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## Extreme Environment Tourist Development

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## **TOURISM IN HYPERARID (DESERT) REGIONS: PRIMARY CONCERNS FOR DEVELOPMENT**

### **Abstract**

Recently a couple from the State of Qatar died of thirst when their car overturned in the Rub al Khali desert south of the city of Doha. Although this region contains stunning natural beauty, including unusual fauna and biota, oases, sand dunes, and unique geomorphology, the Empty Quarter (Rub al Khali) desert is still a forbidding and extreme environment which must be explored with extreme caution. Drylands and deserts, defined by the ratio of precipitation to evapotranspiration, cover approximately 40–50% of the world's surface (including the dry Polar regions); thus they represent an important and underutilized tourist resource. This study reviews the challenges of developing the desert regions of MENA and the Arabian Gulf for sustainable natural and cultural tourism and the potential strategies for utilizing their unique gifts while at the same time maintaining their fragile existence. Deserts do not regenerate quickly and human impacts can remain and degrade these biomes for decades. Thus planners must determine whether mass tourism, niche market (adventure or extreme), or other strategies are appropriate, and the policies to prevent the destruction of the unique environmental features of these locales. As case studies of both successful and harmful projects in Jordan, Egypt and the UAE have demonstrated, desert tourism can be either beneficial to national GDP, local stakeholders, and international tourists, or, on the other hand, harmful to the environmental, socially divisive, and unsustainable in the long term. A general consensus is emerging among tourism researchers that in order to productively add value to an economy and nation, tourism must be sustainable: it must take into account both short and long term environmental effects as well as the impact on local communities. Although seemingly counter-intuitive, lessons learned from sustainable

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extreme environment tourism development can be applied to all regions of the world, including water-rich tropical zones.

**Keywords:** Sustainable tourism, drylands and desert tourism, extreme environments, Middle East and North Africa (MENA), Gulf Cooperation Council (GCC)

## Introduction

The development of arid and hyperarid regions (drylands and deserts) with minimal rainfall presents several important concerns for tourism management and policy planning. The primary issue of course is the particularly complex issue of water resources and water scarcity, which includes not only strictly geophysical and hydrogeological dimensions, but also social and economic issues such as sustainability, distributive justice and cultural concerns since trade-offs are inevitable between large scale tourism infrastructure and local inhabitant needs and traditional patterns of desert life. Taking a case study approach from selected countries of the Arabian Gulf and MENA region, this contribution analyzes factors that must be considered for sustainable, profitable, and equitable tourist industry development in highly arid regions.

Deserts and Drylands are normally defined by their aridity index, which is the ratio between annual precipitation and potential evapotranspiration (evaporation + transpiration) or  $AI = P/PET$ . Extreme environments are here defined as biomes which are Hyperarid ( $AI < 0.05$ ) and Arid ( $AI = 0.05-0.20$ ). Lands which fit this definition comprise approximately 20% of the earth's land mass. Rainfall in these regions can vary from 0–200 mm per annum. Hyperarid and Arid lands occur across North Africa (Sahara desert) extending into the Arabian Peninsula and southern Iran and India, the western United States, Australia, China/Mongolia, Chile and South Africa. Water availability is a dominant concern for these regions and scarcity of this essential resource presents serious economic, environmental and political (security) dimensions. Water is particularly important for the Arabian Gulf (GCC), since as Spiess points out, “four GCC member states are rated among the 10 most water-scarce countries in the world. Kuwait ( $10 \text{ m}^3$  p.a.), the UAE ( $58 \text{ m}^3$  p.a.), Qatar ( $94 \text{ m}^3$  p.a.), and Saudi Arabia ( $118 \text{ m}^3$  p.a.)

rank as the first, third, fifth, and eighth water-deficient countries respectively”.<sup>2</sup> Since tourist water needs typically exceed those of local inhabitants for a variety of reasons, including the fact that tourists tend to abandon conservation-minded behaviors when on holiday, increasing tourist capacity in water scarce areas must take local water resources, as well as other related environmental factors, into account in developing tourist policy and strategies.

