the park. The park extends over 4,400 sq. km on the mainland, and 55 km into the mountains. Its marine component covers 1,600 sq. km, comprising100 km of coastlines, Wadi El Gemal Island, numerous reefs, and the archipelago of Hamata.

The park includes high relief elevations that form Egypt's third largest watershed, extending over an area of approximately 1,849 sq. km supporting flourishing wildlife. The mountainous chain is cut by wadis. Beaches form bays, sharms and heads, including Ras Baghdadi and Ras Hankorab, and Sharm El Luli bay.

Situated approximately 850 km from Cairo, the park is well connected to roads, marinas and international airports (Hurgada and Marsa Alam international airports). Wadi El Gemal translates literally from Arabic as the valley of camels, named after its main livestock. Some believe it was called Wadi El-Gamal (valley of beauty) for its beautiful scenery; others claim it was first called Wadi El-Maal (valley of money), referring to the historical trade route that passed through it as part of the ancient silk road. The valley once contained emerald mines during the Ptolemaic dynasty, substantiated by some historical and archeological sites still remaining in Wadi Sekait.

Among the plant species observed in the areas we find Acacia trees, *Balanites aegyptiaca*, *Tamarix aphylla*, *Zilla spinosa*, *Zygophyllum coccineum*, the Dome Palm tree (*Hyphaene thebaica*), the date palm *Phoenix dactylifera* along with other medicinal plants like *Anastatica heirochuntica* (Salem, 2001; Khedr, 2003). Mountain animals include the Nubian ibex (*Capra nubiana*), the Dorcas gazelle (*Gazella dorcas*), the African wild ass (*Equus africanus*), Rupell's fox (*Vulpes ruppelli*), the rock hyrax (*Procavia capensis*), the Cape hare (*Lepus capensis*), the sand cat (*Felis margarita*), jerboas and the horned viper (Egypt LIFE Red Sea Project, 2003). Different resident species of birds have been recorded in the area, such as the sooty falcon (*Falco concolor*), the striated heron (*Ardeola gularis*), the western reef heron (*Egretta gularis*), the spoonbill (*Platalea leucorodia*), the osprey (*Pandion haliaetus*) and the Caspian tern (*Sterna caspia*) (Basuouny, 2003). Mangroves are found scattered along the coast, dominated by *Avicennia marina* (EEAA/UNEP, 1993; GEF, 1997; Salem 2001). The reef harbours 23 to 35 species of open water fish species such as groupers (Serrannidae), snappers (Lutijanidae), emperors (Lethrinadae), goatfish (Mullinidae), wrasses (Labridae), parrotfish (Scaridae), sturgeonfish (Acanthuridae), rabbitfish (Siganidae), damsels (Poracentridae), angelfish (Pomocanthidae), anthias (Anthiatidae), butterfly (Chaetodonitidae) and fusilier (Caesionidae). The sea grass meadows provide a suitable habitat for the endangered dugongs and green turtles (Egypt LIFE Red Sea Project, 2003).

The park's coastal zones are home to the main human settlements, inhabited by a number of small communities of indigenous tribes and migrants from the nearby Governorates. Other important agglomerations neighbouring the park include Berenice Port, Ras Benas, El Shalateen, and Sheikh Shazly village, all suffering from poor public services. The indigenous inhabitants of the Red Sea Mountains are part of the Beja tribes that have lived in southern Egypt, eastern Sudan, Somalia and Eritrea since at least 2500 BC. They are divided into four main tribes: Bisharin, Ababda, Hadendoa and Beni Amer. Only the first two inhabit Egyptian territories, mainly in the southern parts of the eastern desert with the Ababda being the original residents of the northern Red Sea area and the Besharin living in southern areas.

The Beja are known for their nomadic lifestyle and herding activities. They maintained a cultural heritage that grants leadership on the basis of personal qualities such as good reputation, wisdom, hospitality, sense of humour and oratory skills. The tribes' social structures stipulate a system of loyalty directed towards the extended family and clan, whereas, the society is largely male dominated. The Ababda were exposed to a range of income generating activities that drove them to abandon their original livestock herding livelihoods. The Bisharin, on the other hand, have maintained their original culture, language and traditional lifestyles. Both the Ababda and the Besharin possess a wealth of cultural heritage that include objects, hunting tools, handicrafts, musical instruments, cultural manifestations of music and dance and rituals. The majority of local products are exchanged during the market that accompanies the memorial of El Sheikh Abul Hassan El Shazely, honouring the death of this religious man, who predicted his own death and dug his grave during his last pilgrimage journey. The tribesmen are closely related to their environment and knowledgeable about the uses of medicinal plants. They possess an unwritten code of conduct and a system of land property rights that vary in their flexibility in times of rains and/or desiccation (Egypt LIFE Red Sea Project, 2003).

