Threats of Wetland and its Impact on the Tourism Industry in Egypt: A Case Study of Wadi El Rayan

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Abstract

The uniqueness of wetland areas presents a great deal of opportunity for drawing tourists. Nonetheless, the relationship between wetland area capacity and visitors remains a treasure for efficient management of natural resources. According to the Ramsar Convention, wetlands are vital to the preservation of biodiversity on Earth and are an essential part of ecosystems. In addition, wetlands serve as habitat for numerous threatened plant and animal species. But it is seeing constant deterioration, the disappearance of these lands, and their transfer to other use. This research seeks to achieve two objectives were, firstly, to identify the importance of wetland in tourism industry. Secondly, to examine the main threats of wetland in Wadi El Rayan and its impacts in tourism industry in Egypt. A single case study was applied in this research to reach the research objectives. This research adopted a quantitative approach by using single case study to achieve the aim, objectives and research questions. Data collection involved questionnaire, total number of distributed questionnaires was 120 copies. The final returned questionnaires were 87 copies with 72.5% response rate. Statistical Package for Social Sciences (SPSS, version 26) program was used for analyzing data.

The results showed that wetland play an important role in tourism industry such as; increase the economic benefits for tourism industry; diverse and productive environments for tourism activities; it contributes to the diversification of tourism supply and demand in Egypt. The results also revealed that there are many threats that faced wetland which effect directly on tourism industry in Wadi El Rayan such as; negative attitude of visitor; human activities effect on ecosystem on wetland; fish-farming in Wadi El Rayan; water pollution; wastewater drainage inside the protected area; unlawful hunting and climate change effect on wetland that effect directly on tourism activities in Wadi El Rayan. The results suggest some strategies that help the officials and decision makers for reserve and protected wetland in Wadi El Rayan. This research has many of limitations were, this research has many of limitations were, the first of which is that it only focused on one case study (Wadi El Rayan). Secondly, not all of Egypt's wetland sites were included in the study region. Thirdly the literature showed there is a lack of studies and researches on the study topic in Egypt, in particularly Wadi El Rayan. All wetland sites in Egypt should be included in future research in order to test and generalize the findings of the current study.

Keywords: Wetlands, Threats, Tourism Activities, Wadi El Rayan, Egypt.

Introduction

For thousands of years, wetlands have supported a wide range of habitats, including fish ponds, lagoons, marshes, rivers and their deltas, mangrove forests, coral reefs, and artificial lakes (Medwet, 2021). The RAMSAR Convention (1971: p2) defines wetlands as " areas of marsh, fen, peat land, or water, whether natural or artificial, long-term or short-term, containing fresh,

brackish, or salt water that is static or flowing; this can include marine water areas whose low tide depth does not exceed six meters, which can include coastal zones next to wetlands as well as islands or marine water bodies that are deeper than six meters within the wetlands.". Wetlands can be man-made or natural, and they can be located inland or along the coast (Dushani et al., 2021). The world's most productive and diversified ecosystems are wetlands. Consequently, freshwater wetlands are home to about 40% of the world's biodiversity and 12% of all animal species. They also provide a substantial genetic variation source. Moreover, wetlands are used to harvest more than 20,000 different types of medicinal plants (Medwet, 2022).

In order to prevent soil erosion, wetland vegetation acts as a supply of silt that stabilizes the banks of lakes, rivers, and beaches (Prusty, 2017). Furthermore, wetlands have a built-in capacity to naturally mitigate flooding and erosion. They also serve as a natural sewage system, preventing pollution and maintaining water quality (ElZein, 2016). Additionally, wetlands are important carbon sinks that store up to 40% of terrestrial carbon on Earth, reducing the effects of greenhouse gases that cause global warming and aiding in the adaptation process to the phenomenon of climate change (Afefe, 2020). As a result, wetlands contribute significantly to the rise in demand for travel locations. Where beaches, rivers, lakes, and coral reefs naturally draw tourists (Egresi et al., 2021).

