

Dugong Based Tourism Development at the Red Sea: Case of Marsa Abu Dabab

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Abstract

Nature-based tourism signifies an imperative revenue stream in many countries and is a vital tool for preserving their environmental resources. This paper aims at evaluating the possibilities of Dugong based tourism development in Marsa Abu Dabab besides offering the strategies for its sustainable development. To this end, a questionnaire was designed to achieve the study objectives and was distributed to the stakeholders. Quantitative data were analysed using the statistical package SPSS, while qualitative data were analysed by using the strategic analytical tool (SWOT analysis). Results revealed that the area is rich in important tourism potentials and a great significance is associated with developing Dugong based tourism in Marsa Abu Dabab. A Dugong based tourism development strategy matrix has been proposed to help the officials and decision-makers in developing policies, strategies and decisions that ensure optimum utilisation of the resources.

Keywords: Dugong, Abu Dabab, nature-based tourism, marine tourism

Introduction

Nature-based tourism signifies an imperative revenue stream in many countries such as Australia, New Zealand, Kenya, South Africa, Costa Rica and Tanzania as the rate of spending of a nature-oriented tourist is much more than that of the typical tourist (Eagles, 2003). It invigorates many countries to preserve their environmental resources. In addition, it revitalises them to analyse and describe the economic value of each natural resource. Besides, it facilitates the countries in exploiting their natural resources inappropriate tourism activities in a manner that realises the highest economic and social benefit and ensures the sustainability of these resources (Ayad, 2017). Meanwhile, watching and interacting with marine wildlife is one of the fastest growing sectors of international tourism industry as a type of nature-based tourism (Birtles, Curnock & Valentine, 2001). Demand for nature-based tourism is expected to grow faster over the next two decades (World Bank, 2018). At the same time, tourism plays a vital role in augmenting nature resources conservation (Gosling, 1999). In addition, nature-based tourism undoubtedly has a great role in protecting nature and threatened species (Stronza & Gordillo, 2008). However, in order to ensure continuous growth and sustainability of nature-based tourism, all valuable natural resources should be ecologically and economically planned and managed (Birtles et al., 2001).

The Egyptian environment enjoys unique biodiversity. In particular, marine life in the Egyptian seas is characterised by endangered habitats and species such as seagrass, 4 species of green turtles, more than 20 species of sharks, 17 species of marine mammals and more than 325 species of coral reefs (Nature Conservation Sector - NCS, 2009 and CBD, 2014).



One of the most important endangered species in the Egyptian marine ecosystem is Dugong, which lives in the Red Sea, especially in Abu Dabab Bay, which is considered one of the most valuable bays located on the Red Sea coast in Egypt thanks to the existence of very sensitive habitats such as coral reefs and seagrass beds. The bay contains some rare and endangered main species such as dugongs and green turtles that attract international tourists to enjoy diving and snorkelling with them (Abu El-Regal, El-Moselhy & El-Saman, 2012). According to the latest estimate issued by the Egyptian Nature Conservation Sector on the economic benefits of marine biodiversity, the revenues from marine tourism activities as a type of nature-based tourism that depends on marine biodiversity, such as diving and snorkelling, are estimated to be more than 3 billion euros annually (Samy, Sánchez & Forcada, 2011), which provides a strong motivation to exploit the presence of dugongs in Abu Dabab Bay for developing Dugong based tourism (watching and swimming with dugongs) concurrently protecting them from the dangers of unorganised and sometimes illegal marine activities in addition to preserving them from extinction. This paper aims at evaluating the possibilities of Dugong based tourism development in Marsa Abu Dabab besides offering strategies for its sustainable development.

Literature review

Nature-based tourism

Roxana (2012) defined nature-based tourism as a broad concept of holistic activities such as ecotourism, adventure tourism and nature tourism, while McNeely and Thorsell (1989) argued that it bestows the meaning of ecotourism. In another context, Lucas (1985) specified that nature-based tourism has low impacts on the environment, but it has high social and economic benefits. Moreover, Laarman and Durst (1987) mentioned that nature-based tourism is a type of tourism that integrates education, entertainment and adventure. Generally, it's a trip to explore and learn about nature and wildlife (Eagles, 2003). Birtles et al. (2005) defined dugong tourism as a wide range of activities, which may encompass a dedicated effort to watch or interact with the dugong or include such interactions on an occasional basis as a part of a wider special interest tours or wildlife tour package. In the same context, Tisdell (2013), according to Tourism Research Australia, identified that a nature tourist is a person who participates in activities such as watching whale, watching dolphins, diving, snorkelling or bushwalking and visits wildlife parks, national parks, botanical gardens or aquariums.