FINDINGS

The Protected Area Ecotourism Sustainability Framework was validated in Wadi El Gemal National Park by matching its elements with the observations and information identified through content analysis. The analysis was applied to texts and in-depth interviews that summarized

the elements of the framework. Content analysis resulted in a total of 414 references that were classified in two main tree nodes: a main tree that depicts the ecotourism framework in Wadi El Gemal National Park (391 references) and a much smaller node (23 references) that describes stakeholders' expectations from tourism development in the region (social goals).

Starting with stakeholders' social goals, the analysis revealed a general consensus on tourism acceptance and recognition of its ability to stimulate infrastructure and services development. More specifically, stakeholders referred to tourism's ability to promote health services (6 references), diversify tourism types (6 references), create jobs and generate a stable income (5 references), raise awareness and defeat the negative perceptions about the region (4 references), support the environment and conservation efforts (1 reference), and finally, teaching the locals the basic tourism supply practices (1reference).

The tree node describing the ecotourism system can be fairly divided into a number of sub-nodes ranging from physical plant description (166 references), ecotourism services and management (104 references) and impacts (121 references).

The first sub-node examined was the description of the physical plant. Despite the fact the park was named as a protectorate by virtue of the laws 102/83 and 4/94 to protect its affluent biodiversity, the analysis revealed that cultural heritage is classified as the highest attraction (57 references) with its intangible and tangible components (38 and 19 references respectively). Biodiversity came in the second place (44 references) with a richer terrestrial component (27 references) compared to marine biodiversity (17 references). Natural heritage occupied the third place (21 references). Some 32 references made to the site attributes describe it as rare, unique, authentic, fragile and representative, and stressed the habitat, refugium and recreation functions. The tourism physical plant included settings made to improve: (1) the ecotourism services and hospitality (8 references); (2) site permeability and management (4 references). The first type consisted of a tourism tented camp designed to safeguard ecological norms, while striving to maximize visitor's comfort and enjoyment of the natural physical plant. It consisted of a main tent used as a restaurant and reception area, a cinema tent, bathrooms, kitchen, manager's office, staff tents and some additional tents for occasional overnight guests. Site management of the physical

plant included gates, trails, interpretation signs, offices, ranger outposts and boat mooring buoys, etc.

The services and management sub-node contained information about the purpose of ecotourism development (15 references), services and activities (24 references) and management (31 references). Public authorities mostly strived for the diversification of the tourism product and the attraction of a new typology of tourists (3 references), whereas the ecotourism operator aimed at setting-up tourism services, offering informative tours and quality service in desert environments, increasing visitor numbers, educating them about the value of the place and its people, and finally, educating the locals on the industry of ecotourism and exposing them to an alternative livelihood (12 references). The services and activities offered on-site by the camp and the protectorate management unit included desert safari, camel riding, guided-tours, trekking and camping, in addition to other activities such as diving, snorkelling, bird-watching, fishing and hunting (although the latter is currently banned by the law) (24 references). Finally, 31 references recorded the management measures carried out by the management unit (24 references) and the ecotourism operator (7 references). The management unit responsibilities comprised monitoring of compliance with environmental law, resources management through site hardening measures (trails and boat mooring buoys); awareness campaigns addressed to fishermen, tourism staff, local communities and diving centres; rehabilitation of mangroves, waste management, scientific research, wildlife surveys and cultural interpretation. The operator, on the other hand, handled marketing, operations, and human resources management.

The last sub-node that was examined dealt with the impacts of ecotourism. It included reference to bio-physical impacts (13 references), socio-economic impacts (19 references), and cognitive impacts (123 references). The bio-physical impacts recognized included wildlife poaching and habitat destruction as a result of littering, construction and non-sustainable fishing practices. Employment was recognized as the primary socio-economic benefit of ecotourism development (9 references) followed by funding (6 references) and services (2 references), whereas the increase in the cost of living was recorded as a negative impact (2 references). The cognitive and emotional impacts observed referred to the alteration of visitor's perceptions about culture and

nature (34), awareness of the value of the protectorate (17 references), the engagement of local communities in the ecotourism sector (43 references), the public–private collaboration (20 references) and the education of visitors on ecotourism (9 references).