Consequently, wetlands, which are ecosystems situated at the boundary between land and water, play a vital role in maintaining Egypt's water and climate security due to their numerous hydrological functions and involvement in the water cycle (Abdel-Shafy et al., 2022). An environmental catastrophe and the recent, rapid degradation of natural wetlands pose equal risks to the security of water and climate change (Kumar et al., 2021).

Wetland policies are helpful since other current national policies for the management of natural resources, such those for water, agriculture, fisheries, tourism, health, and other sectors, rarely specifically address wetlands (Rashed, 2005). Creating a wetland policy statement and/or plan can be a crucial first step in identifying the values of wetlands, as well as the issues they face and the specific steps that need to be taken to address them (Jaramillo et al., 2019). However, the importance of wetlands and the global interest of it, there is a lack of studies that have addressed this topic in Egypt. Therefore, this study is considered one of the first studies that addressed the threats facing wetlands and their impact on the tourism industry in Egypt. To fill this gap, this research seeks to achieve two objectives were, firstly, to identify the importance of wetland in tourism industry. Secondly, to examine the main threats of wetland in Wadi El Rayan and its impacts in tourism industry in Egypt.

Literature review

Wetland in Egypt

According to Ramsar Sites Information Service (2017) Egypt is acknowledged has a wetland of international significance such as Lake Burullus, Lake Bardawil, Lake Qarun protected area, and Wadi El Rayan protected area that offers migratory fish, birds, and animals. But there are serious human consequences occurring there as well, like as drainage and conversion to fish farms and agricultural land (Keshta et al., 2022). The definition of wetlands includes areas that "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands (Rashed, 2005). According to (EEAA, 2005) there are two types of wetland including; firstly, natural wetland is any area where the water level is consistently close enough to the ground surface to sustain

saturated soil conditions and the associated plants. Examples of naturally occurring wetlands are swamps, bogs, and marshes (Ramsar, 2017). Secondly, constructed wetland is one that is deliberately created somewhere other than an existing natural wetland with the intention of managing waste and controlling pollution. The free water surface wetland and the subsurface flow wetland are the two main categories of artificial wetlands. Both kinds resemble marshes in appearance and make use of emergent aquatic plants (Rashed, 2005).

Wetlands in Wadi El Rayan, Egypt

Egypt's western desert is home to the protected region known as Wadi El-Ryan. It was included to the Ramsar site as a wetland region and designated as a protected area in 1989 (EEAA, 2012). It was regarded as a significant location with distinctive fossils and a range of landscape types and formations (Abd Ellah, 2016). Furthermore, Wadi El-Rayan is an important tourist destination in the upper part of Egypt. It is regarded as a significant location for bird wintering. Wadi El-Rayan's lakes are crucial for tourism, fishing, and agriculture (Abd El-Mageed et al., 2022).

The Wadi El Rayan protected area is made up of two large lakes that are regarded as one of the most important habitats for numerous domestic, regional, and foreign bird (Afefe et al., 2016) and the Ramsar Sites Information Service, 2017). A variety of endangered mammals and birds can be found in the area, including the Pallid Harrier, Circus macrourus, the Slender Horned Gazelle and Gazella leptoceros, the Ferruginous Duck (Aythya nyroca), and others (EEAA, 2005). According to Afefe (2020), Wadi El Rayan's lakes and springs are crucial to the life cycles of a remarkable variety of species, including 29 fish species, 164 bird species, 24 animal species, 14 reptile species, and 38 plant species. As a result, the wetland in Wadi El-Rayan is regarded as one of the most recent artificial lakes (Abd Ellah, 2016). Many birds, fish, and flora that are protected depend on these lakes. Additionally, it demonstrated the ecological variety of the Fayoum Governorate's significant wetland habitat (EEAA, 2012).

However, El-Hennawy (2010) points out that the Wadi El-Rayan protected area is significant on both a national and international level and is home to a variety of species, including gazelles. Additionally, it offered the local community various hobbies like farming and fishing. Wadi El-Rayan region is a highly significant tourist destination (Abd Ellah, 2016). One of the wetlands ecosystems that emerged at the close of the 20th century is the Wadi El Rayan Protected Area (Abd El-Mageed et al., 2022). Particularly in light of the changes that have recently occurred in terms of the environmental and water balance in the lakes of Wadi El-Rayan and the human influences resulting from the current economic activities, the environmental description of this system and the study of its productivity have not been adequately covered by scientific studies (El-Hennawy, 2010).

