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Investigation on the Desert Climate and Nature of Sharm El-Loul as a Virgin Tourist Beach, South of Marsa Alam City, Egypt

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ABSTRACT: Climate is one of the most important factors that help in promoting tourism activities, especially in areas that have a suitable climate to attract tourists as in the case of Sharm EI- Loul area. In order to have a tourist attraction place for various kinds of tourist, the selected region is preferring to has suitable and moderate climatic elements and different from the one who lives in his homeland.

Sharm El-Loul area is located generally within the arid and semi-arid climate. Due to its presence in the Red Sea coast, it worked on modifying the climatic characteristics in general, and therefore the climate of the studied area is characterized by moderation in contrast with the climate of the Egypt in general. From the aforementioned it becomes clear that the climatic conditions of Sharm El-Loul area in terms of temperature are very suitable for visiting throughout the year (from 22.11°C to 29.51°C). Temperature is moderate through the period from December to April, and for the rest of the year in spite of the high temperature, the blowing of the cool sea breeze from the east and northeast that helps to soften the atmosphere. These conditions can use as evident that all year seasons are very suitable for tourism and resettlement in the area. It can be recommended to consider this area as environmental conserve area.

Key words: Sharm El-Loul, Climate, Tourist, Sustainable, Wind, Virgin beach.

I. NTRODUCTION

Weather is important but hard to predict. The complexity of that system limits the knowledge about it and therefore its predictability even over a few days. It is complex because many variables within the earth's atmosphere, such as temperatures, barometric pressure, wind velocity, humidity, clouds and precipitation, are interacting, and they do so nonlinearly (Mudelsee, 2010).

In the Wadi Gemal - Hamata Protectorate, about 60km south of Marsa Alam City, lies a virgin sand beach of Sharm El-Loul area with azure water, excellent coral and fish viewing. Sharm El-Loul has no development at all (no hotels, restaurants or shops and no facilities). Most of the tourists come for the day, bring what they need and take everything away when they leave.

The Sharm El-Loul beach consists of very fine white sand of various colors, composed of limestone crushed by the waves. The coastal water is shallow to no more than a meter and half. During low tides, large areas of sandbars can be exposed, and for swimming in the sea you will need to walk more than a hundred meters. In some places at a small distance from the coast, there may be separate small corals found. However, in clear blue water, any obstacles are clearly visible from a far.

The Sharm El-Loul area as part of the Egyptian Red Sea coast is considered vulnerable to the impacts of expected climate change, such as rise in sea-level and shoreline erosion, which create major challenges. These challenges also produce stressful effects on tourism and human activities. The aim of this work is to investigate the important geographical and climatic conditions for this virgin area in order to use by design makers to develop this promising tourist area and to consider as environmental reserve area.

II. THE STUDY AREA

Sharm El-Loul area is comprised of coastal plain and hinterland mountainous regions that serve many purposes such as fisheries, diving, safari, and biodiversity. They are special places, given their close near to international airport of Marsa Alam. The area lies between latitudes 24° 36° 18° and 24° 37° 12° N and longitudes 35° 06° 18° and 35° 07° 30° E (Fig. 1). The area is accessible with an asphaltic road along the Red Sea coast, and is located about 60km from Marsa Alam City. Sharm El-Loul area can also be reached by the asphaltic road between the Nile town of Edfu and Marsa Alam City, or by Sheikh Salem – Sheikh Shazly road. There are also some desert tracks accessible to light cars like the track in Wadi El-Gemal about 60 km from Sheikh Salem – Sheikh Shazly road.



Fig. (1): Location map of Sharm El-Loul area, South Marsa Alam City

Sharm El-Loul area is divided into four major geomorphic units; the Red Sea high mountains, the coastal hilly area, the coastal plain and the Sharm El-Loul bay and it's coast (Fig. 2).



Fig. (2): The major geomorphic units of Sharm El-Loul area, South Marsa Alam City

III. RESULTS AND DISCUSSION

3.1-Geomorphology

The elongated massive block of basement rocks forms the highest mountainous chains (Fig. 3). The coastal hilly area forms conspicuous topographical features between the coastal plain and the high Red Sea Mountains (Fig. 3). The coastal plain in the studied area comprises of different geomorphic features, such as, fault scarp, piedmont plain and raised beach (Fig. 4). The coastal plain is very low topographic features that drain the Red Sea rugged mountains dissect it (Fig. 5). Sharm El-Loul coast is exposed to flash floods along great number of Wadies running towards the Red Sea cover the surface (Fig. 5). Sedimentary formations from the piedmont to the Red Sea coast comprise alluvial fans, wadies and littoral (reef), where, coral reefs is extended along the coast (Fig. 6).

