Qeshm Island's Surface and Underground Waters Resources and Methods for Utilizing them.

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Abstract

The Qeshm Island with a maximum area of 1796 km^2, is located at the Persian gulf, near the Hormoz strait. It is located at the extreme southeast of the Zagros sedimentary- structural unit and is a part of the folded Zagros and Bandar Abbas subzone. Varied deposits with Upper Precambrian to Quaternary age have profiles at the island surface, with much influence on the quality of surface and underground waters resources. There is no permanent river at the island. The total area of watersheds is 500 km^2, and the most of which are: 1- Tourian, 2- pay posht, Deirestan, 4- Gowdrin, 5- Giahdan, and 6- Ramchah. The average annual volume of run water is 37 milions m^3. The most important aquifer of the island is located at the Tourian plain. Of course, scattered and limited aquifers are at the areas such as Deirestan, Tonban, Soheili, Table, Gavarzin, Tourgan and Laft. Each year, 4-8 millions m^3 of surface waters and up to 3 millions m^3 of underground waters are utilized and the water balance has been negative in recent few years. The general quality of the waters being used is a medium to good level. Utilization of the aquifers in the island is effected using 387 well. At the present, there is no underground water cannel there. Storage and utilization of surface run waters is affected using 102 earth barriers and dams, 322 natural and artificial pools and water reservoirs, 366 developed natural holes. For the purpose of supplying the water required, maintaining and up grounding the quality of surface and underground waters of the island, the following and suggested: correct and optimal management of using the current resources, correction and development of the current utilization methods, exploration of new underground water resource, using sea water desalination equipments as much as possible, water transfer from the mainland, design and correct implementation of sewerage collection and treatment network.

Introduction

The local and time distribution of water resources in Iran is very heterogenous. In very areas of the Hormozgan province, there is an intense limitation of water resources. In this southern province of Iran, with yearly precipitation mean 200 mm and yearly evaporation average 3200 mm [1], existence of tens of salt domes, infiltration of sea water, droughts of recent years, and increase of consumption, are caused that need to suitable use and management of surface water resources increasing, especially in its island, for example the Qeshm island, which is the subject of this paper.

Discussion

1- Geographic properties

The Qeshm island with 1536 – 1796 km^2 area (in view of minimum and maximum of tide and area of the Harra forest) is located at the Persian gulf and near Hormoz strait. The geographic coordinates of this island, are: 55º 20' – 56º 44' eastern longitudes and 26º 5' - 27º 10' northern latitudes. The Namakdan crest with 397m height is the most raised point of area. Moisture and warm climate, height of waves 1-5 m, sea level changes (during of tide) 0.2-4.3 m, yearly temperature average 27ºC (22-55ºC), yearly precipitation mean 175 mm, are the other common geographic characters [2].

2- Geological characters

The Qeshm island is located at the extreme southeast of the Zagros sedimentary- structural unit and is a part of the folded Zagros and Bandar Abbas subzone [3]. The most important geological structures of this island, have east- west or northeast-southwest strike. Varied deposits with Upper Precambrian to Quaternary age have profiles at the island surface, with much influence on the quality of surface and subsurface water resources.

Hormoz series (Lately Precambrian- Early Cambrian) consists salt rock, gypsum, limestone, dolostone, small parts of igneous rocks. This series has out crops at shape of the Namakdan salt dome in extreme southwest of area. Saline solutions sourced from it, have very effective on reduction of quality of surface and subsurface waters, especially in the west part of this island [4].

Mishan formation (Middle-Lately Miocene) composes from marl and limestone in the area and is impermeable. Aghajari formation (Lately Miocene- Pliocene) consist sandstone, marl and siltstone. In comparison of these formations from the view of effect on reduction of quality of water resource on the area, Mishan formation is more important. Of course, parts of sandy deposits of Aghajari formation are host of restricted groundwater resources with well quality in this island. Bakhtiayri formation equivalent deposits (Pliocene- pliostocene) compose loose conglomerate, siltstone and marl. The sediments (coarse to medium), coastal and eolian sands, evaporite/ mud falts, loumashels (calcareous marine terraces) and fine grain recent sediments. Fan course- medium sediments and loumashels have well permeability and are the host of the most important groundwater resources.