Importance of wetlands in tourism industry

Wetlands are now regarded as extremely significant ecosystems on a worldwide scale and are crucial to tourism. It took into account a substantial demand for travel-related activities. People are generally drawn to natural areas with water, such as lakes, rivers, beaches, and coral reefs (Ramsar, 2012). According to Lamsal et al. (2016) wetlands have a significant role in tourism and recreation. They provide economic benefits to the tourism industry, local communities, and schoolchildren as well as the general public, so they need to be conserved and given attention (Jaramillo et al., 2019).

Wetland systems can improve water quality by transforming and/or eliminating different contaminants (organics, nutrients, trace elements, etc.) through a variety of physical, biological, and chemical processes (Stefanakis, 2019). Wetlands offer a multitude of ecological and economic advantages, which has sparked interest in using their inherent ability to purify water for a variety of purposes, most notably wastewater treatment (Masi et al., 2017). Since natural wetlands have long been utilized for the disposal and treatment of secondary and tertiary wastewater effluents, man-made wetland ecosystems take advantage of these purifying properties of wetlands (Ghermandi et al., 2010).

Additionally, wetlands play a vital role in guaranteeing the nation's water and climate security because they are an essential component of the water cycle and carry out numerous hydrological tasks (Kumar et al., 2021). The water sector can benefit greatly from the integration of wetlands' "natural infrastructure" (Stefanakis, 2019) with the traditional "physical infrastructure" of water resources, provided that policy and programming decisions systematically consider the role these ecosystems play in a landscape's hydrology (Abdel-Shafy et al., 2022).

As mention in the RAMSAR Convention (1971: 15), wetlands include inland wetlands such as lakes and rivers as well as beaches and coral reefs. In addition, wetlands have a certain aesthetic quality that draws many of tourists. Wetlands are also a great place for tourists because of their richness of plant and animal life and natural beauty. Additionally, according to Wood and Van Halsema (2008), some wetlands are protected areas or World Heritage sites. Additionally, a variety of activities, including hunting, fishing, boating, and bird watching, can be done in these locations (Prusty et al., 2017). Additionally, Ramsar Sites Information Service (2017) mentioned that Egypt is home to four Ramsar sites: the lakes of Bardawil, Burullus, Qaroun, and Rayan. These sites are significant globally and unique in terms of their biodiversity.

According to Abd Ellah (2016), wetlands are crucial to the tourism sector and can assist the Wadi El Rayan community both financially and socially. Furthermore, the significance of wetlands was determined by El-Hennawy (2010), Afefe (2020), and Abd El-Mageed et al. (2022). These findings included;

- Development of wetland sites contributes to the diversification of tourism supply and demand in Egypt.
- Preservation of wetlands contributes to the preservation of human tradition.
- Wetlands are diverse and productive environments for tourism activities.
- They are places of amazing beauty and animal and plant diversity, and some are protected areas or World Heritage sites.
- A variety of activities are available, from fishing and boating to bird watching and hunting.

Threats of wetlands and it impact on tourism industry

The United Nations Framework Convention on Climate Change in 1994 was a recognition that climate change is primarily caused by human activity (Ramsar, 2017). Wetlands are subject to human-induced climate change but, if managed well (Rashed, 2005), wetland ecosystems and their biodiversity have a role in mitigating climate change and will be important in helping people adapt to climate change through their vital role in ensuring water and food security (Prusty et al., 2017). Although the primary driver of wetland loss and degradation is currently habitat change due to human development, the effects of climate change are already being felt

around the world (Stefanakis, 2019). As the study of (Kumar et al., 2021) assured that our understanding of climate change increases, there is a new sense of concern for the status of wetland species and ecosystems: it is clear that climate change will become a major driver of ecosystem loss during this century and will compound the effects of other drivers (Abdel-Shafy et al., 2022).