INDICATORS: THE PASSAGE FROM THEORY TO PRACTICE

The passage from the theoretical propositions included in the conceptual framework to operational functions requires the development of indicators that capture and report on the progress made towards the designated normative impacts. The examination of ecotourism and sustainable tourism indicators revealed the prevalence of mono-disciplinary indicators that fail to capture the triple-bottom-line of sustainability. Under the economic category, the author examined tourism satellite accounts (TSA) and the total economic impact of tourism. The social indicators reviewed focused on perceptual indicators, whereas ecological indicators included the carrying capacity, the limits of acceptable change and the ecological footprint.

Indicators of economic impacts proved to have wide acceptability, well-recognized metrics and high levels of comprehension. However, they relied on equating consumption with wellbeing, a concept refuted in the context of sustainable development for failure to recognize the contribution of non-marketed goods and services, and the social values underlying them, to wellbeing. Social indicators, on the other hand, manage to capture ground-breaking dimensions of wellbeing through perceptual indicators that broaden the concept. For example, the Irridex model exemplifies the individual awareness of tourism impacts based on the social exchange theory. Social indicators were found to be equally useful in assessing collective or social preferences. Despite the enormous leaps made in the methodologies of quantifying social indicators, they remained highly subjective and therefore less accepted by the scientific communities for lack of consensus on their metrics and difficulties of aggregation. Finally, the indicators of ecological impacts provide a clear and quantifiable measure of bio-physical impacts. However, their results rarely provide evidence on the cause/effect relationships, neither with tourism activities nor with wellbeing. Their implementation requires excessive knowledge about the spatial and temporal distribution of ecosystems' responses to stimulus in the various areas. Their complex technical jargon frequently alienates both policy-makers and the general public.

The examination of ecotourism and sustainable tourism indicators substantiated the need to adopt multi-disciplinary approaches to address the different dimensions at stake. A close application of such approaches was found in the alternative measures of welfare, originally developed to correct for the fallacies of the GDP. The indicators alternative measures of welfare examined included the Measure of Economic Welfare (MEW) developed by Nordhaus and Tobins in 1973, the Economic Aspects of Welfare by Zolotas (1981) and the Index of Sustainable Economic Welfare (ISEW) developed by Daly and Cobb in 1989. Not only did the alternative measures of welfare correct the GDP accounting techniques, they also succeeded in integrating the social and environmental changes into the equation to support decision-making processes.

Based on this model, the author suggested a structure for the Index of Sustainable Ecotourism Impacts as a composite index that takes advantage of the privileges presented by each category and balances the triple bottom line of sustainability. The steps involved in the index construction shown in Table 1 included: (1) the identification of key physical plant elements worth conservation; (2) the development of social goals relating to the identified elements; (3) the adjustment of the tourism consumption base to the distribution effects of the activity, (4) the internalization of the progress relating to the social goals to indicate the flow of benefits stemming from the activity, (5) the adjustment of the park's natural capital base.

Steps one and two were carried out using stakeholder sovereignty by building a consensus on the physical plant elements at the destination and assessing stakeholders' awareness of the values and the risks they are subjected to as a result of ecotourism development. The third step, on the other hand, was implemented using economic valuation methods. These included the addition of the imputed value of the improved functions of biodiversity resulting from the banning of hunting, the portion of the non-remunerated household production related to ecotourism and the health services provided to the local inhabitants. Additionally the cost of habitat destruction, the value of the locals' labour during the festivities, and the costs of conflict resolution were deducted. And finally, an adjustment of the park's capital base was made.

The analysis of the longitudinal data series of the index and its components can reflect policy and management implications, while

Table I. ISEI CALCULATION

1- The weighted tourism consumption base			
A	The year		The year 2007 was selected as the baseline year
B	Visitors	69860	The figure is based on actual counting done by the park management. It is divided between day visitors (95%) and overnight visitors (5%)
C	Tourism expenditure	$ 60 for day visitors $130 for overnight visitors	Estimates were made using an engineering approach based on national tourism expenditure surveys and actual prices recorded during the field trip
D	Total visitor expenditure	$ 4,436,110.-	$Sj = \sum_{i=1}^{m} Vi * Sij$ where Sj = total spending within the designated region spending category j, j=1,...J m = number of segments Vi = segment i's share of total visits, I = 1,….m. Sij = average spending of a member of segment i on spending category j
E	Tourism multiplier	2.64	The Egyptian national tourism multiplier was obtained from secondary sources
F	The capture rate	42%	Adjustments made to the multiplier to exclude the leakage of economic benefits
G	Adjusted multiplier	1.19	E x F
H	Weighted tourism consumption base	$ 5,278,971.-	D x G
2 – The non-monetized contribution to welfare			
I	Improved biodiversity functions	-	Estimated by the incremental income derived from improved biodiversity. The absence of data on biodiversity uses, volume of production and prices impeded the development of this estimate