3- Water resources

In the Qeshm island, there is no permanent river, but there are small, short and abundant natural and artificial waterway at it's surface. The most important watersheds are: 1- Tourian, 2- Pay posht, 3- Deirestan, 4- Gowdrin, 5- Giahdan, 6- Ramchah. They have 2-400 height, %1-12 dip and south- north or north – south strike. Annual average of total surface runoffs is 37 millions m^3 (0-20 millions m^3) the most important parts of this volume storage back of barriers or seepage on ground. Of course, 17 millions m^3 (50-100 millions m^3 in humid years) of it, yearly discharge to sea. Maximum instantaneous debit 51-161 m^3/s, volume of maximum flood 36,000-1,160,000 m^3, electric conductivity 2/25 dz/m and 6-20 dZ/m at back of barriers, are the other important properties of runoffs of the Qeshm island [5].

The most important aquifer is located at the Tourian plain. It has 50 km^3 area and syncline structure. Average thickness of this aquifer is 37 m and composes from alluvial (fan and river) coarse – medium sediments of Quaternary age. Thickness and size of sediments, quality and quantity of subsurface water reduce in the Tourian plain from east north- north to west south-

south. In 2006, 2,38 millions m^3 discharged from the aquifer [6]. Electricity conductivity change from 1200 μZ /cm to 13800 μZ /cm, and water table is located at 4/7 – 85/4 m (mean 27/19m) bottom of surface. Of course, scattered and limited aquifers are at areas such as Table, Deirestan, Tonban, Soheili, Gavarzin, Tourgan and Laft in the other deposits of the Quaternary age.

4- Revenue methods

For recovery of surface and subsurface water resources to the Qeshm island, modern methods (such as mechanical wells and earthy barriers) and conventional methods (for example natural pools and holes) are used. Each year, 4-8 millions m^3 of surface waters and up to 3 millions m^3 of subsurface waters are utilized. Utilization of the aquifers in the area is effected using 358 wells which 231 of them are placed on Tourian plain with mean discharge 3/17 litr/s. Storages and utilization of surface run offs is effected using 102 earth barriers and dams, 322 natural and artificial pools and water reservoirs, 366 developed natural holes. Volume of capital storage waters in back of earth barrier and dams are 25/910/800m^3 [7]. There is no active qanat in the Qeshm island.

Conclusion

The water balance has been negative in recent few years on Qheshm island and reached, 2/000/000 m^3 in some years. For the purpose of supplying the water required, maintaining and upgrading the quality of surface and underground waters of this area, especially for future years, the following and suggested: correct and optimal management of using the current resources, correction and development of the current utilization methods, exploration of new underground water resources, using sea water desalination equipments as possible (especially, local and solar water desalinators), water transfer from the mainland, design and correct implementation of sewerage collection and treatment network.

References

[1] AMRI KAZEMI. A.R, The geological atlas of Qeshm island, GSI (2005), 113p.

[2] HAGHIPOUR, A., Geology of the Qeshm area, Qeshm free area (2005), 5p.

[3] AGHANABATI. S.A., Geology of Iran, GSI (2004), 586p.

[4] TOOS AAB ADVISER ENGINEERING CO, Project of water securing in the Qheshm island (subsurface), Vol 4 (1999), 33p

[5] QHESHM FREE AREA, Surface water resources of the Qeshm island and their exploration, Vol 9 (1998), 104p.

[6] TOOS AAB ADVISER ENGINEERING CO, Project of water securing in the Qeshm island (conclusion and planning), Vol 12 (1999), 121p.

[7] KAMAND AAB ADVISER ENGINEERING CO, Statical report of the Qeshm area (2006), 124p.