Wetlands are constantly disappearing and facing threats. Wetlands have lost more than half of their area in the last century, which has significantly worsened their functions and diminished their worth. The ongoing loss and degradation of these ecosystems has not stopped, despite multiple initiatives to address this situation (ElZein et al., 2016). As 64% of the world's wetlands have disappeared since 1900, Prusty (2017) said that all types of wetlands have seen significant deterioration and reduction in recent decades due to human destruction, the rapid expansion in human population, and the demand for natural resources for food and fuel. Tourists who hunt, drive, and gather plants and animals can do direct harm to the flora and fauna of wetland areas (Sfougaris et al., 2009).

According to UNWTO (2012) tourism activities wetlands must be managed, to lessen its detrimental effects on the environment and ecosystem. Wetlands are significantly impacted by unsustainable tourism (Afefe et al., 2016). Furthermore, changes in natural habitats are caused by tourist attitudes and behaviors such as noise, unlawful hunting, and pollution. Additionally, wetlands deteriorate due to an increase in visitors and a lack of commitment to maintaining their absorptive capacity (Wanga et al., 2014). According to Daryadel and Talaei (2014), drought has an impact on wetlands, where high rates of evaporation and temperature rise can harm habitats that depend on water. Furthermore, a considerable reduction in river flow will lessen the resources' ability to filter contaminants out of the water (Wang et al., 2012).

However, the building, transportation, and other tourism activities have an impact on the ecology of wetlands (Liu et al., 2018). Furthermore, Lamsal et al. (2016) pointed out that there are a number of hazards to wetlands, such as improper disposal of wastewater, contamination of groundwater, agricultural use of wetlands, tourism in wetlands, and illicit hunting and fishing. As such, every hazard that has come before differs from one wetland to the next (Yu et al., 2018). Also the soil and flora are injured, which might eventually result in damage that can have an adverse effect on biodiversity and other issues. When tourists stray from recognized routes, the damage may become more severe (Afefe, 2020).

Threatened species in wetlands

Ramsar Sites Information Service (2017), reported that threatened species in wetlands according to the IUCN Red list, Wetlands International, Birdlife Worldwide, and other sources, which comprise;

- ***Waterfowl:*** about 17% of the 826 duck species listed on the World Birdlife list are regarded as endangered. At least 41% of the 1,138 duck populations with known trends are declining. The condition of waterfowl, which are thought to be the most dangerous birds, has drastically worsened over the previous 20 years.
- ***Wetland Dependent Mammals:*** of the species that depend on freshwater, 38% are considered globally threatened; this category includes species like river dolphins and manatees, all of which have threatened status. Compared to waterfowl and terrestrial mammals (21% threatened), wetlands mammals are more vulnerable.

- ***Fresh water fish:*** it is estimated that 33% of freshwater fish species worldwide are threatened.
- ***Amphibians:*** of the freshwater amphibian species found worldwide, 26 percent are threatened. Amphibians are generally undernourished; they comprise primarily freshwater and terrestrial species found in forests, with 29% of these species facing extinction. It has been determined that at least 42% of all amphibian species are in decline, and that less than 1% are in excess.

Solutions for the negative effects of wetlands

Recently, wetland tourism has become more popular. It may have both advantages and disadvantages (Chow et al., 2019). When taking into account the stakeholders involved in the tourism development of a wetland, its impact on the community development becomes even more substantial (Do et al., 2015). The involvement of locals in the planning process may determine whether the development of tourism has a beneficial or negative influence (Khoshkam et al., 2014). However, it must meet the requirements of the local population if tourism is to grow in a sustainable manner (Egresi et al., 2021). Many studies have indicated the importance of preserving wetlands and protecting them from the threats they face, as this helps preserve biodiversity in wetlands and enhance the resistance of ecosystems to changes and pressures, whether natural or caused by humans, and the management of wetlands reduces the negative impact of climate change (Yu et al., 2018; Egresi et al., 2021). Sfougaris et al. (2009) and Ramsar (2012) stated that the following numerous techniques are necessary to preserve wetlands and address the issue of biodiversity loss in wetlands:

- Preserving the health of virgin wetlands,
- stepping up efforts to pinpoint the primary causes of wetland deterioration and loss, such as pollution and excessive freshwater extraction,
- Developing a restoration program and planning wetlands to adapt to the increasingly varied and changing environment and protect ecosystems,
- Wetlands were added to the Ramsar List,
- Increasing the number of wetland reserves,
- Training the reserve staff how to manage wetlands,
- Increasing visitors' awareness of the importance of wetlands,
- Monitor and predict environmental changes on wetlands,
- Publishing wetlands booklets and brochures in many languages,
- Encouraging sustainable development in wetlands, and
- Using an environmental management strategy for sites are just a few of the initiatives being undertaken.

Conceptual framework of the study

The variables in the current study and their relationships to one another were explained by the framework (see Figure 1). The structure that follows demonstrates association between the tourism sector and threats of wetland in Wadi El Rayan and tourism industry. It also shows the relationship between solutions for the negative effects of wetlands in Wadi El Rayan and tourism industry. The following hypotheses were generated and examined in this study:

- **H1:** Threats of wetland will negatively effect in tourism industry in Wadi El Rayan.
- **H2:** Solutions for the negative effects of wetlands threats will positively effect in tourism industry in Wadi El Rayan.

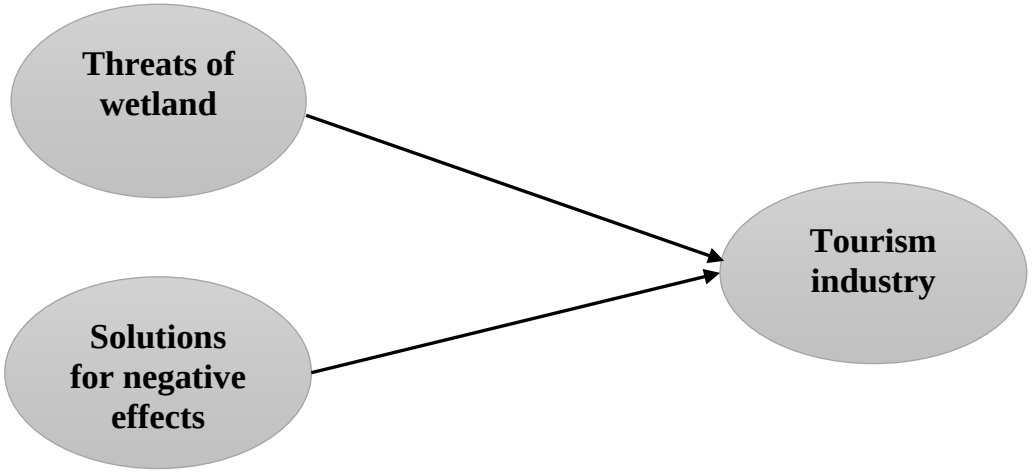

Figure1: Conceptual framework of the study

Methodology

In order to choose an appropriate methodology to address the research problems, the case study approaches assist the researcher. In addition to satisfying all requirements for theory testing, a single case study can make a substantial contribution to the development of knowledge and theory (Yin, 2009). The present study used a single-case methodology to determine the primary threats to Wadi El Rayan as a wetland and the effects these threats have on the tourism sector. The case study approach uses a variety of data collection techniques, including documents, questionnaires, archives, and various forms of observations and interviews. The current study is depending on a quantitative methodology to enhance comprehension of the setting from practitioners and participants (Saunders, 2011). Additionally, a questionnaire was used to gather the study's primary data. This study employed a convenience sample that included Wadi El Rayan Manager, officials from the Egyptian Environmental Affairs Agency, the Fayoum Tourism Authority, and experts (who have expertise and experience linked to wetlands). A total of 120 copies of the questionnaires were delivered. 87 copies of the completed surveys were returned, representing a 72.5% response rate.

The research questionnaire is divided into five sections: the respondent's demographic profiles, the importance of wetlands, threats of wetlands, and solutions for the negative effects of tourism in wetlands. Every research construct was assessed using a 5-point Likert-type scale, where 1 represented "strongly disagree" and 5 represented "strongly agree." The Statistical Package for Social Sciences (SPSS, version 26) was used to Analyze the data.

