

# Qeshm Island of Iran, Natural Academy of Geotourism Development

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## ABSTRACT

Geotourism is one of the specialized branches of tourism, which has been recently widely considered, and identifies attractive geological phenomena and their tourism merit. Iran is a country with a beautiful nature, diverse climate, and regions full of exclusive geological phenomena, study of which is necessary to identify them. Beautiful Qeshm Island, having a valuable geoheritage such as Namakdan salt dome, the biggest salt cave of the world, wonderful erosion phenomena such as Strait of Chahkuh, Stars Valley and ... as well as biodiversity, cultural and historical diversity, brought together a precious collection which is unique in the world. Collection of these attractions in Qeshm island as the first geopark in Iran and the Middle East, and since this island is located in the strategic area of the Persian Gulf made this island be important in national and international societies, and can be called the gateway to Iranian geotourism. In this paper, after providing theoretical concepts, geographical, geological details and ecotourism and geotourism potentials of the island are introduced, and some solutions are provided for geotourism development. The methodology of research is of descriptive-analytical type and the information gathering method is based on library studies, analysis of satellite images and field studies.

**KEYWORDS:** Geotourism, Qeshm Island, Natural Academy, Strait of Chahkuh, Stars Valley.

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## 1. INTRODUCTION

In recent years, geo-tourism industry has, in different aspects especially economic interests, turned into one of the main pillars of development so that many authorities believe that tourism will turn into the dominant industry within the next years and will have various economic and social effects (Bayati Khatibi, 2010). As regards its vocation-creating nature and relatively fast profitability, tourism is regarded as a suitable field for foreign investment; it can also elevate economic criteria and introduce new ideas, technologies and markets (Papeli, 2011, p.70). Being one of the subcategories of tourism, geo-tourism is regarded as one of the new methods of presenting tourism attractions and has devoted to itself a major part of tourism studies (Servati, 2008). Iran has a beautiful nature, varied climates and regions filled with unique geological phenomena, study of which seems essential for more knowledge of them and geo-tourism development (Yazdi, 2012, p. 35). Iran is regarded as one of the few world countries enjoying various beautiful natural and geological phenomena, and Qeshm can be regarded as a gate for entering Iran's geo-tourism. Possessing varied and unique geological as well as biological phenomena, this vast island has a great potential for being turned into a major ecotourism and geo-tourism center in the Persian Gulf (Amri Kazemi, 2004, p.14). In this paper, having presented fundamental concepts, we will delineate unique attractions and geological heritage of the geo-park and Qeshm Island for the purpose of geo-tourism development as well as stable development.

## 2. Research method

This article is applicable and developing survey and the research method is descriptive-analytical. Accordingly, various kinds of library –documentation studies, interpretation as well as satellite images analysis of some studied areas, field studies, direct observation and survey of phenomena are used particularly from geotourism perspective.

## 3. Theoretical Research

### 3.1. Geotourism Concept

Geotourism or land tourism is considered a relatively new concept in tourism industry that has gained a considerable growth and attention in the recent decade. Geotourism has defined boundaries that geological tourism is on its spotlight (Newsome & Dowling, 2006, p4) and surveys the problems and complications associated with the land, geomorphologic situation, tectonic phenomena as well as their tourism capacity. From the viewpoint of Gates (2006), Geotourism means "Tourism in geological perspectives". In Newsome and Dowling words, Geotourism is a part of land associated with geology, geomorphology and natural landscape resources as well as available forms on the land surface, fossil-containing layers, rocks and minerals according with the emphasis on understanding the underlying and shaping processes of these complications (Newsome & Dowling, 2006, p5). Moreover, it can be said that Geotourism is an informed and responsible tourism in the nature with the aim of observation and understanding of geology processes and phenomena as well as learning how they shape and progress (Amri Kazemi, 2009).