J	Non-remunerated household production	$ 959,400.-	Estimates relied on the production capacities available and the actual market prices
K	Health services provided to locals	$ 100,250.-	Estimated using the per capita public expenditure on health multiplied by the number of people served in WGNP
3- The regrettables			
L	Cost of habitat destruction	($ 17,056)	The annual costs of vigilance patrols was used as a proxy of the defensive costs incurred for the avoidance of habitat destruction. The costs were based on data on daily wages of WGNP staff, cost of gas and annual vehicles maintenance and spare parts costs
M	Cost of overwork during festivities	($ 5,000.-)	The estimate was made by multiplying the duration of festivities by the daily wages
N	Cost of conflict resolution	($ 262,728)	Estimates are based on the duration of the conflict and the time invested in mediation efforts
4- Adjustment of the net capital base			
O	Value of rehabilitated lands and wildlife replenishment	--	This item was not computed due to the absence of data on areas rehabilitated, ecological survey results and/or expenditure estimates
5- Total			
P	ISEI	$ 6,053,837.--	

Table I. ISEI CALCULATION

alerting policy-makers to key issues that might threaten ecotourism sustainability in the future. The calculation of index that amounted to US$ 6,053,837.- proved to be a process requiring the translation of additional data on ecological and social impacts into monetary values. The calculation was hindered by the lack of data, and therefore the index's value should not be taken as conclusive on the value of ecotourism impacts in Wadi El Gemal National Park. Rather, it is an illustration of comprehensive measures of ecotourism impacts.

CONCLUSIONS

Ecotourism literature failed to reach consensus on its definition, but managed to delineate its parameters that were used to develop the conceptual framework. The extension of the concepts of sustainable development to the tourism industry, and more specifically to ecotourism, placed the physical plant at the centre of the activity in the Protected Area Ecotourism Sustainability Framework. Similarly, nature and culture interpretation services, eco-efficiency measures and management of visitors' expectations stand out as important elements of the suggested framework, whereas the three traditions of sustainability are closely intertwined.

The verification of the conceptual framework in Wadi El Gemal National Park confirmed the existence of all elements suggested. The framing and elevation of the park comprised resource management measures that affected the physical plant, whereas tourism services and management processes developed during the enshrinement phase. The activity included high levels of involvement from different stakeholders. Ecotourism operations included a spectrum of nature-based activities that incorporated elements of learning and understanding about nature and culture to stimulate supportive attitudes and behaviours and boost the number of visitors.

Ecotourism activities were marked by the three traditions of sustainability with resource-based sustainability being the primary objective, followed by stakeholder-based sustainability reflected in visitors' engagement, recruitment of the local community, the involvement of the business sector in conservation activities and the collaboration of environmental authorities in tourism services. Ecotourism managed to achieve its cognitive impacts in Wadi El Gemal, whereas both bio-physical and socio-economic impacts remain inadequate.

Several issues emerged from the application of the conceptual framework to the case study. First, the content analysis showed that the primary element of the physical plant (cultural heritage) remains unprotected, and thus signals an important sustainability risk of commodification and cultural erosion. Second, activity-based sustainability was compromised by excessive tourism neotony due to a shortage of adequate infrastructure. Moreover, the roles of ecotourism operators and environmental authorities occasionally overlapped. Third, the low level of social development in the area and the absence of revenue earmarking mechanisms hindered the development of community-based ecotourism initiatives. Finally, there was no proof of systematic efforts to manage stakeholders, particularly, local communities. All efforts seemed to be erratic and ad-hoc.

The examination of impact indicators evidenced how mono-disciplinary approaches provided partial views that have limited applications in sustainable tourism. Instead, the use of inter-disciplinary approaches was recommended for the development of ecotourism impact indicators to capture the full range of its dimensions. On the other hand, multi-disciplinarity allowed the researcher to construct a composite indicator to gauge impacts. The application of the Index of Sustainable Ecotourism Impacts on Wadi El Gemal Park proved to be a process requiring the integration of various types of information. With the help of economic valuation, data on ecological and social trends could be aggregated with economic measures using unified metrics that can be easily comprehended by decision-makers, scientists and the general public. However, the case of WGNP evidenced the scarcity in the data at the local level.

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