Countries such as southern Tunisia, Egypt, and Jordan have begun to develop mass tourism infrastructures in arid regions, and some of the challenges encountered are chronicled below. Human activities, in particular farming, unregulated irrigation, grazing, and now tourism (water use in desert hotels and parks can be especially heavy for swimming pools, laundry, fountains, outdoor cleaning, and maintaining parks and green spaces) have been implicated in desertification, a recognized international problem. Desertification occurs when formerly productive land becomes non-productive wasteland with soil erosion, loss of plant and animal life, and decreases in biodiversity. Although not entirely understood, the causes of desertification are specifically linked by Imeson to the explosive growth of human population from 1850 to the present, and man’s increasing technological ability to alter his own environment.<sup>3</sup> Unfortunately, due to the remoteness from scientific centers of expertise and poor technical infrastructure of many of the countries dominated by desert climates, a wide array of key scientific and environmental indicators from desert regions are missing or incomplete, such as the size and quality of underground aquifers, regional drought patterns, hydrogeological cycles, soil chemistry, animal impacts, biodiversity, and plant lifecycles and succession, which calls for a cautious approach to full scale mass tourism development, in colloquial terms ‘better safe than sorry.’

As a World Bank report warned as early as 1990, “the problem of desertification has been poorly characterized by public statements, books, magazines and sometimes scientific articles. It has been poorly characterized in five ways. First, the impression has been conveyed that the extent of the problem of desertification is well known, when in fact the evidence is extraordinarily scanty.

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<sup>2</sup> A. Spiess, 2012, *Environmental Degradation, Climate Uncertainties, and Human Vulnerabilities: Realm of Possible Actions toward a Shifting Security Paradigm in the Arab Gulf Monarchies*. In: *Climate Change, Human Security and Violent Conflict*, J. Scheffran et al. (eds.), Hexagon Series on Human and Environmental Security and Peace 8, Berlin, Springer, p. 388.

<sup>3</sup> A. Imeson, 2012, *Desertification, Land Degradation and Sustainability*, Oxford, Wiley-Blackwell, pp. 10–11.

Second, the degree to which there is professional agreement among scientists and practitioners on the extent, causes and solutions has been overestimated. Third, the extent of desertification as an irreversible state has probably been exaggerated, although it is correct to classify it as a serious problem. Fourth, the image created has too often been of inexorably advancing sands, as opposed to more subtle, more complex, pulsating deteriorations, sometimes with reversals, but at least, with substantial periodic remissions, radiating out from centers of excessive population pressure. Fifth, the availability of profitable technologies to combat the problem has been overestimated because the gap between what is socially profitable and what is perceived as privately profitable has been underestimated”.<sup>4</sup> Desertification involves loss of vegetation, from either human activities such as intensive agriculture and poor soil conservation practices, from overgrazing or naturally high animal populations, or from climatic changes.

When plant cover is removed for long periods due to animal grazing or during plant harvest times, soil dries and erodes away leaving unproductive soil layers or bedrock below. However, paleodesert sediments exist from the Cambrian period (c. 500 million years ago) which long predates the arrival of humans; thus man cannot be the sole cause of deserts and desertification. Similarly, the Sand Hills of Nebraska, with clear geological features of moving barchan sand dunes also found in the Sahara and other arid deserts, have been naturally reclaimed and stabilized with vegetation, probably due to moist air masses from the Gulf of Mexico and microclimate establishment from local interdune wetlands (dune-blocked stream drainage). But humans certainly can exacerbate naturally occurring climatic events such as droughts by poor farming methods including lack of contour plowing, neglecting fallow land practices, wasteful and inefficient irrigation (which produces runoff and high evaporation), and maintaining animal herds above environmental carrying capacity. Thus geological and climatic events that occur naturally need to be better studied so that human and natural impacts can be more fully understood in order to place sustainable tourist practice on an evidence-based and scientific footing.

