

MANAGEMENT OF WATER SOURCES AND TRADITIONAL DEVICES FOR SUPPLY OF SUITABLE WATER IN THE QESHM ISLAND (HORMOZGAN)

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ABSTRACT

Water, this holy element is the cause of life for all living beings on the earth. With the existence of regions with little rain fall, gaining the technology to access water, this element of life, calls for great struggle, something that was accomplished by our ancestors, relying only on the primitive technology of their time.

Existing dams, pool (Berke), aqueduct (Qanat) etc., in Iran speak of the hard work of our ancestors to manage supplying water. This important task can be seen in the Persian Gulf, especially in Qeshm Island.

Opportunity techniques to access water and its distribution management in the hot and humid weather conditions of this Island, with average raining of 200 mm. yearly, by were developed hundreds of years ago by intelligent architects. Unfortunately with the arrivival of modern technology with its values, these old techniques were not only abandoned but also we witness of their destruction at the moment.

In this article, traditional water sources of Qeshm Island like pools (Berke), dams, Koleghs (large holes in hard rock), ox-wells and techniques of their operation are explained.

Also we will speak about the land – sea project to supply water form Bandar Abbas to Qeshm Island.

Finally, we have some suggestions to protect, repair and operate traditional water sources.

1– GEOGRAPHICAL SITUATION

Qeshm Island is the largest Island in the Persian Gulf. It has an area of 1445 km², it is near to Hormoz strait, with geographical coordinates of 26, 45' north latitude and 55, 47' east longitude, which is located in the south of Bandar Abbas.

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Form the climate point of view, this region is hot and humid. The average humidity and rain is 63 % and 200 m.m. respectively. There are mountain at different distance of the sea-side. The highest point of the Island is on Kish Kouh mountain at a 350 m. height. This mountain is known as Namakdan, because it contains of salt.