### 3.2. Relation of Geotourism and Ecotourism

Some consider the professional branches of Geotourism as one of the Ecotourism sub-branches but from the viewpoint of the writer, these two kinds of tourism are based on the nature and are parallel not subset. If we divide the nature to two sections of animate and inanimate, Ecotourism includes the study of animate nature and its attractions and Geotourism studies inanimate nature and its attractions. Therefore, tourism can be divided to two sub-branches of Geotourism and Ecotourism. According to the above matters, it is determined that these two kinds of tourism are a set of tourism that is dependent to the nature which are not sub-branch of each other. The main difference of these is that Ecotourism is focused on the living organisms and plant and animal living environment. But Geotourism mostly involved with geomorphology and geology phenomena and indeed the inanimate nature and its evolution.

### 3.3. Concept of Geosite

Geosite is a place with rare forms and attractive processes of geology and geomorphology. This is while the tourism infrastructures such as accommodation, access roads to Geosites, and the related management to that attraction and so on are considered for that area.

Geosites are mainly divided to two groups: those that outcrop as natural or synthetic forms of special geology and geomorphology within the open boundaries limitations (Hose, 2006) and the other is Geotourism access centers in confined spaces like Earth Sciences Museum and etc. The other term that is equivalent to Geosite is German word of Geotope (Sturm, 1994).

### 3.4. Concept of Geopark

Geopark means Geology Park in word and it is said to a geographical area with determined borders in concept that has one or more special or unique geology phenomena as well as significant natural and cultural attractions in the available area. This set should affect the economic development of the region and has special protective measures and programs as well as complied management plans (Amri Kazemi, 2006). Also, in the range of Geopark, we can find a group of Geosites.

Geoparks are a part of universal net and can have an important role in the country's economy and have a vast effect on sustainable development with tourism boom especially Geotourism. Therefore, each country or area that has ancient history and attractions as well as geology effects, will has a suitable potential in development of this industry.

### 3.5. Geosites, Geoparks and Sustainable Development

Universal commission of environment and development was held in 2009 in the conference of "Our Common Future" and defined sustainable development as: a development that meets the needs of the current generation with no harm to the need of the next generations (Khosh Raftar, 2012, p21). Sustainable development is a new era that pays attention to politic, culture, economy and business simultaneously (Bahram Zade, 2003) and stresses on economic, commercial and industrial boom.

Sustainable development is one of the important requirements that have a main role in tourism programming. According to a Declaration of WTO, this growing industry has gained the third rank in 2000 international trade (Yavari, 2011). Therefore, countries that have various geomorphological and ecology affects and do the necessary affairs for universal record of their potential Geosites and Geoparks in the universal heritage list of Geoparks, can be more successful in attraction of tourist as well as its economic returns.

### 3.6. Types of Geological Phenomena Considered as to Geotourism

Geo-sites or geological phenomena can be classified into three types as regards their importance and value: regional geo-sites, national geo-sites and international geo-sites. Regional geo-sites are those phenomena for which there are similar samples in other parts of the country and are not unique. National geo-sites are those sites for which there are no other similar samples and are nationally unique. Also, international geo-sites are considered as the best types of genotypes and as one of the few phenomena of this type in the world as well. They have the chance of being included in the list of UNESCO geo-parks, leading to the international development of tourism and attracting foreign currencies for the related country.

## 4. Discussion

Nowadays, geo-tourism presents to the visitors some information beyond geological beautiful attractions and has direct and important effects on elevating cultural, social and economic status, also on creating vocations for the regions in the vicinity of geo-site sand geo-parks and on state's tourism incomes. Geo-parks attract visitors and lead to the development of local economies and creation of new vocations (Zun and Milay, 2002). Hence, Qeshm Island is studied for possessing the first geo-park of the Middle East as well as various historical, cultural and ecological specialties. Especially, as a result of the necessity of meeting special standards required for geo-parks and also gathering a large variety of geological attractions and the likes, in this Island, it is considered as a natural school for developing geo-tourism.

## 5. Qeshm Island Location

Being like a dolphin in form, Qeshm is the biggest Persian Gulf Island located parallel to Iran's southern coasts, in Hormoz Strait, between the latitudes of '32°26 and '59°26 north and also longitudes of '15°55 and '17°56 east, with

an area of about 1600 square kilometers. Being unique in its type, this Island contains a series of geological, ecological, historical, cultural and natural attractions as well as the first Middle East geo-park. Qeshm geo-park was introduced in 2003 and 2004 and was considered as the UNESCO's global network geo-parks, as of March, 2006. This Island is 130 kilometers long, with the average and maximum widths of 10 kilometers and 30 kilometers respectively. The highest point of this Island is located on the salty dome of Namakdan, being 400 meters high. From among those Islands bordering Qeshm, one can refer to Hormoz, Hengam, Lark and small Islands of Naz (Fig.1).