Sustainable and eco-friendly tourism represents one of the most promising futures for desert regions and the populations who live in them. Other uses of arid lands, such as pastoralism or irrigated farming, must be closely monitored,

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<sup>4</sup> R. Nelson, 1990, *Dryland Management: The “Desertification” Problem*, Washington: DC, World Bank, p. 1.

since overuse by introducing tourism impacts can permanently exhaust fossil water sources or degrade the soil reducing its ability to sustain life. Mining for minerals and petroleum is another land use strategy that can provide economic benefits from drylands since many are rich in metallic ores. Yet similar to fossil water, mineral resources in deserts are non-renewable and finite; for example, the sodium nitrate fertilizer deposits of the Atacama desert of Chile sparked the momentous War of the Pacific in 1879-83 among Chile, Bolivia and Peru, but now the mines and mining towns are abandoned due to the introduction of the cheaper Haber-Bosch ammonia process in Germany. Copper mines have replaced the nitrate mines in the Atacama desert, and account for a significant portion of Chile's GDP, but when they are exhausted, domestic and regional conflict will undoubtedly resurface as the country seeks new sources of income. Economic diversity, as opposed to economies that rely heavily on rents from mineral resources, has been shown to temper boom and bust cycles. Adding sustainable tourism to other sustainable economic activities thus promotes economic and political stability.

## **1. Methods**

This contribution draws on the direct observations of the author as a frequent guided and unguided traveler and explorer in the MENA and Arabian Gulf deserts of Morocco, Kuwait, Jordan, Oman, UAE, Qatar, and Egypt. The paper also reviews the small body of peer-reviewed scholarly literature on desert tourism as well as recent scientific research into the geomorphology, ecology, hydrology, botany, and anthropogenic biome impacts (habitat sustainability) in highly arid regions. A case study approach from various arid and hyperarid regions is adopted to highlight specific concerns, which are summarized in Table 1 below along with recommendations for minimizing human impacts and achieving environmental and social sustainability in tourism development plans.

## 2. Discussion and Results

### 2.1. Water and tourism

The water scarcity problem in desert regions should not be underestimated – overpopulation and unsustainable water withdrawals when coupled with drought leading to crop and cattle destruction have fueled numerous political conflicts in North Africa and the Jordan River Valley over the centuries as well as direct deaths and outmigration from famine. Although among the most water scarce nations on earth, the countries of the Gulf Cooperation Council (GCC)—including Bahrain, Qatar, UAE, Saudi Arabia, Kuwait and Oman—have temporarily solved their water shortage problems by installed water desalination plants powered by the region’s cheap and plentiful natural gas and oil resources. To give a sense of the scale of produced water in the region, the country of Qatar with a current population of 1.9 million has five desalination plants with a capacity of 217 MIGD (986,000 m<sup>3</sup>/day) with two more plants scheduled to come online with 108 MIGD (491,000 m<sup>3</sup>/day) capacity.<sup>5</sup> Almost 100% of domestic and drinking water needs in Qatar are met by desalination, since groundwater is used primarily for low-yield agriculture. The wisdom of using this groundwater for a sector which produces less than 1% of GDP has recently been called into question in Qatar. The country contains 5,400 km of water transmission pipes and 22 pumping stations. The fact that water is provided for free or is subsidized by many Gulf governments increases consumption, and Gulf nations will soon become the highest per capita users of water in the world.<sup>6</sup> Thus introducing a water conservation ethic into the Arabian Gulf tourist industry is particularly challenging since true water costs are obscured by government subsidy, and almost no domestic water consumption reduction technologies or public information campaigns on water usage now exist in the Gulf.

The obvious sustainability issue with the desalinated water systems that have arisen throughout the Gulf is the reliance on finite hydrocarbon resources to fuel

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<sup>5</sup> S. Atilhan, A.B. Mahfouz, B. Batchelor, P. Linke, A. Abdel-Wahab, F. Nápoles-Rivera, M.H. El-Halwagi, 2012, *A systems-integration approach to the optimization of macroscopic water desalination and distribution networks: a general framework applied to Qatar’s water resources*, Clean Technologies and Environmental Policy, 14, p. 162.