Centre for responsible travel affirmed that nature-based tourism contributed 20% of global tourism in 2018 and this share is continuously increasing (Metin, 2019). In addition, it contributed US\$120.1 billion to the GDP of the global economy in 2018 and created 21.8 million jobs of the total jobs created by global tourism, which is equivalent to the population of Sri Lanka. With the additional economic multiplier effects, its contribution will increase to US\$343.6 billion, which is equal to the current GDP of South Africa or Hong Kong. In fact, it represents over %30 of tourism revenue in Africa (World Travel and Tourism Council, [WTTC], 2019). In the context of nature-based tourism, the interrelations between nature-based tourism products requirements and the pertinent natural resources characteristics have been studied by Knut Fossgard and Peter Fredman (2019). They proposed a framework to identify and manage the required resources to develop activities for nature-based tourism. The proposed framework is based on six dimensions, which are adapting to guests' needs, access to resources, experience facilitation, risk management, crowding management and connection to place. The framework of Knut Fossgard and Peter Fredman was adopted as a measuring scale for this study in order to assess the possibilities of developing dugong tourism in Marsa Abu Dabab as a type of nature-based tourism.



The Dugongs

The dugong is the only herbivorous marine mammal present in the world (Marsh et al. 1982) as it relies solely on sea-grass for feeding, specifically two types of sea-grass, namely *Halodule* and *Halophila* (Marsh, Eros, Corkeron & Breen, 1999). Dugongs generally live in shallow waters at depths of less than 3 meters, where they spend 72% of their lives at this level of water depth (Chilvers, Delean, Gales, Holley, Lawler, Marsh & Preen, 2004). When fully grown, dugongs are about 3.31 m long. An adult weighs 250 to 600 kg and can consume daily about 28-40 kg of sea-grass (Shawky, 2018). The ideal habitat for Dugong is shallow to medium-deep bay, less than 5m deep, with low fibre tropical sea-grass species and warm water (Minimum 15 - 17°C) (Hines et al., 2012). Dugongs spend most of their time in the bottom for feeding on sea-grass, while they spend little of their time on or near the surface because they have to float on the surface for a few seconds to breathe regularly and repeatedly (Shawky, 2018). Females do not carry their first calf until they are at least ten years old. The pregnancy lasts about 13-15 months and it gives birth to one calf at a time. The lactation period lasts for 14-18 months and the period between successive births is estimated from 2.4 to 7 years, that's why the number of dugongs is improbable to increase by more than 5% per year (Shawky, 2018) and they are particularly in danger due to human disturbance due to their long life, as they live about 70 years, in addition to their slow rate of reproduction (Marsh & Sobotzick, 2019b). The dugong has been classified as vulnerable and considered protected under Schedule I of wildlife since 1996. Furthermore, according to the amended version of 2015 assessment of IUCN Red List of Threatened Species, Dugong is vulnerable (Marsh & Sobotzick, 2019a). Marsh, O'Shea and Reynolds (2011), Robards and Reeves (2011), Hines, Reynolds, Mignucci-Giannoni, Aragones and Marmontel (2012) and Batista, Fabre, Malhado and Ladle (2014) specified many major threats to Dugongs, including trawling fishing, chemical pollution, threats to sea-grass, illegal hunting, boat strikes, climate change, selling dugong meat, artisanal coastal fisheries and shipping activities.

Dugongs in Egypt

The dugong is one of the most endangered species in the world. It lives in coastal and island waters between latitudes of about 27° north and south of Equator, covering around 128,000 km of coastline across 37 countries between East Africa and Vanuatu. According to this geographic range, Egypt is listed as a native occurrence habitat for dugong in the world (Marsh et al. 2011). Despite the permanent presence of dugongs in Abu Dabab Bay, their actual number in this bay is not precisely defined. According to a report prepared in 2008 counting the number of dugongs around the world, dugongs are now extinct in the Maldives, Mauritius and Taiwan and have declined in other waters in at least a third of the regions where they are found (UNEP, 2010). To counter this, many international endeavours have been made to preserve the dugong from extinction. Many international agreements have been made to preserve the dugong from extinction. In addition, many initiatives and protection programmes have commenced in many countries in the South Pacific region, Red Sea and Gulf of Aden region. However, Marsh et al. (2011) argued that most of these local initiatives are just on paper without any implementation. He attributed the reason for this to poverty, lack of resources and personnel (Marsh & Sobotzick, 2019a). This indicates the dangers faced by dugongs in developing countries including Egypt. The Egyptian ministry of environment launched a follow-up plan to observe Dugong in the Red Sea and determine their population. A survey was conducted and 195 questionnaires were distributed to diving centres and safari boats in the Red Sea. 102 responses were recorded confirming sighting the dugong in Abu Dabab. The respondents mentioned that thanks to the abundance of sea-grass in this area, a

total of 50 Dugong were recorded in 2015 (MoE, 2016). In the Red Sea, up to 4,000 dugongs have been observed (Shawky, 2018).

The Egyptian Ministry of Environment analysed and described the environmental situation of the marine ecosystem in Egypt In the National Environmental Action Plan, it showed concerns about lack of satisfactory infrastructure to protect natural resources, lack of adequate regulation of marine tourism and lack of adequate coordination and cooperation among all concerned parties in Egypt to collect data, store and analyse biodiversity. It also showed concerns about the absence of comprehensive legal protection for natural heritage resources outside the reserves that threaten the sustainability of these resources in the future. The report of the Egyptian Ministry of Environment also emphasized that the greatest dangers threatening marine ecosystems in Egypt are unregulated tourism, pollution and illegal exploitation of marine resources (MoE, 2016), which is consistent with what was mentioned by Marsh and Sobtzick (2019).