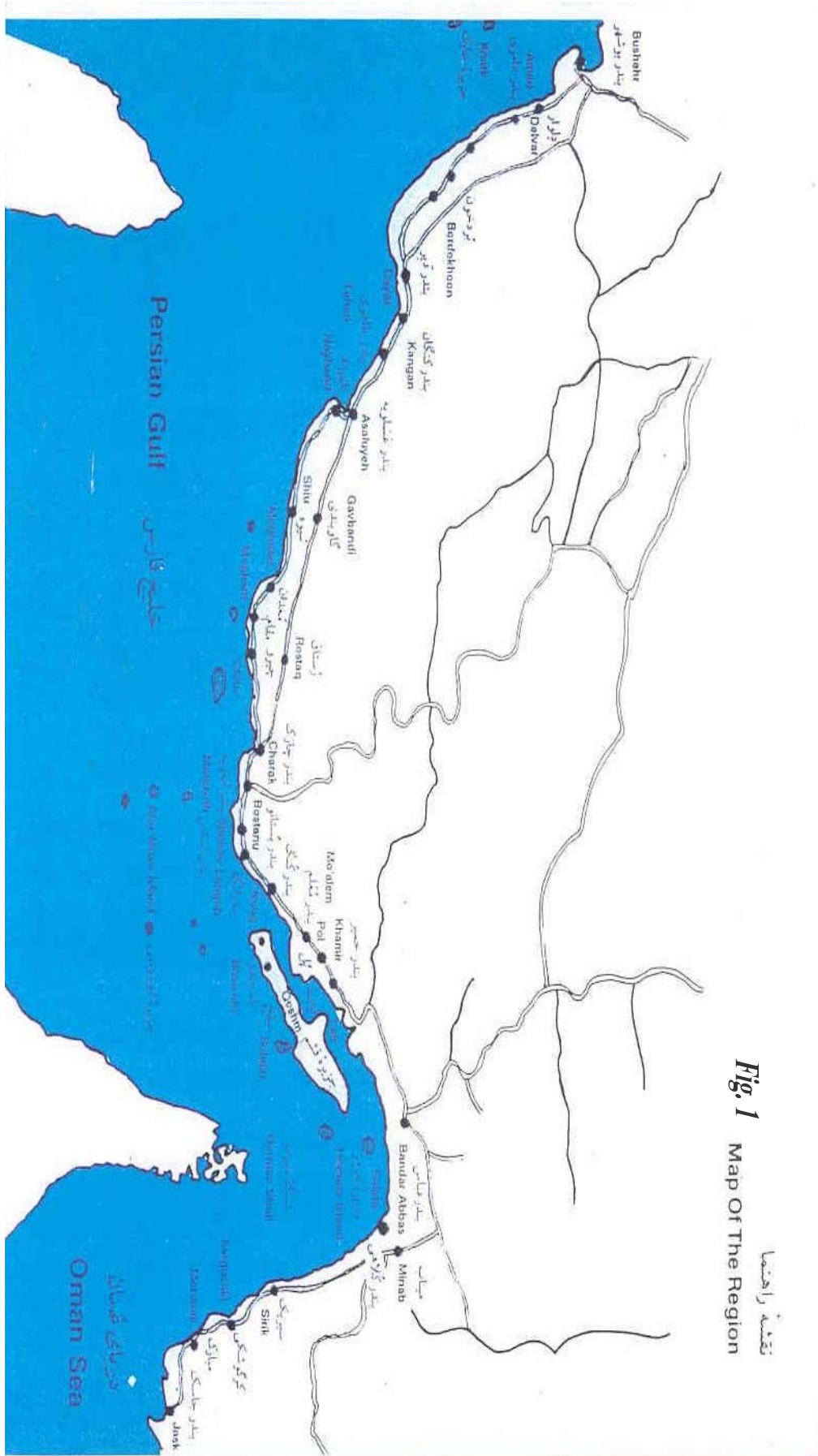
2- GEOLOGY

Qeshm is formed of the young formation belonging to the Cenozoic period. In the west,the Hormuz formation (salt plug), is the oldest formation of the Island. Other formations are Guri limestone, Mishan marn, Aghajari (marn and sandstone), Pliocene conglomerate (fossiliferous) and Quaternar alluvium (Tourian plain).

3- PLANT COVERING

Qeshm Island, according to climatology division is situated in the tropical region, it means that it contains tropical forests.

This Island form the plant covering point of view, is very poor, the reasons are various, including windy and water surface erosion, presence of sand, low depth of humid soil, and other factors like lack of rain and, tropical weather.



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Fig. 1 Map Of The Region

Important plant species are lotus, sacred fig tree, sun flower, silk – tasseled acacia, tamarisk and mangrove (Hara).

One of the special view of the Island is mangrove forest (hara). This plant is able to make sweet water from salty water of the sea and use it. This type of plant grows between Laft (in Qeshm) and Pul port in the north-west of Qeshm.

4- HISTORICAL BACKGROUND

The name of the Island varied in different times of history, Borekhat, Kavan, Kish, Laft, lar, Byseedo, Keshm, Jask and Qeshm are among them.

Form 3000 B.C or 8000 B.C, Elamites were dominant in the area.

After words Persian Islands were controlled by the Achaemenians, Arsacides and Sassanides dynasties.

During Sassanide dynasty, Tel-Bala and Dem dams were constructed in the north-west of Qeshm.

During the Safavid dynasty. different buildings, dams and Ox-wells were constructed in Qeshm.

5- AGRICULTURE ECONOMY

In this area due to the little rain-fall and shortage of suitable water, agriculture is limited, and mostly is done through dry farming.

The agricultural products of this region include orange, lemon, onion, tomato, dates, etc.

The most important reason for non existence progress and development of agriculture is lack of suitable water.

The reasons for lack of suitable water are little rain-fall, topography and geographical situation of the island.

6- HISTORICAL OBSERVATION OF HORMUZGAN PEOPLE TO WATER

A- Achaemeni and Sassanide periods

When Arian tribes arrived in Iran and settled in Persian Island, as Qeshm, for compensation of suitable water, they made dams and reservoirs.

During Achaemenidae dynasty, they constructed great storages of water, for example in Khoush –Ab, Laft, Kherbes.

During the Sassanide time, great dams like Tele –bala and Dem were constructed, remains of which are still visibility on the north-east and north-west edge of Qeshm.