<sup>6</sup> S. Atilhan, et al. op. cit., p. 162; J. McKenna, A. Freudmann, J. Kinninmont, 2010, *The GCC in 2020: Resources for the Future*, London, The Economist Intelligence Unit Limited.

the desalination process. In addition, the lack of water tariffs in oil-rich countries does not instill in consumers a sense of the real costs and value of water, who take the resource for granted. Qatar is currently countering this future challenge by supporting research through Qatar National Research Fund and Qatar Science and Technology Park into more efficient and renewable energy-based desalination techniques, such as solar desalination. The government will also upgrade the distribution network, which leaks an estimated 30–35% of water volume into the ground. Research is also underway to treat and reuse produced water (PW) which originates in gas and oil wells, much of which is currently dumped.

Adding tourist infrastructure to water-scarce areas creates new water needs in a number of areas: water for the construction of buildings, roads and attractions; water for imported construction workers (all Gulf nations have severe manual labor shortages – thus tourist development will increase the local population); and water for the tourists themselves. Although there is not enough current reliable evidence to make accurate generalized comparisons, the water usage of desert hotels probably exceeds that of a typical hotel in a humid and temperate climate for the following reasons: outdoor pools and fountains experience high evaporation rates, and greenery must be artificially irrigated (and many hotels witnessed by the author use inefficient and poorly installed spray irrigation, and often irrigate during the daytime hours instead of at night). In addition, the lack of rainfall and persistent dust and sand deposits necessitate the constant cleaning of external surfaces with water. Also few hotels in the Gulf capture and reuse wastewater (greywater) for recycling. Air conditioning condensate, which is considerable due to the high humidity in the Gulf, is rarely collected on a small or large scale, even though this water is almost pure enough for human consumption.<sup>7</sup> Many of these problems, such as daytime irrigation, can be directly attributed to a lack of environmental consciousness and a lack of concern for efficiency and productivity – also, due to monopolistic economic behavior in the Middle East (both the *wasta* system and government dominance of the tourism sector), and access to extremely inexpensive expatriate labor from India and South Asia, free market forces and competition do not drive efficient and sustainable practices in the tourist sector.

A case study from southern Tunisia by Dłuzewska in 2008 indicated that tourist attitudes about water usage can negatively impact the behaviors and eco-

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<sup>7</sup> K.J. Loveless, A. Farooq, N. Ghaffour, , *Collection of condensate water: Global potential and water quality impacts*, “Water Resource Management” 2013, 27, pp. 1351–1361.



logical attitudes of the indigenous population, even in the face of their own traditional knowledge about water use. In water scarce southern Tunisia, water usage by primarily European tourists in Tozeur and Nefta is estimated at approximately 200–300 liters per day per capita, close to 20 times greater than the usage by local inhabitants in the near past.<sup>8</sup> Water conservation is not practiced or encouraged in the Tunisian tourist industry, through warning signs or instruction by staff in the hotels and due to the abundance of swimming pools and the practice of ornamental plant watering, European visitors may in fact be unaware that they are in a water scarce area. Dłuzewska found in addition that local inhabitants themselves believe that water is plentiful, pointing to the practices of the hotel industry as evidence for a bountiful water supply. If water were in fact scarce, locals reported to Dłuzewska in interviews, why would hotels be constantly refilling pools and watering plants? The lack of concern for environmentally-friendly tourist behavior becomes acute in mass tourism settings, since the primary destination motivation for this consumer segment is low cost, and not necessarily an interest in natural beauty or cultural education. Also, large masses of people increase the amount of environmental stress from simple day-to-day activities, such as walking over vegetation, and they generate large amounts of non-biodegradable waste, for example plastic water bottles in hot environments.

Another case study from Oman demonstrates that distributive justice must be taken into account in allocation of finite water resources in order to achieve culturally sustainable tourism that does not negatively impact traditional activities such as farming, which contains a cultural component (the customs and rituals of agricultural life) as well as a strictly economic dimension.<sup>9</sup> Several inexorable forces are transforming modern Omani society, including the urbanization of Oman and migration to the city of Muscat, and abandonment of agriculture, such as date palm production in oases. Omanis have for thousands of years developed a complicated system of water capture and transport called falaj (plural aflaj), which still supplies 410 Million m<sup>3</sup> of water per year in Oman.<sup>10</sup> Most

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<sup>8</sup> A. Dłuzewska, *Direct and indirect impact of the tourism industry on drylands: the tourism industry example of southern Tunisia*, "Management of Environmental Quality: An International Journal" 2008, 19(6), p. 664.