The study area

Abu Dabbab Bay is the home of dugong in the Red Sea as it offers many ideal conditions of habitat for Dugongs. It has become one of the most famous diving sites on the southern coast of the Red Sea in Egypt (Alwany, 2011). It is about 30 kilometres north of Marsa Alam city and is located directly on the Egyptian Red Sea coast off Wadi Abu Dabab at 25° 20'14" north and 34° 44'15" East. Abu Dabab bay has six reefs which consist of a group of reasonably shallow coral reefs. The northern and southern borders of the bay are rich in coral reefs, while the central part features very large patches of sea-grass and algae that provide a suitable habitat for dugongs and green turtles. The back reef of the bay extends from 75 m to 100 m and ends with a lagoon at 5-25 m depth in the central part where meadows flourish with sea-grass. At the northern and southern borders, coral reefs follow rich and highly diversified reef edges and coral cliffs ranging in depth from 1 meter to 12 meters (Abu El-Regal et al., 2012) (Figure 1).



Figure 1. Abu Dabbab bay



Methodology

Quantitative methodology was adopted for this study. Dugong tourism development was measured by six dimensions (variables) derived from Knut Fossgard and Peter Fredman (2019) that encompass adapting to guests' needs, access to resources, experience facilitation, risk management, crowding management and connection to place as shown in Table 1. The scale proposed by Ayad (2017) was employed to measure the importance of developing Dugong tourism in Marsa Abu dabab. The scale has ten reflective items (conservation, protection, sustainability of natural resources, creating new jobs for local community, improving social services for local community and raising efficiency of infrastructure) as shown in table 2. The population of this study includes tour operators in the Red Sea Governorate, which are 58 companies according to the statistics of the Egyptian travel agents association (ETAA, 2020) and 141 diving centres according to the statistics of the Egyptian chamber of diving and water sports (CDWS, 2020). The diving centres are distributed as follows: 31 centres in Marsa Alam, 66 in Hurghada, 11 in El Qusier, 30 in Safaga and 3 centres in Hamata. In addition, non-governmental organisations interested in biodiversity conservation, employees at the Egyptian Ministry of Tourism and Antiquities, Egyptian Ministry of Environment, Egyptian Tourism Authority, Elba national park, Wadi El-Gemal national park and local people also form part of the population of this study. Secondary data were collected from the official reports, articles, statistics and websites of international organisations to ensure the reliability of the data, while the primary data were collected by self-administrated questionnaires with private and governmental stakeholders. A random sample method was employed to collect data from stakeholders. The questionnaire was pre-tested and modified by some experts and academia. A total of 320 questionnaires were dropped and then collected. 31 surveys were excluded due to incompleteness, so the actual number of questionnaires with no missing data were 289, representing a response rate of 90%.

The questionnaire was designed to achieve the study objectives. The respondents were asked to identify their point of view regarding Dugong based tourism development possibilities and the importance of Marsa Abu Dabab. The questionnaire consisted of three parts. The first part of the questionnaire aims to assess the possibilities of Dugong based tourism development in Marsa Abu Dabab on a 5-point Likert scale, starting from far below standards to far above standards. The second part of the questionnaire deals with the importance of developing Dugong based tourism in Marsa Abu Dabab. The respondents were asked to determine their viewpoints on a five-point Likert scale, ranging from strongly disagree to strongly agree. The third part of the questionnaire contains four open questions to know respondents' points of view about the strengths and weaknesses of Marsa Abu Dabab as a nature-based tourism destination besides determining the opportunities and threats to develop Dugong based tourism in Marsa Abu Dabab. Quantitative data were analysed using the statistical package SPSS version 17 and Excel Spread Sheet in Office 2007 in order to measure the attitudes of stakeholders towards Dugong based tourism development possibilities and the importance of Marsa Abu Dabab by measuring means, standard deviation and weighted means. Qualitative data were analysed by using the strategic analytical tool (SWOT analysis) in order to suggest strategies for developing Dugong based tourism in Marsa Abu Dabab, to examine the potential of Marsa Abu Dabab as a nature-based tourism destination by presenting the strengths and weaknesses, which are the internal characteristics of Dugong based tourism development in Marsa Abu Dabab and to determine the opportunities and the threats of the external environment for developing Dugong based tourism in Marsa Abu Dabab.



Results

Assessment of Dugong based tourism development possibilities in Marsa Abu Dabab

To assess the possibilities of developing dugong based tourism in Marsa Abu Dabab as a type of nature-based tourism, the six dimensions' framework proposed by P. Fredman and K. Fossgard (2019) has been adopted to assess the current situation of product requirements and natural resource characteristics for nature-based tourism in Marsa Abu Dabab. The six dimensions include adapting to guests' needs, access to resources, experience facilitation, risk management, crowding management and connection to place. The respondents were asked to rank their points of view towards all factors popped up from the six dimensions on a 5-point Likert scale, starting with far below standards as "1" to "5" as far above standards. Table (1) presents the results of stakeholders' points of view.