B- Safavid period

Safavid period is dehiscence era of Iranian architect are in the construction of bridges (Latidan), dam (Goran) and water storages.

In this period water storges has constructed in the form of berke (in the shape of circular or linear). This type of water storage have been used for collection of raining water.

At present more than 300 brekes are present in this Island; which most of them are used by native people.

In the same time suitable water from Qeshm Island was carried to other Islands like Larak, Hengam and Hormuz.

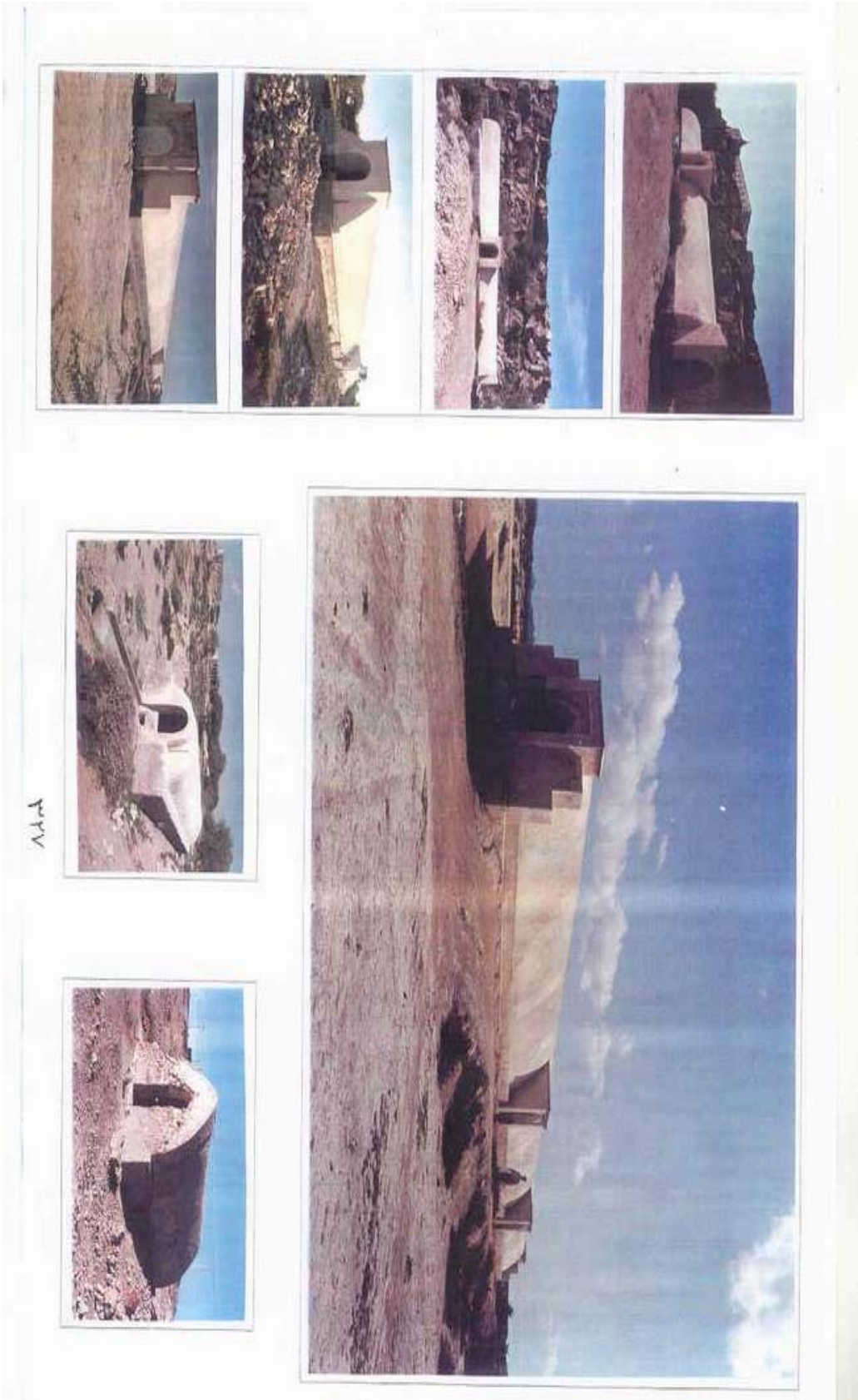


Fig. 2 :Berke

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C- Contemporary period

When modern machinery arrived in Qeshm for the construction of dams, huge changes took place in this area.