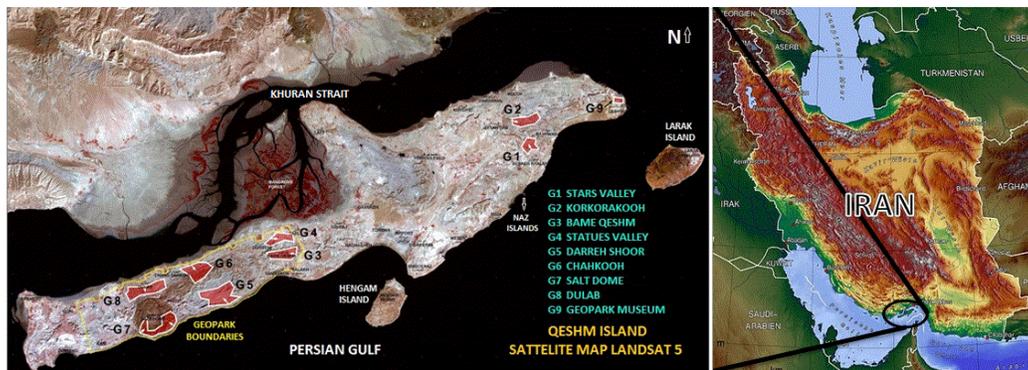


Figure1. Qeshm Island status in Iran and Geosites of this Island, using Satellite images of Landsat- 5

## 6. Geology and Stratigraphy of Qeshm Island

Based on the tectonic and sedimentological signs, Qeshm can be considered as the southern part of the Zagros Mountains. Form similarities and the alignment of Qeshm's large anticlines with Zagros anticlines bear witness to this claim. Effects of the salty dome of Namakdan on the western part of Island are quite clear and have caused some morphological and tectonic changes to this part of the Island (Amri Kazemi, 2004, p.19). The oldest formation one can see in the Island is related to the Hormoz series, having been resulted by the function of salty dome of Namakdan; yet, it is not considered as one of the main formations of the Island, but it is carried up by the pressure forces of the salt (diapirism). Its average age is estimated to date back to the middle Cambrian.

Other main formations of this Island include: Mishan formation dating back to the late Miocene, Aghajari formation dating back to the late Pliocene, Qeshm lime dating back to 25 to 30 thousand years ago, Dulab conglomerate dating back to the early Holocene, Suza sandstone dating back to 4 to 5 thousand years ago and the late Holocene sediments (Samadian, 1990).

## 7. Characteristics of Qeshm GeoPark

Apart from Namakdan salt cave, being the largest one among the world caves of its type, there are other attractions found individually in this Island such as erosion phenomena, Hara forest, salty dome, etc. that are found in other regions of the world and Iran. What turns Qeshm into an exception and registers it in the list of other world's geo-parks, is the presence of a series of such phenomena in one Island; what seen less in other parts of the world. Valuable Qeshm attractions are to be categorized as follow: natural and ecological attractions, geological attractions, common geological-ecological attractions and historical-cultural attractions (Amri Kazemi, 2012, p. 54).

### 7.1. Qeshm Natural and Ecological Attractions

Qeshm Island is a collection of a variety of animals, birds, reptiles and marine lives. From among nearly 70 types of birds living there either aboriginal or as migrants, one can refer to cranes, pelicans and white hawks. From among the mammals, one can allude to gazelles and foxes. Also, there are 50 species of bivalve mollusks, Gastropods, Cephalopods, Echinodermata, crabs, corals, various types of shrimps, jellyfish, etc. in the coasts and waters of Qeshm. Presence of a kind of fish named Gel Khorak (Mud Skipper) in Hara forests has increased the animal attractions of the Island. There is a great variety of the fish types in the waters surrounding the Island and various types of fish of commercial and beauty uses, sharks, grey dolphins and a type of whale, 12 meters long, are seen. Also two rare species of sea tortoises (eagle tortoise and green tortoise) lay eggs in the vicinity of Namakdan Mountain (Amri Kazemi, 2004).