Table 1: Assessment of Dugong based tourism development requirements in Marsa Abu Dabab

Dimensions	Factors	Min	Max	Mean	Std Deviation	Factor Rank	Weighted Mean	Dimension Rank
Adapting to Guests' Needs	- Activity Mastering	1	4	2.923	0.652	5	2.718	5
	- Attraction Development	1	3	2.514	0.528	6		
Access to Resources	- Commercial access	3	5	4.422	0.771	3	2.956	3
	- Public access	1	4	2.923	0.652	5		
	- Exclusion from resource	1	2	1.525	0.431	8		
Experience Facilitation	- Conditions for facilitation	3	5	4.476	0.568	2	3.565	2
	- Attraction maintenance	1	3	2.923	0.652	5		
	- Eco-Guidance	1	3	2.923	0.652	5		
	- Social interaction	2	5	3.941	0.821	4		
Risk Management	- Basic risk management	1	3	2.923	0.652	5	2.123	6
	- Preventive risk management	1	2	1.922	0.661	7		
	- Ad hoc risk management	1	2	1.525	0.431	8		
Crowding Management	- Size of operation area	1	3	2.923	0.652	5	2.923	4
	- Facilitated capacity	1	3	2.923	0.652	5		
Connection to Place	- Connections with nature	3	5	4.528	0.643	1	4.381	1
	- Landscape scenery	3	5	4.528	0.643	1		
	- Location and reputation	2	5	3.941	0.821	4		
	- Sensory qualities	3	5	4.528	0.643	1		
The Weighted Average of Requirements Assessment				3.239				
Standard Deviation					0.640			

(*) Likert Scale (1 to 5); "1" = Far Below Standards, "2" = Below Standards, "3" = Meets Standards, "4" = Above Standards and "5" = Far Above Standards

Table 1 shows the descriptive statistics for the assessment of the level of Dugong based tourism development requirements in Marsa Abu Dabab to indicate the possibilities of tourism development in this area as perceived by stakeholders. The highest average was for the dimension "Connection to Place" with a mean of 4.381, followed by the dimension "Experience Facilitation" with a mean of 3.565, while the lowest average was for the dimension "Risk Management" with a mean of 2.123. In the same context, the highest average among all the factors was for "Connections with nature", "Landscape scenery" and "Sensory qualities" with a mean of 4.528 and standard deviation of 0.643, followed by "Conditions for facilitation" with a mean of 4.476 and standard deviation of 0.568, while the lowest average among all factors was for "Exclusion from resource" and "Ad hoc risk management" with a mean of 1.525 and standard deviation of 0.431. The weighted average for Dugong tourism development requirements assessment was 3.239 with a standard deviation of 0.640 which indicates that the level of Dugong tourism development requirements is moderate and there is a possibility to develop this type of nature-based tourism although many factors are below standards. This conclusion is based on the fact that 3.239, the weighted average for Dugong tourism development requirements assessment, lies within the interval 2.60 – 3.39 according to a 5-point Likert scale as shown in table (1) and



according to the intervals of levels; [Low level 1 – 2.59; Moderate Level 2.60 – 3.39; High level 3.40 – 5].

The importance of developing Dugong based tourism in Marsa Abu Dabab

To measure the importance of developing Dugong based tourism in Marsa Abu Dabab, the scale proposed by Ayad (2017) has been adopted for this study. This scale was chosen because it covers most of the key aspects of the impact of nature-based tourism development on the local community. Table (2) presents the descriptive statistics of the importance of developing Dugong tourism in Marsa Abu Dabab.

Table 2. The importance of developing Dugong based tourism in Marsa Abu Dabab

Item	Mini	Max	Mean	Std Deviation	Rank
1. Improving Egypt's competitive position as a tourist destination in the global tourism market	2	5	4,258	0,622	3
2. Conservation of biodiversity and marine heritage resources of Marsa Abu Dabab	3	5	4,548	0,566	1
3. Conservation, protection and sustainability of natural resources	3	5	4,548	0,566	1
4. Provision, developing and raising efficiency of infrastructure	2	5	3,578	0,962	5
5. Attracting new investments	2	5	4,154	0,619	3
6. Provision, developing and raising efficiency of nature-based tourism infrastructure	3	5	4,476	0,568	2
7. Creating new jobs for Red Sea local community	3	5	4,154	0,619	3
8. Improving social services for Red Sea local community	1	5	3,456	0,542	6
9. Increasing economic benefits for Red Sea local community	3	5	4,154	0,619	3
10. Preserving the cultural richness and local customs and traditions	1	5	3,862	0,712	4
The Weighted Average			4.118		
Standard Deviation				0.639	

(*) Likert Scale (1 to 5); Starting with "1" = Strongly disagree to "5" = Strongly agree