Results and discussions

Validity and Reliability

According to the study of Creswell (2003) the research reliability showed the participants answer which is steady and constant over time. As well, Pallant (2013) explained that Cronbach's Alpha is above 0.70, it will be acceptable. This research has conducted the Cronbach's Alpha coefficient and the reliability has been achieved (see Table 1).

Table 1: Reliability for the questionnaire

The scale of study variables	No. of Items	Cronbach's Alpha
Importance of wetlands	6	0.76
Threats of wetland	16	0.80
Solutions for the negative effects of wetlands threats	8	0.70

Descriptive analysis

The following table (2) showed the study participants were surveyed at Wadi El Rayan, 62 (71.3%) were male and 25 (28.7%) female. The largest group of respondents were aged between 25-34 represented 42 (48%). The 35-44year olds represented the second largest group 27 (31%) of respondents. The 45-55 year olds represented the third largest group 18 (21%) of respondents. In term of level of education 55 (63.3%) of the respondents had a higher level education and 32 (36.7%) of the respondents had postgraduate.

Table 2: The profiles of the study respondents

Variable	Category	Frequency (N=87)	Percentages (%)
Gender	Male	62	71.3
	Female	25	28.7
Age	25-34	42	48
	35-44	27	31
	45-55	18	21
Level of Education	Higher education	55	63.3
	Postgraduate	32	36.7

Importance of wetlands on tourism industry

The following table (3) showed that, the mean scores for the importance of wetlands on tourism industry range from 4.35 to 4.75. The standard deviations for the responses to the items measuring it ranged between 0.60 to 0.80 displays a reasonable level of variability. The results showed that the grand mean of the importance of wetlands on tourism industry were 4.24, comparing that mean with the 5-piont of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), this mean is situated in the choice number (4) agree. These mean statistics explained the agreement of the participants for the importance of wetlands on tourism industry. This results were matched with the literature that the wetland play an important role in the tourism industry because it pull several customers around the world who looking for water and natural such as coral reef, beaches, lakes and rivers (Ramsar, 2012). As well as, wetlands play an important role in tourism and recreation, not only offering economic benefits for tourism industry and the local communities but also have a great educational benefit for school children and general public so it must be make attention and conservation (Lamsal et al. 2016; Jaramillo et al., 2019).

Table 3: Mean and standard deviation of wetlands importance in tourism industry

Importance of wetlands in tourism industry	Mean	Std. Deviation
1. Increase the economic benefits for tourism industry.	4.75	0.76
2. Wetlands are rich and varied places that are good for tourism activities.	4.25	0.73
3. There are places of breathtaking beauty, a great diversity of animals and plants, and some that are protected areas or World Heritage Sites.	4.03	0.60
4. Presented a variety of sports, including hunting, fishing, and boating.	4.12	0.63
5. Wetland site development helps Egypt's tourism industry become more diverse in terms of both supply and demand.	4.02	0.75
6. The preservation of wetlands contributes in the preservation of human custom.	4.31	0.81
General mean	**4.24**	**0.87**

Threats of wetland on tourism industry

The following table (4) showed that, the mean scores for the threats of wetland on tourism industry range from 3.71 to 4.15. The standard deviations for the responses to the items measuring it ranged between 0.65to 1.81 displays a reasonable level of variability. The results showed that the grand mean of the Threats of wetland on tourism industry were 3.95, comparing that mean with the 5-piont of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), this mean is situated in the choice number (4) agree. These mean statistics explained the agreement of the participants for the threats of wetland on tourism industry. The literature review confirmed these results; ElZein et al. (2016) mentioned that wetlands are under threat and in constant decline. It has lost more than half of their area, which leading to a significant deterioration in their functions and loss of value. Moreover, a significant decrease in river flow water resources will reduce their capacity to remove pollutants from the water (Wang et al., 2012).