Most of the notable attractions and phenomena in Qeshm Island are created under the effects of the erosion caused by winds, rains, sea waves, humidity, etc. Abundance of loose layers and sections made of marl and silt being alternated with harder layers and affected by erosion, have created very beautiful forms to which we will refer below:

**7.2.1. Chahkuh Strait:** This strait is located 84 kilometers away from the west of City Qeshm, in the vicinity of Chahu village and has 2 valleys one stretched from the north to the south and the other, from the east to the west. Walls of this strait are made of an alternation of silt, lime, calcareous sandstone and red marl. Under the effects of water erosion in a karst environment, in this region, there are some beautiful groove-like forms as well as spherical, spoon-like and lentiform holes produced, exhibiting a scenic and wonderful morphology (Fig. 2&3). The entrance to this valley is u-formed, being gradually narrower at the end and getting similar to the letter "V". Some ancient wells have been dug at the beginning of the valley by the aboriginals of the region, for reserving potable water (Fig. 4).



**Figure 2.** Scenic shapes caused by erosion, in Chahkuh strait (northern-eastern valley).



**Figure 3.** Beautiful shapes caused by erosion, in eastern-western strait of Chahkuh.



**Figure 4.** Entrance to Chahkuh strait and wells for reserving potable water.

**7.2.2. Tang-e Ali Strait:** Geosite of Tang Ali Strait, with a northern-southern direction, is located at the west of the Island and South of the Eastern Chahu village. Northern entrance to this strait is located in the vicinity of Eastern Chahu village and its southern end part ends to the salty dome. Walls of this strait are made of an alternation of clay, marl and calcareous sandstone. As a result of flood water and water dissolution and erosion, some beautiful scenes are created in the forms of small and large parallel grooves, and crescent-like, spoon-like, spherical and blade-like forms, in looser layers and parts of clay and marls (Fig. 5). In the walls of this valley, there are many cracks seen that might be caused the bordering salty dome. The entrance to this strait is wide and its end is narrow, beautiful and exciting.

**7.2.3. Stars Valley:** Stars valley is located 5 kilometers away from southern coasts of the Island, north of Village Berke Khalaf. This region includes some most beautiful geo-morphological forms and terrains created under the effects of severe erosion caused by surface waters and seasonal showers in alluvial lynchets. These conditions have led to the producing of significant masses in the forms of strip walls, sharp cones, columns and blades (Fig. 6). The above-mentioned terrains are mainly made of sandstones, loose calcareous cement and a high percentage of fossil shells.



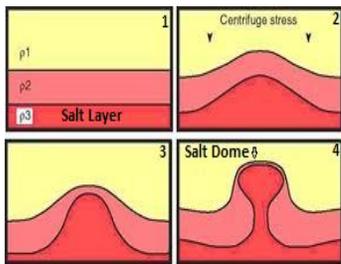
**Figure 5.** Beautiful scenes of erosion in Tang Ali Strait.



**Figure 6.** Wonderful shapes and masses caused by water erosion in the geosite of stars valley.

**7.2.4. Namakdan Salt Dome:** The reason for the creation of salt domes, such as Namakdan salt dome, is noteworthy. In the regions where some thick layers of salt are placed underground, if there are some weaknesses in the upper layers including thinness, cracks, faults, etc., a heavy mass of salt, being lighter and more flexible, uses this condition and moves up. It then surfaces the earth, lifts all of its layers and leads to some major changes in the structure forms of the region (Fig. 7). In 1988, Reiss et al. carried out some studies for assessing the uplift rate of alluvial lynchets in Qeshm Island. Their studies showed an annual rate of 2/0 millimeter. This rate has been higher around the salt dome of Namakdan, having reached an annual sum of 6 millimeters (Amri Kazemi, 2009, p.22). This dome is located to the south of the Island.