Table 2 shows the descriptive statistics for the measurement of the importance of developing Dugong based tourism in Marsa Abu Dabab as perceived by stakeholders. The highest average among all statements was for statements 2 & 3, "Conservation of biodiversity and marine heritage resources of Marsa Abu Dabab" and "Conservation, protection and sustainability of natural resources", with a mean of 4.548 and standard deviation of 0.566, followed by statement 2, " Provision, developing and raising efficiency of nature-based tourism infrastructure", with a mean of 4.476 and standard deviation of 0.568, while the lowest average among all statements was for statement 8, " Improving social services for Red Sea local community", with a mean of 3.456 and standard deviation of 0.542. The weighted average for the importance of developing Dugong tourism in Marsa Abu Dabab was 4.118 and the standard deviation was 0.639. This indicates that the views of the stakeholders agree on the great importance of developing dugong tourism in Marsa Abu Dabab and it has positive economic, social and environmental impacts on the local community. This conclusion is based on the fact that 4.118, the weighted average for the importance of developing Dugong tourism in Marsa Abu Dabab, lies within the interval 3.40-5.00 according to a 5-point Likert scale, which is considered a high level of importance according to the intervals of levels; [Low level 1 – 2.59; Moderate Level 2.60 – 3.39; High level 3.40 – 5].



Opportunities and threats of developing Dugong based tourism in Marsa Abu Dabab

The opportunities and threats of developing Dugong based tourism in Marsa Abu Dabab as perceived by stakeholders have been examined by using a self-administered questionnaire, which contains four open questions about the strengths and weaknesses of Marsa Abu Dabab as a nature-based tourism destination in addition to determining the opportunities and threats to develop Dugong based tourism in Marsa Abu Dabab. The respondents' responses and secondary data were arranged and read many times to check the redundancy. The data was then coded and closely related categories were incorporated together. The data was then analysed using SWOT analysis to determine strengths and weaknesses factors that influence the internal environment besides assessing the opportunities and threats caused by the external environment. This analysis helps identify the internal and external factors that affect, positively or negatively, success (Wheelen, Hunger, Hoffman & Bamford, 2015). Afterwards, the strengths and weaknesses (Internal Factors) were listed in Table (3) and opportunities and threats (External Factors) were listed in Table (4) according to stakeholders' responses. After that, the internal factors evaluation matrix (IFE) and external factors evaluation matrix (EFE) was built. The significance of each sub-factor was checked and assigned a weighting score between zero (insignificant) to one (significant). Finally, the weighted score of sub-factors of both IFE and EFE were calculated by multiplying the weight of each sub-factor by the weight of the normalized factor (Table 3 and 4).

Table 3. Internal Factors Evaluation (IFE) - Strengths and Weaknesses

Cod e	Strengths	Weight	Score	Weighted Score
S1	- Dugong population in Abu Dabab, which is globally recognised.	0.067	4	0.268
S2	- Availability of the only two types of sea-grass, on which the dugong depends for its food, only in Abu Dabab along the Red Sea coast in Egypt.	0.059	3	0.177
S3	- Shallow water of Abu Dabab, which is ideal habitat for dugongs.	0.054	2	0.108
S4	- Abu Dabab is located near Marsa Alam and Hurghada, which are two major tourist cities in Egypt.	0.048	1	0.048
S5	- Sheltered Sandy Beach of Abu Dabab.	0.054	2	0.108
S6	- Unpolluted Pure Environment.	0.062	4	0.248
S7	- Abu Dabab is one of the rare sea-grass habitats in the Red Sea.	0.054	2	0.108
S8	- Easy to be accessed from main cities.	0.048	1	0.048
S9	- Unique in its geographical features and environmental resources.	0.067	4	0.268
Sub-total		0.513		
Cod e	Weaknesses	Weight	Score	Weighted Score
W1	- Some uncontrolled and unregulated tourism activities.	0.099	4	0.396
W2	- Lack of qualified, trained and skilled staff in nature-based tourism sectors.	0.048	3	0.144
W3	- Dugong is classified as vulnerable by the IUCN Red List.	0.062	4	0.248
W4	- The lack of Dugong tourism development strategies.	0.048	3	0.144
W5	- Insufficient and poor enforcement of nature-based tourism legislative framework and regulations in Abu Dabab.	0.062	4	0.248
W6	- Incomplete infrastructure in Abu Dabab and near areas.	0.028	2	0.056
W7	- Deficiency in nature-based tourism facilities.	0.016	1	0.016
W8	- Shortage of private sector investments in the field of nature-based tourism.	0.028	2	0.056
W9	- Lack of nature-based tourism tour operators in Egypt.	0.016	1	0.016
W10	- Limited Institutional Capacities for areas with rich marine and natural heritage resources.	0.032	3	0.096
W11	- Low level of public awareness of biodiversity and ecological issues.	0.032	3	0.096
W12	- Shortage of local communities' participation in tourism management in Abu Dabab.	0.016	1	0.016
Sub-total		0.487		
Total		1		



Table (3) shows 9 strong points and 12 weaknesses determined by evaluating the internal factors of Marsa Abu Dabab as a potential destination for Dugong based tourism as perceived by stakeholders. Strengths and weaknesses have been analysed and the proportional influence index of all points have been separately determined. According to stakeholders' responses, the main strong points of Marsa Abu Dabab as a potential destination for Dugong based tourism were S1 "Dugong populations in Abu Dabab, which is globally recognized" and S9 "Unique in its geographical features and environmental resources" with a weighted score of 0.268. On the other hand, the weakest point was W1 "Some uncontrolled and unregulated tourism activities" with a weighted score of 0.396.