<sup>9</sup> S. Zekri, M. Mbagha, A. Fouzai, S. Al-Shaqsi, 2011, *Recreational value of an oasis in Oman*, *Environmental Management*, 48, pp. 81–88.

<sup>10</sup> Zekri S et al., 2011, *op. cit.*, p. 82.

of this water is used in irrigated agriculture, but significant amounts are diverted for domestic, tourist and industrial use. If agricultural users neglect regular maintenance of this system or migrate elsewhere, then new water systems eventually will need to be built and new wells dug. Also, a decline in domestic agriculture from water diversion will necessitate more food imports, which are costly due to the continuing high price of transportation fuel. The full contribution of the many thousands of Omanis who maintain the traditional sluices, canals, cisterns, tanks and pipes of the falaj system is undervalued in Oman today, although five falaj sites were listed as World Heritage Sites by UNESCO in 2006.

In water scarce areas such as parts of Oman (the southern regions are well watered by monsoon rains), all human activity can cause water quality degradation due to agriculture, domestic use, and over pumping of wells which causes salt water intrusion and salinization of soils. If there is not sufficient rain water to flush out the salt from groundwater used in agriculture, salt buildup in soils becomes toxic to plants, and agricultural land must be abandoned. Ahmed et al. estimated that soil salinity problems in Oman in 2005 alone caused \$18.9 – 36.0 million USD in damages.<sup>11</sup> Increased tourist infrastructure which incorporates irrigated ornamental plants and green spaces will thus exacerbate the soil salinity problem. Therefore water policy and water allocation in regions such as Oman are obviously complicated questions that require competent cost-benefit analyses that examine long-term trends such as soil degradation. Soil degradation is a real phenomenon that has been measured directly as well as modeled extensively by computer programs in Australia and Canada<sup>12</sup>. A simple solution would be to accept the natural desert aesthetic of limited plant cover and dry soil and sand, and design hotel landscapes that reflect the local flora that exists on the limited rainfall or dew, instead of using imported plants that cannot live without being watered artificially.

The international food crisis of 2007–2008 which saw large spikes in food prices and bottled water in the GCC caused widespread concern about food security

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<sup>11</sup> M. Ahmed, N. Hussain, S.A. Al-Rawahy, 2013, *Management of saline lands in Oman: Learning to live with salinity*. In: *Developments in soil salinity assessment and reclamation: Innovative thinking and use of marginal soil and water resources in irrigated agriculture*, ed. S.A. Shahid et al., Dordrecht: Springer Science+Business Media B.V., pp. 265; N. Hussain, 2005, *Strategic plan for combating water and soil salinity in Sultanate of Oman for 2005–2015*, Oman, Ministry of Agriculture and Fisheries (unpublished).

<sup>12</sup> J.A. Dixon, D.E. James, P.B. Sherman, 1990, *Dryland Management: Economic Case Studies*. London: Earthscan Publications, pp. 241–303.

in the Gulf, and a re-examination of agricultural practices and water use. Qatar currently imports over 90% of its foodstuffs. Some Gulf nations responded to the crisis by purchasing land and land rights in water-rich countries (primarily Africa) to insure a reliable and secure supply of imported food crops. However, the long-term sustainability of these practices has been challenged, since some of these land purchases have been characterized as ‘land-grabs’ in which the farmland of poor indigenous farmers has been illegally appropriated or sold below cost by governments with unreliable claims to this farmland<sup>13</sup>. The food security issue underscores the regional and global interconnectedness of all areas of human development. For low population desert countries like Kuwait, Qatar and UAE, large scale tourism obviously puts additional stress on strained local food and water sources, and the natural environment from off-road vehicles, camping, and trekking.