**7.2.5. Namakdan salt cave:** This salt dome contains some salt caves, namely the longest world's cave being more than 6 kilometers long. At the entrance of the cave, a basin is located, 20 meters long, whose water volume depends on precipitation. The cave walls are formed of colorful salt strips and ferrous ores of hematite and oligist, giving it a special beauty (Fig. 8). Also Stalagmite, Stalactite and crystallized salts, present in the cave, have added to its beauties (Fig. 9).



**Figure 7.** Stages of the formation of Namakdan salt dome.



**Figure 8.** Colorful salt strips, hematite and oligist in Namakdan cave.



**Figure 9.** Beautiful salt Stalactites in Namakdan cave.

**7.2.6. Salt spring:** As a result of the penetration of precipitation water into the cracks and crevices of the salt dome and high dissolution rate of salts and other dissolvable substances into the penetrated waters, and finally the outflow of supersaturated water from other points in the form of springs, a large part of these salts settle in the beautiful cauliflower-like, kidney-like and blade-like salts forms to the edges of these springs. Then, red hematite compounds settle on the beds of the brooks and exhibit quite exciting scenes (Fig. 10).

**7.2.7. Bame Qeshm (Qeshm's roof):** Bame Qeshm heights are situated in the western part of the island, between Bandar Salakh village and Tabl village. As it is the widest height of the island and above which the unique surrounding perspective can be seen, it is named Bame Qeshm (Fig.11). Its high parts consist of hard limestone containing a plenty of shells and its slopes are formed of loose eroded sandstones, marl and silt. Hara forest, Persian Gulf coasts and eroded novel perspectives to the south, called Tandis,ha valley (literally meaning statutes valley), are from among the noteworthy attractions of Qeshm Geo-park. In this region, erosion has carved some scenic statutes out the stones, producing a beautiful perspective in the region (Fig. 12).



**Figure 10.** Beautiful display of hematite and salt deposits of salt spring near the salt dome



**Figure 11.** Landscape of Bame Qeshm, highest part of the island



**Figure 12.** A sample of beautiful statues as a result of erosion in statues' valley

**7.2.8. Kaseh Salakh (Salakh bowl):** At the southern coast of the island, an area known as Barahut is placed with approximate length of 7kilometers and width of 5kilometers with no plants while small and large conical hills with beautiful attrition forms are placed there (fig. 13). In Kargah area that is placed around Salakh gas field and Salakh anticline core, a boiling spring (artesian) with relatively warm water has been seen that has a combination of salt, sulfur and H<sub>2</sub>S gas with unpleasant smell.

**7.2.9. Doolab:** It is a vast area of alluvial origin as river residents and fan alluvial while its sediments in Qeshm Island can be observed only on Basaeid and Salakh anticline confluence that is started from 1 kilometer of the north of Namakdan salt dome and continued to the north. Doolab conglomerate formation is considered as a part of this region. Some seasonal rivers are available in this area that is created by marl layers and sand marl and sometimes their depth reach to 10 meters.

**7.2.10. Koorkoora Kooh:** in the northern part of Qeshm Island, another Geosite is available with the name of Koorkoora Kooh that is located besides Giyahdan village. This region mainly consists of marl. Therefore it is affected by erosion caused by floods and rains and created beautiful forms in the valleys of this region (figure 14).

## 7.2. Common Attractions of Biological Geology

Hara forest and coral colonies are some attractions that are placed in this group.

**7.3.1. Hara marine forests:** it is created around 200 square kilometers in Tange Khoran region, between the north of Qeshm Island and Khamir port (picture 15). Mangrove species are trees in sizes 3 to 6 meters that its scientific name is attributed to Iranian scientist, Abu Ali Sina as *Avicenennia Marina*. These trees are salty and their main part downs in the water when sea is in high water form. The leaves of this tree absorb the sweet part of the sea's water and extract its salt. Because mangrove forest has suitable ecological condition, it is always considered as a safe habitat for variety of tropical birds, mollusks, crustaceans and fishes while its detailed study should be done later.