Table 4. External factors evaluation (EFE) - opportunities and threats

Code	Opportunities	Weight	Score	Weighted Score
O1	- Growing global demand for nature-based tourism.	0.089	4	0.356
O2	- Biodiversity conservation and environmental protection initiatives by NGOs in Egypt.	0.04	2	0.08
O3	- The global trend of conservation, protection and sustainability of natural resources.	0.016	1	0.016
O4	- Launching the national environmental action plan for Egypt from 2015 to 2030.	0.066	3	0.198
O5	- Political stability in Egypt in recent years.	0.066	3	0.198
O6	- Increasing government interest in the tourism industry as an important source of national income.	0.04	2	0.08
O7	- Increasing the government's interest in attracting investment in tourism in the coastal areas south of the Red Sea.	0.01	1	0.01
O8	- The government's interest in developing border and remote areas.	0.089	4	0.356
O9	- Environmental resource sustainability as one of the pillars of Egypt 2030 vision.	0.096	4	0.384
O10	- The Egyptian government's interest in counting all wealth and natural resources, which have great economic value, and making good use of them.	0.04	2	0.08
Sub-total		0.552		
Code	Threats	Weight	Score	Weighted Score
T1	- The disruption of the Dugongs' normal behaviour caused by the hundreds of tourists who visit the area for diving, swimming and snorkelling every day.	0.075	3	0.225
T2	- Collision with tourism and fishing boats, which kills the dugong.	0.086	4	0.344
T3	- Fishing with branchia nets in near areas.	0.039	2	0.078
T4	- Sea-grass loss caused by human intrusions, tourism activities and climate change.	0.075	3	0.225
T5	- Conflict of interest among concerning parties; Government, private sector and local communities.	0.052	3	0.156
T6	- The threat of tourism building developments near to Abu Dabab.	0.052	3	0.156
T7	- Herbicidal run-off from landscaping projects that could affect both Dugongs and their sea-grass habitats.	0.039	2	0.078
T8	- The threat to marine life and habitats by the frequent oil pollution at north of the Red Sea.	0.026	1	0.026
T9	- Shipping lanes via Suez Canal, passing through Red Sea, may threat Dugongs and breeding grounds.	0.004	1	0.004
Sub-total		0.448		
Total		1		

Table (4) shows 10 opportunities points against 9 threats points determined by evaluating the external factors that may influence the possibilities of developing Dugong based tourism in Marsa Abu Dabab as perceived by stakeholders. Opportunities and threats points have been ranked and analysed. The proportional influence index of all points has been separately determined. According to stakeholders' responses, the main opportunities points of developing Dugong based tourism in Marsa Abu Dabab were O9 "Environmental resource sustainability as one of the pillars of Egypt 2030 vision" with a weighted score of 0.384,



followed by O1 "Growing global demand for nature-based tourism" and O8 "The government's interest in developing border and remote areas" with a weighted score of 0.356. On the other hand, T2 "Collision with tourism and fishing boats, which kills the dugong" with a weighted score of 0.344 and T1 "The disruption of the Dugongs' normal behaviour caused by the hundreds of tourists who visit the area for diving, swimming and snorkelling every day" and T4 "Sea-grass loss caused by human intrusions, tourism activities and climate change" with a weighted score of 0.225 stand as the major threats to developing Dugong based tourism in Marsa Abu Dabab.

All strong points and weaknesses (Internal Factors) and opportunities and threats points (External Factors) have been ranked, examined and compared in order to develop four different types of strategies. The first strategy that uses the strengths with opportunities points is Maxi-Maxi Strategy (SO), which leverages strengths to maximize opportunities. The second strategy is Mini-Maxi Strategy (WO), which uses weaknesses and opportunities points to leverage opportunities and strengths to resolve the weaknesses. The third strategy that uses the strengths and threats points is Maxi-Mini Strategy (ST), which leverages strengths to minimize threats. The fourth strategy is Mini-Mini Strategy (WT) that minimizes both weaknesses and threats (Gomatesh and Poornima, 2012). These four types of strategies have been used to build a final matrix for Dugong based Tourism Development Strategy in Marsa Abu Dabab (Table 5).