Table 4: Mean and standard deviation of wetland threats on tourism industry

Threats of wetland in tourism industry	Mean	Std. Deviation
1. Wetlands are negatively impacted by visitor behavior.	3.95	1.02
2. Negative visitor behavior destroys and damages environments.	4.02	1.01
3. The ecosystem of wetlands is impacted by uncontrolled human activity.	4.15	0.82
4. Fish-farming in Wadi El Rayan.	4.00	0.99
5. Unsustainable of using the natural resources for economic purposes.	4.09	1.31
6. The protected area's surrounding overgrazing.	3.89	0.87
7. Encroachment on protected land.	3.78	0.98
8. Water pollution.	4.11	0.95
9. Fires caused by humans in a protected area.	3.77	1.06
10. Noise pollution.	3.92	0.77

11. Endangered species are under strain from unsustainable tourism.	4.02	0.88
12. Failure to adhere to carrying capacity.	3.71	0.65
13. Drainage of wastewater within the protected area.	4.10	1.16
14. Unlawful hunting.	4.06	1.81
15. Habitat destruction is a negative effect of drought.	3.76	0.78
16. Impact of climate change on wetlands.	3.99	1.03
General mean	**3.95**	**0.98**

Solutions for the negative effects of wetlands threats

The results in table (5) showed that the mean scores for solutions to overcome the negative effects of wetlands range from 3.66 to 4.40. The standard deviations for the responses to the items measuring it ranged between 0.61 to 0.90 displays a reasonable level of variability. The results reported that the grand mean of Solutions to overcome the negative effects of wetlands variables were 4.35, comparing that mean with the 5-piont of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), this mean is situated in the choice number (4) agree. These mean statistics show the agreement of participants for the solutions to overcome the negative effects of wetlands. The literature review mentioned that there are many strategies that must be followed in order to conserve wetlands and solve the problem of biodiversity loss in wetlands (Sfougaris et al., 2009; Ramsar, 2012).

Table 5: Mean and standard deviation of solutions of the negative effects of wetlands threats

Solutions for the negative effects of wetlands threats	Mean	Std. Deviation
1. It is appropriate to include wetlands on the Ramsar list.	4.33	0.85
2. Extending the reserves of wetlands.	4.26	0.61
3. Training employees how to handle wetlands.	4.40	0.62
4. Increasing tourists' understanding of the value of wetlands.	4.31	0.76
5. Monitor and predict any changes to the wetlands' ecosystem.	4.10	0.98
6. Publishing booklets and brochures about wetlands in a variety of languages.	4.22	0.73
7. Wetland sustainable development.	3.76	0.90
8. Applying a strategy to site-specific environmental management.	3.66	0.87
General mean	**3.95**	**0.76**

Testing the study hypothesis

For testing the first hypothesis, ***threats of wetland will negatively effect in tourism industry in Wadi El Rayan***, Results for the independent variable "threats of wetland" were displayed in the following table (6), where the significant regression coefficients, or (T) value, were (0.595) with a significant degree (0.000) at a significant level (0.01). As a result, the dependent variable (the tourism industry) is strongly impacted by the independent variable. Additionally, the Model Summary is table (6) of importance. To find out how well a regression model fits the data, go to this table, which gives the R, R2, corrected R2, and standard error of the estimate. The wetland threats in Wadi El Rayan have a determination coefficient (R^2) of (0.354). The determination coefficient (R^2) percentage was 35%, indicating a strong influence of the

independent variable on the dependent variable. This suggests that changes in the independent variable are responsible for some of the changes observed in the dependent variable, the tourism industry.

The Variance Analysis results were displayed in a table (6). The calculated (F) value was (1, 87) = 64.623 *Sig.* = 0.000, indicating that wetland threats had an impact on Wadi El Rayan's tourism sector. As a result, the study rejected the null hypothesis and accepted the alternative, which declared that there are negatively effects of wetland threats on tourism industry in Wadi El Rayan.