**Figure 13.** Salakh bowl region in Qeshm island.



**Figure 14.** Morphology of marl Geosite in Koorkoora Mountain.



**Figure 15.** A part of Hara beautiful forests in Qeshm island.

**7.3.2. Coral colonies:** Coral colonies have been seen in Shib Deraz region, located in the south central part of island and also in the waters of south and southwest that has diversity of species and beautiful colors. These colonies influence on the situation of surrounding area's water that creates a small ecosystem that is effective in the life of many organisms and attract the attention of a lot of researchers (Amri Kazemi, 2012, p 56).

### 7.3. Cultural and Historical Attractions

Qeshm Island has several monuments such as Koorbas cave, Tala wells, Portuguese fortress, historical cemeteries and etc.

**7.4.1. Koorbas cave:** at 12 kilometers of Qeshm city, in the side of south road, Koorbas caves are located within a clay-marl valley which overlooks the sea and Mian Kase weald. According to the material of the cave walls that are mainly from loose rock (marl and silt), it seems that these holes and caves are firstly created by erosion and later expanded by natives and made larger (fig. 16).

**7.4.2. Tala (Tal water) wells:** at 30 kilometers from the north of Qeshm international airport, in the entrance of Loft village near Naderi castle, several water well's rings has been seen in the crater of hillside that were drilled via the region's natives in Achemenid and Zoroaster era in schist ricks of this region for saving the rain's water. Since the foundation of stone in this area is from plaster layers that cover the bottom of these wells, water remains cool in them for a long time. It has been said that the number of these wells were drilled 366 rings as the number of leap year but some were out of worked and some still remain (fig. 17).



**Figure 16.** Span of Koorbas ancient caves in Qeshm island.



**Figure 17.** Tal water (Tala) ancient wells for saving drinking water.

Some of other momentums are Pey Posht bridge (Sassanian), Goran bridge (Achemenid), Portuguese fortress, Naderi castle, Venus temple and etc.

## 8. Conclusion

All of the mentioned discussions in theories and findings of the research suggests that Geopark and Qeshm Island has a high potential and capacity for developing Geotourism according to the universal importance of Geotourism. Diversity of attractions, landscapes and geology natural heritage like erosion phenomenon in Geosites of ChahKooch strait, Star valley, Tang Ali Strait and..., Hara forests, Namakdan salt dome as the largest salt cave of the world as well as cultural and historical attractions like Koorbas cave and Tala wells and other ancient, tourism, pilgrimage attractions and low diversity of bio such as birds, fishes, animals and reptiles makes a unique set in the world. Maybe each of these matters in different places of the country and world found lonely but a set of these attractions in an island is unique and is considered as a strong potential for making this region to one of world Ecotourism and Geotourism poles and an original environment for research of different natural sciences to step ahead according to stronger foundation resulted from scientific researches' findings towards Geotourism scientific development in this region besides tourism discussion, transfer of scientific concepts of phenomenon and Geosites to visitors. In such a situation, Geoconservation (protection of geological phenomenon) via tourism are well done and besides economic development gained by nature-tourism find its real meaning. In the regards, Qeshm Geopark and island can be a natural school for achieving the above aims and an environment for implementing them as well as direct effect in economic sustainable development of the region and country.

## 9. Suggestion

Regarding Geotourism development in Qeshm island as well as management empowerment in this field, the following matters are suggested:

- Foundation of professional museums in mining, fossils, animals and plants as natural science museum.
- Creating professional Geotourism tours for interested ones in the earth science and tourists in this field in tourism agencies via training the managers and employees of these centers.
- Creating Qeshm Geotourism database for international Geotourists.
- Determining Qeshm Island as a regulated center of cultural, economic and commercial exchanges of the country in the region of Persian Gulf.
- Expansion the culture of geology conservation regarding sustainable development.
- Preparing training and documentary films regarding more identification of these attractions and providing the culture for protecting them.
- More expansion of land, sea and air communication network of Qeshm Island with national and international centers for more booming of tourism in this region.
- Providing suitable platform for investment in the private sector in Qeshm Island regarding UNESCO organization's programs and policies for Geoparks.
- Protection of the residents of Qeshm island Geosites for producing and providing local products and providing welfare, shopping and entertainment centers and etc.
- Establishment of Geotourism exhibitions and introducing Qeshm island capabilities in different parts of the country.

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