Some concrete evidence does exist for the economic importance of maintaining biodiversity for both tourism and maintaining the health of ecosystems: using the example of Iceland’s whaling industry, Hudson and Lee have argued that preserving species for sustainable tourist practice, such as whale-watching in Iceland or Australia, can actually provide more value than commercially killing those same species for food and oil, which can lead to species extinction or threat of extinction<sup>14</sup>. Similarly, by banning the hunting of the nearly extinct Arabian oryx (*Oryx leucoryx*) in Qatar and the reintroduction of new herds now generates tourist dollars through zoos and an oryx breeding farm outside of Doha. Well documented in modern historical periods are permanent extinctions of various species caused by human hunting, introduction of invasive species, and habitat destruction, such as the Dodo bird (*Raphus cucullatus*) and Passenger Pigeon (*Ectopistes migratorius*). Also, the economically valuable Canadian cod industry was decimated by overfishing the Grand Banks, and completely collapsed in 1992–93 sparking a government moratorium on fishing. Ecological theories of niche and the food web maintain that life is one interconnected web in consumer-resource systems, and that breaks in the web such as mass extinctions of key species could present serious consequences for the human food chain. Due to the limited number of species adapted to survive in deserts, breaks in the food chain in hyperarid regions could be catastrophic and have been under-studied.

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<sup>13</sup> Oxfam, 2012, *Our Land our Lives: Time Out on the Global Land Rush*, London, Oxfam.

<sup>14</sup> K. Hudson, D. Lee, *Biodiversity and tourism: A valuable relationship*, “Social Alternatives” 2010, 29(3), pp. 39–43.

## 2.2. Cultural impacts of desert tourism

Desert tourism development has been implicated in potentially causing permanent cultural change to local populations and shifts in economic means of production (abandonment of farming, child begging, lifestyles revolving around tourist businesses, etc.). Hobbs argues that tourism may be encouraging sedentarization of the traditional Bedouin in Egypt.<sup>15</sup> Hobbs has chronicled the tourism boom experienced by the Khushmaan Bedouin tribe in the northern Eastern Desert of Egypt. The 1997–2005 drought forced the Bedouin either to enter the tourist trade or migrate to cities along the Nile or other tourist resorts along the Red Sea. Hobbs believes that continued drought along with continuation of tourist activities could prevent the transfer of indigenous Bedouin knowledge such as hunting, tracking, and desert survival from parents to children, and that “sustained drought combined with tourism impacts could take Khushmaan culture beyond a tipping point, depriving youth of traditional pastoral education and channeling them toward a permanent settled existence”.<sup>16</sup> Stafford Smith and others<sup>17</sup> have argued that in addition to lifestyle change initiated by tourism, several other factors increase the vulnerability of desert inhabitants – general poverty, since arid lands have fewer exploitable natural resources (with the exception of mineral wealth), and remoteness from population centers leading to economic exposure and lack of political voice. Thus laws and policies such as national tourism strategies that impact desert regions are often implemented by national power centers without consultation with locals, which has led to government conflicts with native Bedouins in the Negev Desert, Taureg and Berbers in North Africa and Morocco, and Bedouins in Jordan and Kuwait (specifically the bidoon or stateless persons). The most contentious and sometimes violent conflicts have involved resettlement of locals to make way for tourist projects.

Similar cultural concerns have been documented for the Bedul and Liyathnah tribes who inhabited the Nabataean and Roman ruins around Petra, Jordan before

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<sup>15</sup> J.J. Hobbs, F. Tsunemi, *Soft sedentarization: Bedouin tourist stations as a response to drought in Egypt's eastern desert*, “Human Ecology” 2007, 35, pp. 209–222.

<sup>16</sup> J.J. Hobbs, F. Tsunemi, 2007, op. cit., p. 209.