At present more than 100 dams are present in this region.

Water authority organization of Hormuzgan in 1983, using modern technology and machinery has constructed soily dams in Khalesy and Payposht regions of Qeshm.

7- OPPORTUNITY METHODS TO REACH SUITABLE WATER AND DISTRIBUTION MANAGEMENT FOR DRINKING WATER AND AGRICULTURE

Special condition of Iranian Islands due to little rain, absence of permanent surface water and lack of ground water aquifer, and from otherside increase of population, the reasons for the people to use different methods of opportunity to water.

Water establishments like, Kolegh, berke, well, water parting, will described as below:

7-1- KOLEGH:

Kolegh are exposed pools, which are either naturally or dug in the hard ground by people. There are also called Berke by native people. Koleghs are primitive form of Berke. The water from rain is stored here, and people use it for drinking, also it is used for animals. Some examples of Kolegh can be found in, Koleghan hill and Laft. This form of storage belongs to the Media and Achaemenian period.

7 - 2 - BERKE:

In Hormuzgan province and Persian Gulf Islands, we can see some structures, which are used as storage for rain water, and can be used in time of water shortage.

The name of this structure is Berke. These berkes are important structures in the region. These simple and beautiful buildings are about 300 in number, have been built different sizes.

Most berkes have been built by help of charitable (benevolent) people.

They are built in circular or linear forms and made by coral rocks and mortar (colled as Saruj). Unfortunately at the moment due to modern life and developing of the cities, most of houses have sewage systems and they are emptied in berkes, therefore some of them are useless.

Some are historical berkes which are belong to the Safavid period, are still usable, for example Sha-e-shahid or Be-be. Berke is made of different parts including, storage, setting canal, water canal, roof, trap doors for taking water, (elements which belong to religious and social believes of the people of the region).

For taking water and sharing it, there is a custodian of water. The custodian distributes the water of berkes to between all families according to the number of people in each family. He cleans the berke with the help of the inhabitants.

According to a statistical study which was done on 2005, about 300 berkes with 70000m³ store of water exist in Qeshm. This show the important role of this structure in the life of the native inhabitants.