The coast of Sharm El-Loul is surrounded from east and west with the small headland to its' north entrance it slightly directed from the prevailing winds (Fig.6). It's important to stress slightly because while there is a stunning small hills backdrop inland to the east, the immediate surroundings are extremely flat. However, the headland and the surrounding reef (Fig. 6), which is widest near the open sea at the eastern flank do ensure that the bay is usually calm.



Fig. (3): High basements rocks and coastal hills at Sharm El-Loul area, South Marsa Alam City



Fig. (4): Fault scarp at Sharm El-Loul area, South Marsa Alam City



Fig. (5): The trace of the flash flood at Sharm El-Loul area, South Marsa Alam City



Fig. (6): Sharm El-Loul bay showing the open sea, recent sediments and coral reefs and headland area

3.2- Climate

The atmosphere is a compressible fluid, made up of gases whose molecules are pulled to Earth's surface by gravity. As a result, the molecules that make up the atmosphere are most compressed close to earth's surface and atmospheric density decreases most rapidly with height (Carbone, 2016).

The activity of the wind is reflected to the water currents in the bay and its ability to carve or settle. The temperatures contribute greatly to the activity of weathering processes. The rain plays in precipitation processes, which gave importance for the climate in the studied area. All these factors are present for the

human being with his tourism activities in order to increase the availability of suitable coastal climate for tourism.

The study relied on the meteorological stations of Ras Banas, which is the closest station to an area. The study concerned with the elements of climate of temperature, humidity, winds, and rain, during the period from (2004 to 2020).

3.2.1-Temperatures

As listed in table (1) and shown in figure (7), the annual average (T), maximum (TM) and minimum (Tm) temperature values from year 2006 to 2019 were 26.08, 29.51, and 22.11°C, respectively.

These rates of temperatures confirm the coastal characteristic of the prevailing climate conditions in the Sharm El-Loul area, where temperatures rise in the summer to acceptable levels, while they decrease in the winter season.

Table (1): Minimum, maximum and average temperatures from year 2006 to 2019 in Sharm El-Loul										
area, South Eastern Desert.										
	Annual average	Annual maximum temperature	Annual minimum							
Year	temperature (T)	(TM)	temperature (Tm)							
2006	26	28.9	22.2							
2007	25.6	29	21.5							
2008	25.7	29.4	21.7							
2009	25.2	29.1	21.3							
2010	27.8	30.8	23.8							
2011	26	28.7	22.1							
2012	26.5	29.5	22.3							
2013	26.1	29.4	22							
2014	26	29.8	22							
2015	25.9	29.6	21.9							
2016	26.1	29.7	22.1							
2017	25.9	29.5	22.1							
2018	26.5	30.2	22.6							
2019	25.8	29.5	22							
Aver.	26.08	29.51	22.11							
Fig. (7): Minimum, maximum and average temperatures during years 2006 - 2019 in Sharm El-Loul										
area, south Eastern Desert.										

Figures (8, 9 & 10) show the monthly average temperature is highest value (29.51°C) in August, and drops to its lowest value (22.11°C) in January; the average highest temperatures value is (35°C) in June, July and August, but the lowest value (23°C) in January. The monthly average low temperature is highest value (26°C) in July and August, but is lowest value (13°C) in January.



Fig. (8): The average monthly temperature in Sharm El-Loul area, South Eastern Desert



Fig. (9): The high monthly temperature in Sharm El-Loul area, South Eastern Desert



Fig. (10): The low monthly temperature in Sharm El-Loul area, South Eastern Desert

Figure (11), shows the total daily incident shortwave solar energy reaching the surface of the ground over a wide area, taking full account of seasonal variations in the length of the day time, the elevation of the sun above the horizon, and absorption by clouds and other atmospheric constituents. Shortwave radiation includes visible light and ultraviolet radiation.

The average daily incident shortwave solar energy experience *significant* seasonal variation over the course of the year. The *brighter* period of the year from *April* to *August* has an average daily incident shortwave energy per square meter above 5.5 kWh. The *brightest* month of the year is *May* with a 6.2 kWh. The *darker* period of the year from *November* to *February* has an average daily incident shortwave energy per square meter below 3.5 kWh. The relatively *darkest* month of the year is *December*, with a 3 kWh.



Fig. (11): The average daily solar Radiation in Sharm El-Loul area, South Eastern Desert

3.2.2- Relative humidity

The relative humidity varies between 28% in summer and 57% in winter. The average evapotranspiration varies between 8.7mm/day in winter and 28 mm/day in summer (Fig. 12).