<sup>17</sup> M. Stafford Smith, , *The ‘desert syndrome’—causally linked factors that characterise outback Australia*, “The Rangeland Journal” 2008, 30(1), pp. 3–14; J. Davies, S. Holcombe, *Desert knowledge: integrating knowledge and development in arid and semi-arid drylands*, “GeoJournal” 2009, 74, p. 365.

they were removed by the government park service to a settled village.<sup>18</sup> As tourist numbers increased in Petra, more and more traditional inhabitants were drawn into tourism service jobs. Petra has also been experiencing serious built heritage problems: Tom Paradise studied two popular sites in Petra over a ten year period—the Khazneh and Theatre—“finding that touching, leaning and rubbing the surface of Khazneh have receded the surface by 40mm in less than 10 years, for the theater, markings of the stone masonry are continuously disappearing; less than 5% of them can be seen now”.<sup>19</sup> This alarming rate of destruction means that unprotected stone relief, engravings and inscriptions will disappear within decades. Moisture from tourists’ breath is also cracking the interior walls of sandstone caves and monuments in the park. Lubick also notes that neglect of the traditional water collection and diversion system in Petra (damaged in an earthquake in 363 A.D.) has increased flash flooding and damage to the bases of the sandstone monuments.<sup>20</sup> Intelligent and sustainable practice would dictate that the Nabataean water system should be thoroughly studied by Water Engineers and historians, and potentially restored to functionality to capture and divert rain water. Captured water could provide water for toilets (which are virtually non-existent in the park) and treated drinking water for tourists, and decrease damage to historical buildings. Water policy in Jordan, just as in the Gulf, is again a critical concern since “with 167 m<sup>3</sup>/capita/year, Jordan falls into the category of ‘absolute scarcity.’ The scarcity of water in Jordan is the single most important constraint to the country’s growth and development because water is not only a factor for food production but a very crucial factor of health, survival, and social and economical development”.<sup>21</sup>

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<sup>18</sup> A.S. Weber, 2011, *Bedouin memory between city and desert*, Memory Connection, 1(1), pp. 135-37; A.S. Weber, 2013, *Sustainable tourism in extreme environments: Lessons from desert regions*, in: *Proceedings of the 2nd International Scientific Conference - Tourism in Southern and Eastern Europe: Crisis - A Challenge of Sustainable Tourism Development?*, vol. 2, Opatija: University of Rijeka, Faculty of Tourism and Hospitality Management, pp. 430–31.

<sup>19</sup> M.H. Mustafa, S.N. Abu Tayeh, *The impacts of tourism development on the archaeological site of Petra and local communities in surrounding villages*, “Asian Social Science” 2011, 7(8), p. 90.

<sup>20</sup> Lubick N, 2004, *Petra: An eroding ancient city*, Geotimes, 2004, [http://www.geotimes.org/june04/feature\\_petra.html](http://www.geotimes.org/june04/feature_petra.html) [4 July 2014].

<sup>21</sup> M. Al-Alawi, 2008, *Desertification in Jordan: A security issue*. In: *Environmental Change and Human Security*, P.H. Liotta et al. (eds.), (pp. 81–102), Dordrecht: Springer Science+Business Media B.V., p. 92.

### **3. Conclusion and Recommendations**

Table 1 below summarizes the major desert tourism challenges and suggested solutions. Due to the well known destructive examples of deliberately introduced invasive species such as cane toads and rabbits in Australia, the author in general does not support human intervention in land regeneration and prefers leaving nature to correct any imbalances. However, deserts may require human assistance to regenerate, such as artificial breeding of endangered animals and returning them to their former natural habitat or re-establishing native plants that stabilize soils and retain moisture. Also, heat, drought and salinity tolerant plant hybrids, such as Jojoba plant used in India which stabilizes soil and produces commercial oil can be used to mitigate tourist impacts in Drylands and help return them to their natural state. Windbreaks and man-made dune stabilization may also be beneficial and the problems of wind erosion, advancing dunes, and desert micro-climates require much more additional scientific study.