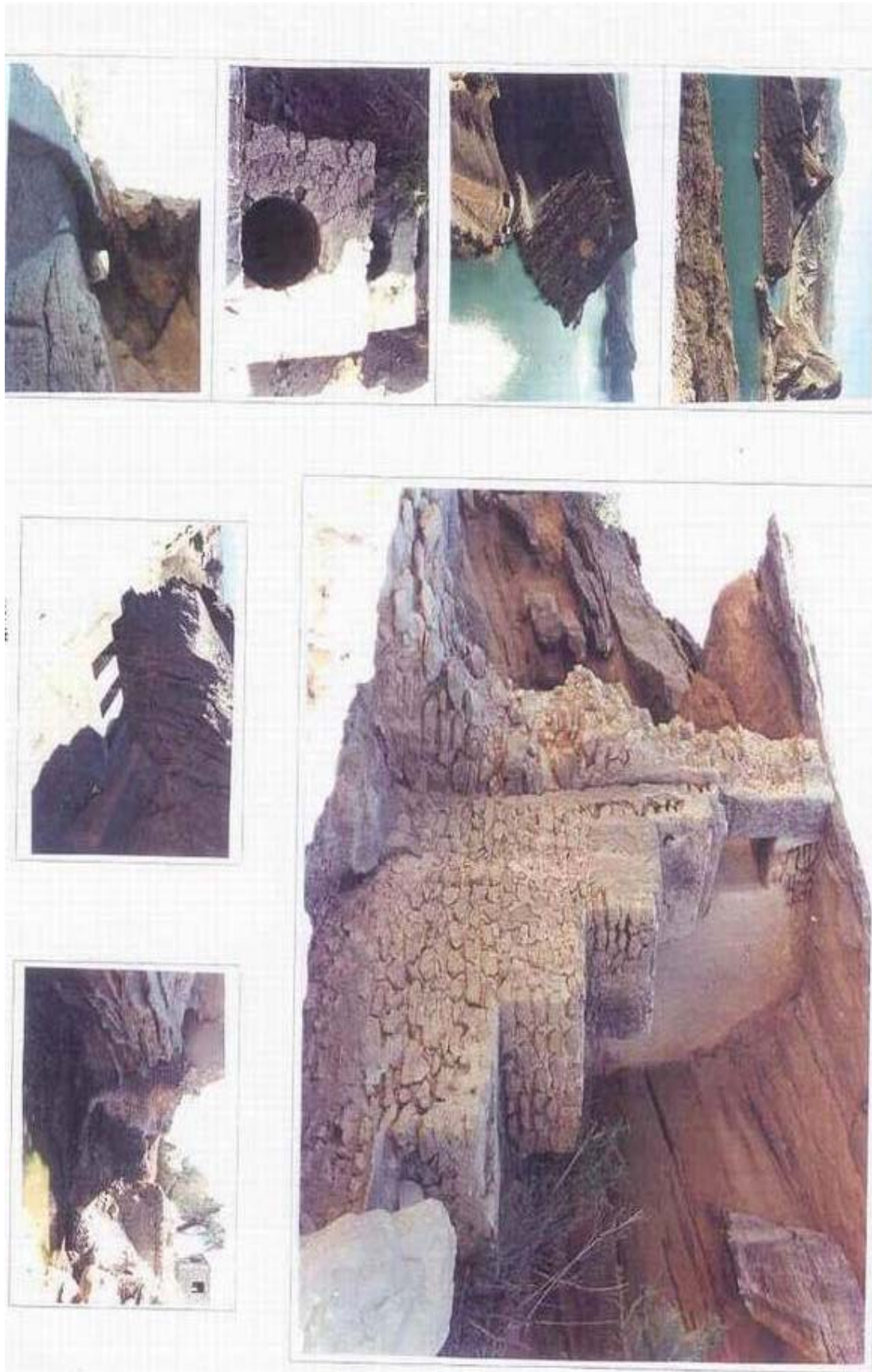
7-3- FLOODGATE:

Floodgates are small soily dams which are used for the storage of rain water. Sometimes, floodgates are made by rocks and mortar or cement.

Floodgates also lead rain water and surface water to berkes or they are used strengthen the aquifers.

Unfortunately in most of the villages of the Qeshm, due to lake of proper management and renovation, most of floodgates have been destroyed.

Fig. 3: Historical Payposht Dam



7-4- DAMS:

Dams are used to store rain water and surface water in large scale, most of them are soil dams, some of them have been constructed by coral rocks and mortar. In the next page we will describe historical dams of qeshm island.

7-5- WATERSHED:

Watersheds are constructed on the way of canals, and they part water for agriculture and filling the berkes.

7-6- WELLS AND OX-WELLS:

More than 300 wells are used in this region. In this island the most important area to have suitable groundwater is Tourian.

Most ox-wells are destroyed and useless.

7-7- DISCHARGE OF SEWAGE AND SURFACE WATER

There are two ways to discharge sewage and surface water, one of them is directing them to the sea through exposed canals, (historical exposed canals still are visible) and another method is with the help of wells

8- WATER SOURCES.**8-1- SURFACE WATER.**

In Qeshm island, there are no permanent rivers, only floodways and seasonal rivers are present. Surface water through floodway is directed to the sea.. The average capacity of rain water in the area is about 200mm, which small amounts of surface water penetration in aquifers. Because of little permeability of the soil and the special geological situation of the region, most of the surface water is evaporated or is delivered to the sea through floodway. Therefore due to this problem, we can understand the important role of floodgates and dams in this region.

Construction of floodgates and dams in Qeshm from long ago, shows their role in controlling and using surface water.

About 100 soil dams are recognized in this area, some of them are from 100 years ago, and others are new.