Table 6: Regression coefficients for influence of wetland threats on tourism industry

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.750	0.323		11.763	0.000
Wetland threats	0.594	0.067	0.595	7.159	0.000
R			0.595**		
R Square			0.354		
Adjusted R Square			0.348		
DF			1 / 87		
F			64.623		
Sig.			0.000		

** Correlation is significant at 1% level

For testing the second hypothesis, *"**solutions for the negative effects of wetlands threats will positively effect in tourism industry in Wadi El Rayan**"*, the findings in table (7) below demonstrated that the independent variable "solutions for the negative effects of wetlands threats" had a significant regression coefficient, or (T) value, of (0.689) at a significant level (0.01) and a significant degree (0.000). As a result, there is a significant and positive relationship between the independent and dependent variables. Table (7) also includes the Model Summary, which is interesting. Regression model fit to data can be assessed using the R, R2, adjusted R2, and standard error of the estimate provided in this table. For Wadi El Rayan, the determination coefficient (R2) for wetland risks was (0.464). The determination coefficient (R2) percentage was 46%, indicating a strong influence of the independent variable on the dependent variable. This suggests that changes in the independent variable are responsible for some of the changes observed in the dependent variable, the tourism industry.

The Variance Analysis results in the table (7) indicated that there was an impact of the solutions for the negative effects of wetlands in tourism industry in Wadi El Rayan. The computed (F) value was (1, 87) = 62.712 *Sig.* = 0.000. As a result, this study rejected the null hypothesis and supported the alternative, which said that there are a positively effects of the solutions for the negative effects of wetland threats in tourism industry in Wadi El Rayan.

Table 7: Regression coefficients for influence of solutions for the negative effects of wetlands threats in tourism industry

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.460	0.233		12.546	0.000
Solutions for the negative effects of wetlands threats	0.688	0.076	0.689	6.250	0.000
R			0.689**		
R Square			0.464		
Adjusted R Square			0.454		
DF			1 / 87		
F			62.712		
Sig.			0.000		

** Correlation is significant at 1% level

Conclusion and further research

The results revealed that wetland play an important role in tourism industry which including; increase the economic benefits for tourism industry; wetlands are diverse and productive environments for tourism activities; it spots of amazing beauty and animal and plant diversity and some are protected areas or World Heritage site; development of wetland sites contributes to the diversification of tourism supply and demand in Egypt; conservation of wetlands contributes to the conservation of human tradition. The results also revealed that there are many threats that faced wetland which effect directly on tourism industry in Wadi El Rayan such as; negative attitude of visitor; human activities effect on ecosystem on wetland; fish-farming in Wadi El Rayan; overgrazing around the protected area; encroachment on protected land; water pollution; wastewater drainage inside the protected area; unlawful hunting and climate change effect on wetland. Additionally, the results reported that there are several strategies that help the officials and decision makers for reserve and protected wetland in Wadi El Rayan including; wetlands should be added to the Ramsar List; creating more wetland reserves; training staff on how to deal with wetlands; increasing visitors' awareness of the importance of wetlands; monitor and predict any environmental changes on wetlands; publishing wetlands brochures and booklet in various languages; sustainable development in wetland. Consequently, this study refused the null hypothesis and accepted the alternative one, which declared that there is a strong influence of the independent variable on the dependent variable.

However, little is known about the ecological functioning, niche patterns, and biodiversity of these wetlands, despite the fact that they are vitally important ecosystems with a varied range of flora and fauna as well as significant economic benefits. Furthermore, the importance of wetlands and the global interest of it, there is a lack of studies that have addressed this topic in Egypt. Therefore, this study is considered one of the first studies that addressed the threats facing wetlands and their impact on the tourism industry in Egypt. The current study added to the reviews of the literature related to the importance of wetlands in Egypt's tourism sector and

the threats of wetland in Wadi El Rayan. Also, it is clear that this research contributed the theory by offering the suggested model to measure firstly, to identify the importance of wetland in tourism industry. Secondly, to examine the main threats of wetland in Wadi El Rayan and its impacts in tourism industry in Egypt. This research has many of limitations were, the first of which is that it only focused on one Wadi El Rayan case study. Secondly, not all of Egypt's wetland sites were included in the study region. Thirdly the literature showed there is a lack of studies and researches on the study topic in Egypt, in particularly Wadi El Rayan. All wetland sites in Egypt should be included in future research in order to test and generalize the findings of the current study.

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