Table 5. Dugong based tourism development strategy matrix in Marsa Abu Dabab

	Strengths	Weaknesses
Internal Factors Analysis	S1- Dugong population in Abu Dabab, which is globally recognized. S2- Availability of the only two types of sea-grass, on which the dugong depends for its food, only in Abu Dabab along the Red Sea coast in Egypt. S3- Shallow water of Abu Dabab which is ideal habitat for dugongs. S4- Abu Dabab is located near Marsa Alam and Hurghada, which are two major tourist cities in Egypt. S5- Sheltered Sandy Beach of Abu Dabab. S6- Unpolluted Pure Environment. S7- Abu Dabab is one of the rare sea-grass habitats in the Red Sea S8- Easy to be accessed from main cities. S9- Unique in its geographical features and environmental resources.	W1- Some uncontrolled and unregulated tourism activities. W2- Lack of qualified, trained and skilled staff in nature-based tourism sectors. W3- Dugong is classified as vulnerable by the IUCN Red List. W4- Lack of Dugong tourism development strategies. W5- Insufficient and poor enforcement of nature-based tourism legislative framework and regulations in Abu Dabab. W6- Incomplete infrastructure in Abu Dabab and near areas. W7- Deficiency in nature-based tourism facilities. W8- Shortage of private sector investments in the field of nature-based tourism. W9- Lack of nature-based tourism tour operators in Egypt. W10- Limited Institutional Capacities for areas with rich marine and natural heritage resources. W11- Low level of public awareness of biodiversity and ecological issues. W12- Shortage of local communities' participation in tourism management in Abu Dabab.
External Factors Analysis		
Opportunities	SO "Maxi-Maxi strategy"	WO "Mini-Maxi strategy"
O1- Growing global demand for nature-based tourism. O2- Biodiversity conservation and environmental protection initiatives by NGOs in Egypt. O3- The global trend of conservation, protection and sustainability of natural resources. O4- Launching the national environmental action plan for Egypt from 2015 to 2030. O5- Political stability in Egypt in recent years. O6- Increasing government interest in the tourism industry as an important source of national income. O7- Increasing the government's	SO1- Creating a special brand for Dugong Tourism at Marsa Abu Dabab. SO2- Preparing a feasibility study to make a good use of unique geographical features and environmental resources at Marsa Abu Dabab. SO3- Launching a national campaign to invest in environmentally friendly tourism projects. SO4- Building strategic partnerships with international organisations, which are interested in Biodiversity conservation and environmental protection. SO5- Launching a national marketing	WO1- Launching an awareness campaign to increase public awareness about biodiversity and ecological issues. WO2- Adopting specialised training programmes in nature-based tourism to improve skills of tour guides. WO3- Issuing a specialised license and applying it as a condition to allow guides to accompany tourists in environmental areas. WO4- Providing concessions and facilities to investors to invest in infrastructure projects and tourism projects in the southern Red Sea. WO5- Strict government control over unregulated tourism activities in Marsa Abu Dabab and imposing large financial fines. WO6- Establishing a mechanism for the participation of tribal residents in the southern Red Sea in planning and implementing tourism activities.



<p>interest in attracting investment in tourism in the coastal areas south of the Red Sea. O8- The government's interest in developing border and remote areas. O9- Environmental resource sustainability as one of the pillars of Egypt 2030 vision. O10- The Egyptian government's interest in counting all wealth and natural resources, which have great economic value, and making good use of them.</p>	<p>campaign to keep pace with the growing global demand for nature-based tourism. SO6- Using technological applications to monitor natural resources that have a great economic value, which could be exploited in nature-based tourism activities. SO7- Establishing a scientific research centre for dugong in Marsa Abu Dabab.</p>	<p>WO7- Developing a strategy to increase institutional capacities for areas with rich marine and natural heritage resources.</p>
<p>Threats</p>	<p>ST "Maxi-Mini strategy"</p>	<p>WT "Mini-Mini strategy"</p>
<p>T1- The disruption of the Dugongs' normal behaviour caused by the hundreds of tourists who visit the area for diving, swimming and snorkelling every day. T2- Collision with tourism and fishing boats, which kills the dugong. T3- Fishing with branchia nets in near areas. T4- Sea-grass loss caused by human intrusions, tourism activities and climate change. T5- Conflict of interest among concerning parties; Government, private sector and local communities. T6- The threat of tourism building developments near to Abu Dabab. T7- Herbicidal run-off from landscaping projects that could affect both Dugongs and their sea-grass habitats. T8- The Threat to marine life and habitats by the frequent oil pollution at north of the Red Sea. T9- Shipping lanes via Suez Canal, passing through Red Sea, may threat Dugongs and breeding grounds.</p>	<p>ST1- Determining the optimum carrying capacity of tourists at Marsa Abu Dabab to maintain the natural behaviour of dugongs in order to face the daily tourism activities in the area. ST2- Preparing a database to count Dugong population and making an inventory of natural resources suitable for nature-based tourism activities at Marsa Abu Dabab and southren Red Sea. ST3- Preventing passage of boats inside Abu Dabab Bay and determining a completely safe new zoning line. ST4- Banning the entry of tourist boats into the bay and allowing entry only from the shore for divers and snorkelers. ST5- Preserving the unpolluted pure environment of Abu Dabab from various pollution sources. ST6- Preparing a formula of understanding between the government, the private sector and the local community to prevent conflicts of interest.</p>	<p>WT1- Preventing entry for a specified period to the sea-grass area, until it restores the lost sea-grass areas. WT2- Patrolling on a permanent basis at the bay to enforce laws related to biodiversity conservation, environmental protection and preserving marine life. WT3- Developing an environmentally friendly infrastructure in Abu Dabab and the surrounding areas. WT4- Government and non-governmental campaigns to stop Herbicidal run-off from landscaping projects that could affect both Dugongs and their sea-grass habitats. WT5- Creating a license for tourism companies specialised in nature-based tourism activities. WT6- Updating the environmental legislative framework and regulations to cope with the current changes. WT7- Integration between local traditions, habits and handicrafts of the local Bedouin population and nature-based tourism activities, which will add a competitive advantage to tourism product of this area.</p>