In addition, preserves and exclusion zones, management of herd sizes, and limits on water use – which require enforcement, education, and negotiation with local stakeholders – can also be integrated into rational sustainable tourism management schemes. Unfortunately, many desert dwellers, especially those maintaining a semi-nomadic existence, are hostile or indifferent to urban elites and government agencies since they feel neglected in the distribution of state goods and services such as roads, wells, and social welfare and education. Thus many small-scale tourist enterprises are locally controlled with little interference from government agencies, a situation with both advantages and disadvantages. The obvious advantage is that locally run establishments are better adapted to their environments and more sensitive to challenges and constraints of their particular tourist locale, including very important cultural considerations involving Muslim attitudes towards alcohol and pre-marital and extra-marital behaviors. Disadvantages include the fact that national policies and regulations that protect both operators and tourists and which promote sustainable tourist practices are difficult to implement, and sound management and oversight becomes logistically difficult when factored into transportation and communication problems in remote regions. Remoteness (limited accessibility) in and of itself was cited as a key obstacle in desert tourism development, along with harsh physical

conditions, poor infrastructure, and limited and untrained manpower in Krakover's study of sparselands tourism in Israel's Dead Sea area.<sup>22</sup>

Table 1

Summary of Desert Tourism Management Problems and Recommended Solutions

Desert Tourism Problem	Recommended Mitigation Strategies
Flora and fauna fragility	Off-limits and protected zones; restrict travel to marked trails and roads only; rotate fallow regions; temporary off-limits zones during breeding; patrols and fines for hunting or damaging wildlife; artificial breeding and reintroduction of indigenous plants and animals
Slow biome regeneration	Fallow areas; limited entrance; permits; environmental education; required video viewing on responsible tourist behaviors before entering parks
Landscape destruction	Initial environmental impact assessment, including natural aesthetics; ban or limit activities such as camping, open fires, collection of natural objects
Water scarcity	Desalination, pumped ground water, rain water collection, dams; limit entrance to day trips or water carried in by tourists; building codes requiring water saving technologies; research into renewable energy desalination
Water competition	Engage farmers, ranchers, government agencies, and tourist developers in discussions on equitable water distribution
Local culture change	Engage local leaders; education on tourist impacts on culture; government subsidy of traditional local cultural activities

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<sup>22</sup> S. Krakover, 1985, *Development of tourism resort areas in arid regions*. In: *Desert development: Man and technology in sparselands*, Y Gradus (ed.), (pp. 271–284), Dordrecht, D. Reidel Publishing Company.

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## **TOURISM IN HYPERARID (DESERT) REGIONS: PRIMARY CONCERNS FOR DEVELOPMENT**

### **Streszczenie**

Recently a couple from the State of Qatar died of thirst when their car overturned in the Rub al Khali desert south of the city of Doha. Although this region contains stunning natural beauty, including unusual fauna and biota, oases, sand dunes, and unique geomorphology, the Empty Quarter (Rub al Khali) desert is still a forbidding and extreme environment which must be explored with extreme caution. Drylands and deserts, defined by the ratio of precipitation to evapotranspiration, cover approximately 40-50% of the world's surface (including the dry Polar regions); thus they represent an important and underutilized tourist resource. This study reviews the challenges of developing the desert regions of MENA and the Arabian Gulf for sustainable natural and cultural tourism and the potential strategies for utilizing their unique gifts while at the same time maintaining their fragile existence. Deserts do not regenerate quickly and human impacts can remain and degrade these biomes for decades. Thus planners must determine whether mass tourism, niche market (adventure or extreme), or other strategies are appropriate, and the policies to prevent the destruction of the unique environmental features of these locales. As case studies of both successful and harmful projects in Jordan, Egypt and the UAE have demonstrated, desert tourism can be either beneficial to national GDP, local stakeholders, and international tourists, or, on the other hand, harmful to the environmental, socially divisive, and unsustainable in the long term. A general consensus is emerging among tourism researchers that in order to productively add value to an economy and nation, tourism must be sustainable: it must take into account both short and long term environmental effects as well as the impact on local communities. Although seemingly counter-intuitive, lessons learned from sustainable extreme environment tourism development can be applied to all regions of the world, including water-rich tropical zones.

**Słowa kluczowe:** Sustainable tourism, drylands and desert tourism, extreme environments, Middle East and North Africa (MENA), Gulf Cooperation Council (GCC)