8-2- GROUND WATER:

Ground water sources of the island, from quality and quantity point of view are not suitable. Important reasons for this problem are climatic conditions, lack of rain, little extent of the water basin, lack of suitable penetration alluvium, trace of geological formation on the aquifer (like marn, salt plug, ...) the relation of aquifer with sea.

Tourian is the only plain in the region to have suitable aquifer. It has an extent of 20Km² and 231 wells.

8-3- CONTROL, MANAGEMENT AND TRADITIONAL USE OF SEASONAL AND SURFACE WATER.

After the first rain, surface water due to rain is directed to farming lands Through exposed canals. Control and management of this water is done by a water distributor (called Mirab). The people have trust in him. The farmers never change the way of canals and respect teach other. If there are complaints, people will refer to a reliable person to solve the problem.

IMPORTANT HISTORICAL DAMS IN QESHM ISLAND:

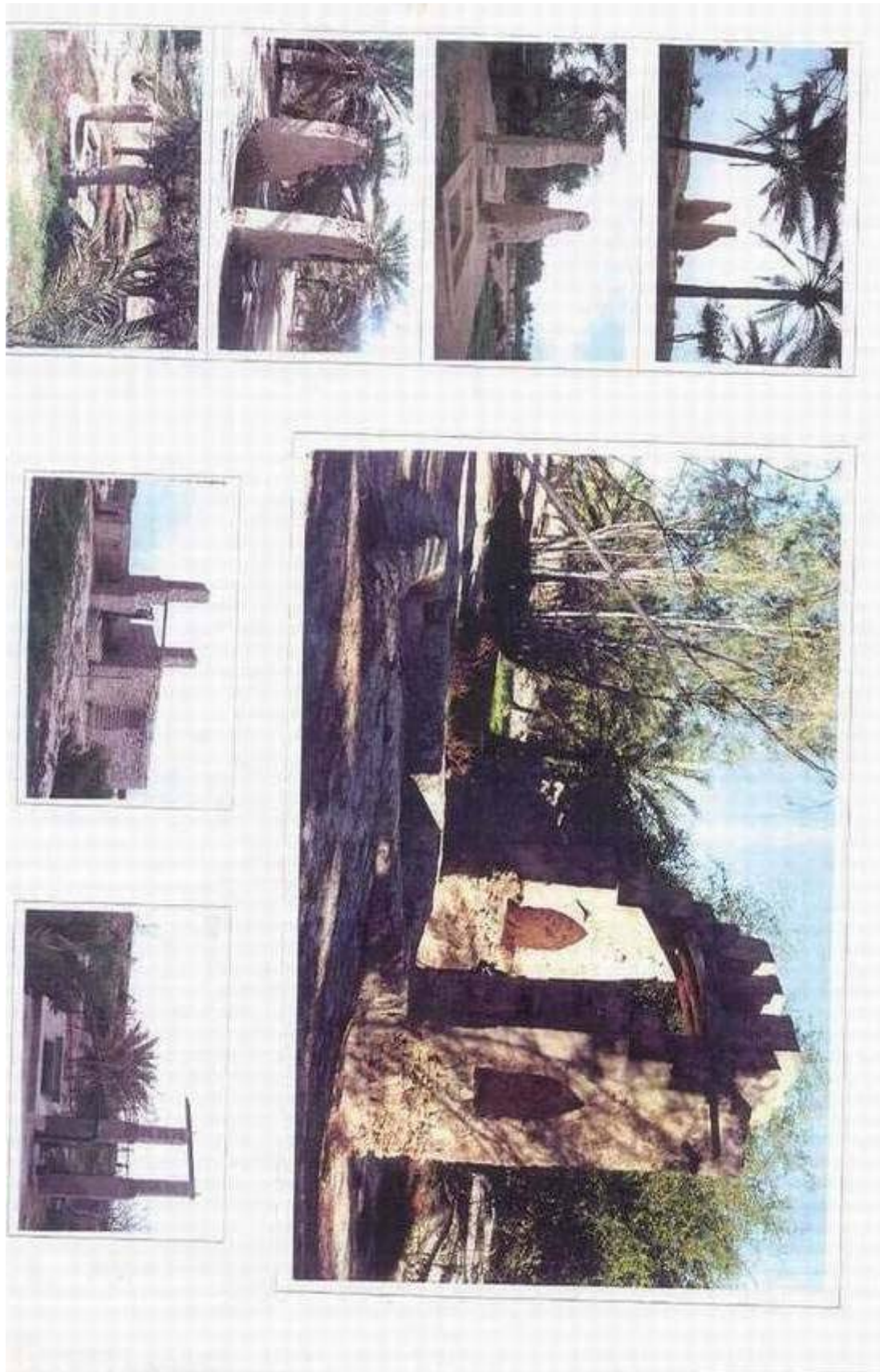
1- DERHASH DAM:

This dam is located on the east of Giyahdan village. This dam was constructed 200 years ago, and is constructed by limestone, cement of chalk and mortar. This dam has been repaired many times and still is in use.

2- KHALESI DAM:

This dam is located in the same position of new KHalesi dam, near Deyrestan village, which has constructed by Hormozgan water authority organization in 1983.

Fig. 4: Ox - Well



Unfortunately the old dam which was built 100 years ago, was destroyed at the time of the construction of the new dam.

3- SHEYKH ALI FLOODGATE:

This floodgate is located on the west on Selkh village and it was built 100 years ago. Same as the previous dam, construction material are rock and mortar.

4- GAVARZIN DAM:

This dam is located on the north of Gavarzin village, and nearby the new dam. It was constructed 500 years ago and its architect was Ostad Yahya. Some parts of the dam still remain.

5- MOLLA DAM:

This dam is located nearby Salakh village, and is 100 years old. Molla dam is still usable.

6- GURAN DAM:

It is located on Guran village, and was built 100 years ago. This dam is also usable. The architect of Molla and Guran dams was Ostad Yahya.

7- DEM DAM:

This dam is located in Peyposht village and was constructed by rocks and cement of chalk and gravel. It belongs to the Sassanide dynasty, and same as other monuments of that time was destroyed by floods.

However, this dam was repaired in the Safavid period, but due to some technical problems, it was destroyed again, and at present some parts of this dam still remain.

Unfortunately, most historical dams which are located in this region have been destroyed. However, these structures need restoration and protection, because they are historical heritage of this country.

NATIONAL PROJECT OF WATER CARRIER LINE TO THE QESHM ISLAND.

As mentioned before, Qeshm has limited source of water, therefore for to solve this problem, Hormozgan water authority organization has fixed many installations to change sea water to suitable fresh water.

But with the development of this Island, installations are not sufficient, therefore after the study of the area, the project of water transfer from Bandarabbas to Qeshm has started since 2005.

This project contains two parts, one in the land (83 km) and the other in the sea, 10km. This water line is not only for Qeshm and Bandar Abbas, but also will supply suitable water to Khamir port, refinery and industrial town.

CONCLUSION

- 1- The base of opportunity for suitable water in Qeshm was preserving of rain water in structures like Koleghs, Berkes, wells and dams. All these structures helped keep water.
- 2- Historical water structures in the Island were usable for two purposes, one for preserving water in the Berkes, Koleghs and two for agriculture (Dams,. Ox-Wells).
- 3- The Kolegh is the primary form of opportunity to access suitable water and is very old.
- 4- Water structures in the past, due to being managed, by people was in the control, of the people but at present this management is not functional. The result of this problem is the destruction of water structures.
- 5- Some of these structures due to urban extension are, completely destroyed and useless.
- 6- Construction material that were used for water structures include limestone, coral rocks and mortar (Saruj).

SUGGESTIONS

- 1- Repairing historical dams.
- 2- Repairing floodgate of village.
- 3- Construction of exposed Berkes (same as Laft"s well) in those areas which have suitable aquifer.
- 4- Determine limits for water structures like Berkes, dams,
- 5- Determining urban standards and regulations for any constructions near water structures.
- 6- Changing and re-establishment of historical water structures to cultural and tourism center.
- 7- Using of pumps instead of hand buckets to take water from Berkes.
- 8- Re-establishment and support humanity management for protection of historical water structures like as Berkes and dams.

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