Discussion and implications

This paper aims at evaluating the possibilities of Dugong based tourism development in Marsa Abu Dabab besides offering the strategies for its sustainable development from the perspective of private and governmental stakeholders. This study offers a significant contribution to tourism literature, decision and policymakers and tourism stakeholders in Egypt. All dimensions related to natural resources achieved the highest results from the point of view of stakeholders, confirming the availability of unexploited natural resources in the study area, which are suitable for sustainable tourism development in general and the development of dugong-based tourism in particular, which is consistent with what was mentioned by Abu El-Regal et al. (2012). On the contrary, all dimensions related to management, policy and infrastructure aspects were evaluated as poor/weak dimensions, which is consistent with what was mentioned by the Egyptian Ministry of Environment in the National Environmental Action Plan, in which the environmental situation of the marine ecosystem in Egypt was analysed and described (MoE, 2016). It is also consistent with the researcher's field observation, as the area is charming at the environmental level and a lot of efforts are needed in the administrative and technical aspects.

The results also show that there is great importance for developing dugong based tourism in Marsa Abu Dabab from the point of view of stakeholders and it will have positive economic, social and environmental impacts on the local Bedouins and near the urban



community, by offering the direct and indirect jobs for the local people thanks to Dugong-based tourism and the prosperity of public income, which is consistent with Eagles (2003), wherein the author mentioned that nature-based tourism activities achieve great economic returns in addition to the significant positive effects on the environmental sustainability of the study area by conserving the biodiversity, marine heritage resources and natural resources of Marsa Abu Dabab.

The results of SWOT analysis showed the positive factors (Strengths and Opportunities) and negative factors (Threats and Weaknesses) that greatly affect Dugong based tourism development in Marsa Abu Dabab. The results affirmed that the Dugong population in Abu Dabab, the unique geographical features and environmental resources, the growing global demand for nature-based tourism, Egypt 2030 vision and the government's interest to develop remote areas positively support the potentials of Dugong based tourism development in Marsa Abu Dabab. Meanwhile, the uncontrolled and unregulated tourism activities, which disturb the Dugongs' normal behaviour, seagrass loss caused by human intrusions, tourism activities and climate change, the absence of an effective government role and weak infrastructure negatively affect the potentials and possibilities of Dugong based tourism development in Marsa Abu Dabab. These results provide a real picture of the current situation of sustainable tourism development and the development of Dugong based tourism in particular in Marsa Abu Dabab without any bias. In order to face this reality and overcome these challenges, the proposed Dugong based tourism development strategy matrix in Marsa Abu Dabab will provide a helping hand to officials, planners, policymakers and decision-makers by providing the appropriate strategy options (ST, WO, SO, WT) to maximize strengths and opportunities as well as to minimize weaknesses and threats. In addition, it will help identify sustainable tourism activities based on Dugongs in Marsa Abu Dabab.

Conclusion

This paper sheds light on Marsa Abu Dabab, which is rich in important tourism potentials, primarily because it is considered a home for dugongs in Egypt. Evidence and results indicate that opportunities and strengths outweigh all threats and weaknesses in Marsa Abu Dabab. Moreover, there is a strong conviction that despite the unique natural resources that characterize the region and the great potential for Dugong based tourism, the current state of tourism activities and their sustainability in the region do not correspond to these capabilities. Moreover, the current strategies and action plans related to tourism and environment in addition to uncontrolled tourism activities, the absence of an effective government role and poor infrastructure do not support tourism sustainable development in Marsa Abu Dabab. This factor represents an alert to decision-makers, planners and development officials dealing with the importance of the region and its unique tourism potentials. It also urges for the urgent priority to clarify official strategies and plans for sustainable tourism development based on the dugong besides urging legislators to amend the investment law or develop special legislation and investment incentives to attract investors to Marsa Abu Dabab. This is in addition to the need of involving local community associations and nature conservation associations in planning and developing the region in tourism to take advantage of its uniqueness in the presence of dugongs in a way that ensures the preservation of rare dugongs and encourages the integration of local communities in tourism activities in order to raise the standard of living for local residents. A Dugong based tourism development strategy matrix has been proposed to help the officials and decision-makers in developing policies, strategies and decisions that ensure optimum utilisation of resources in order to achieve sustainable development for Marsa Abu Dabab, maximize the benefits for all beneficiaries of

government, private sector and local community and preserve the unique biological diversity of the area.

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