Fig. (12): The relative average monthly humidity in Marsa Alam – Barence area including Sharm El-Loul area, South Eastern Desert.

3.2.3-Wind speed and Rainfalls

Throughout the year, winds from NW to NE are predominating, except in rare cases, wind is southerly directed. The velocity of the winds usually ranges between 15 km/h in October to over 40km/h in January, February, Mars, April, September, November and December, with an average of 35km/h (data from the Meteorological Station, Institute of Oceanography and Fisheries, Red Sea branch) (Fig. 13 &Table 2). In general, wind velocity is distinctly higher during the day time, a phenomenon that can be explained by the higher temperature differences between the stronger heated landmass and seawater during the day. The water level changes periodically as a result of thermally driven winds, blowing landward in daytime. The chimney effect, especially of NW winds blowing sediments from the coast results in southward is transport of sand and its eventual dumping into the sea. NW winds carry oil spill and litter into the coastal area (Fig. 5).



Fig. (13): The average monthly wind speed in Marsa Alam – Barence area including Sharm El-Loul area, South Eastern Desert

The marine area along the coast is subjected to the wave action, where erosion should be taken into consideration for any construction plans in the coastal area. Because of nearly permanent air- and water-turbulence, a complete mixing of the water column occurs and no stratification is developed inside the water body. This is reflected also by the values of temperature and salinity, which show no significant differences between surface and bottom waters (Piller and Pervesler, 1989). Morcos (1970) and Edwards and Head (1987) described the well-known oscillatory condition, whereby the central part at 20-21°N has almost no daily difference in tidal height, and the northern and southern ends, which have daily ranges increasing with distance from the central region (approximately 0.6m in the north and up to 0.9m in the south).

The average annual precipitation rate is about 17.4 mm (meteorological stations of Ras Banas). Most of this precipitation occurs as heavy showers with short duration results in flash floods during the winter season between October and February. The maximum amount of perception recorded in one day was 64 mm (24 November 1966).

According to these climatic parameters, the area from Marsa Alam to Ras Banas including Sharm El-Loul area (Mansour et al, 2003) receives an average rainfall quantity equal 98.78 million cubic meter/year, where a considerable amount is lost to evaporation. The amount of water surplus reaches up to 80% of the total rainfall amount (Ghodeif, 1995).

with tornado & Number of days with hail from year 2006 to 2019 in Marsa Alam-Barnece area including Sharm El-Loul area, south Eastern Desert.										
	PP	V	RA	SN	TS	FG	TN	GR		
2004	-	-	-	-	-	-	-	-		
2005	-	-	-	-	-	-	-	-		
2006	0	20.3	0	0	0	0	0	0		
2007	0	19.2	0	0	0	0	0	0		
2008	0	18.6	1	0	0	0	0	0		
2009	0	17.7	0	1	0	0	0	0		
2010	0	19.7	1	0	0	0	0	0		
2011	0	19.6	0	0	0	0	0	0		
2012	0	16.9	0	0	1	0	0	0		
2013	0	19.5	0	0	0	0	0	0		
2014	0	19.3	3	0	1	0	0	0		
2015	0	19.8	1	0	0	0	0	0		
2016	0	21.4	1	0	0	1	0	0		
2017	0	22	1	0	1	0	0	0		
2018	0	20.8	1	0	0	0	0	0		
2019	0	19.8	1	0	2	2	0	0		
2020	-	-	-	-	-	-	-	-		
If the table appears fields without values with the symbol (-) this only indicates that has not been performed average, this happens if there is no sufficient data to compute.										

Table (2): Rain/snow precipitation total annual, Annual average wind speed, Number of days with

The total rainfall value (0) may indicate that there has made such measurement and /or the weather station does not broadcast.

pp =Rain snow precipitation total annual, V= Annual average wind speed, RA= Number of days with rain, SN= Number of days with snow, TS= Number of days with storm, FG= Number of foggy days, TN= Number of days with tornado & Gr = Number of days with hail

IV. **Conclusion and Recommendation**

- The Sharm El-Loul beach consists of fine white sand of various colors, composed of limestone crushed by the waves. The depth of the sea near the coast is relatively small about counts no more than a meter and a half.
- The area is characterized by arid climate, hot and rainless in summer and mild in winter. The monthly mean temperature varies between 24-38°C during summer and 12-26°C during winter.
- The rates of temperatures, relative humidity, wind and rainfalls confirm the coastal Sharm El-Loul area characterized for the suitable climate conditions for tourism.
- The investigation of the Sharm El-Loul area revealed that this area is promising Egyptian coast for sustainable development and as for future attractive tourism area and needs some facilities for these activities.
- Also, this area can be considered as environmental reserve area.

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