

The Geotourism of Minab Esteghlal Dam Area

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Abstract

The MINAB area is located in southeast of IRAN near Hormoz strait. This is the Frontier between two Subductions. The subduction of Arabian plate beneath Iran from one point and the Oman subduction from other point, are the reasons for the existence of these spectacular structures in the region. The area that we are focusing on in this article is Minab dam which the well known Minab fault passes just near it and this is the very reason we have vertical scarps with dip angle of 70 degrees. In the case that we proceed toward south the structural differences between Zagros and Makran Will be unveiled.

Keywords: *Geotourism, Minab Esteghlal dam, Makran, scarp.*

1. Introduction

The Makran area is located in the southeast of Iran. The characteristics due to Arabian-Iranian plate convergence undergoes some changes as we proceed from east of Zagros to Makran. One of the distinguishing features of this area is that, here the folding are more stretched in comparison to Zagros area. Molinaro et al (2004) named this folding as a fault propagation fold. The Minab dam is situated at its central anticline fracture and the Northern part inherits the Zagros characteristics while in the other one and toward south the Makran features prevails.

Geologic setting

Minab Esteghlal Dam is located at 100 km from Bandar Abbas and 5 km from Minab at the longitude and latitudes of 57°06'44" and 27°09'52" respectively. This dam is situated over Minab stream and is brought into service since 1983.

Geotourism

Geotourism is one of the newest forms of tourism that after the introduction of Geo-parks in 2000, UNESCO paid a lot of attention to it. Various definitions can be provided for Geotourism from different points of view and this list would be so long that we can't present it here. Therefore we only define the Geotourism as one of the experts (Rahimpour 2006) in this field had once presented. Geotourism is one of the technical fields of a ecotourism that introduces the geological events to visitors while the local features of the area be kept under secrecy. Geotourism benefits from other scientific fields including: GEOMORPHOLOGY, GEOTECHNICS, GEOPHYSICS; GEOCHEMISTRY and CLIMOTOLOGY it also invites experts and all of those who are interested in nature. The main goals of Geotourism are to protect the environment against destructive factors including human interference with nature. Generally the studies about Geotourism were conducted for the first time at the national level

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by the travel and tourism union of the United States of America, in which a special attention is paid on the environment stability and its widespread development, even the cultural issues were considered (NAZERI 2006). According to the Internet database of geological and mineral exploration organization, in 2002 Alireza Amir Kazemi the executive Geotourism in IRAN has provided an article concerning the introduction of Iran's Geotourism in a conference in Australia.

2.The geology classification of Minab Esteghlal Dam area

From the technical point of view any geological attractiveness can be ranked according to its value and the rate of tourist visits in the area. In this article we use two classifications in order to rank Minab Esteghlal Dam area.

(A) The first suggested classification (Nabavi 2008)

In this classification the geological events are divided into six categories including: uniqueness, the exclusiveness of the event in the state, being a rare phenomenon, according to their values for different age groups and also to the tourist's attraction factor, the pattern and Index Diversity which it can provide for both domestic and foreign tourists.

3.The pattern and the Index

This factor is very important from the Educational point of view and for ordinary visitors it's also believed to be attractive.

B: classification according to the Geotourism criteria

In this classification the Geotourism experts divide the area into 3 different categories:

- 1) There are a lot of places around the globe that are not known completely by Geologists and mountain climbers, instead These are the places that ordinary people visit frequently.
- 2) In the outskirts of some big cities despite their harsh appearance there are spectacular Geological views just kilometers away from the city, the points 1 that ordinary people are not familiar with.
- 3) And finally there are places where seem to be real gifts to Geologists and very few ordinary people .The fabulous places like Siccarp points at the East coast of Scotland and Hutton's section in holy road in Edinburgh are the ones that James Hutton the father of Geology and pioneer in concepts like modern stratigraphy has worked experience there.

The Esteghlal Dam is classified as the first and second group based on its Geotourism characteristics and features.

The tourism industrial significance of the Esteghlal dam:

The Geotourism effect of Esteghlal dam plays a special role in tourism industry due to having some unique privileges as below:

- 1) The Short distance to Shaheed Rajaei port where thousands of ships are berthing annually .The advertising industry here can affect more foreign visitors.
- 2) The short distance to cities like Bandar Abbas (100km) and Minab (5km).
- 3) The Minab-Bandar Abbas road passes by the Esteghlal dam.
- 4-There is no need to walk long distances in order to reach the Dam.

- 5-The access to dam is fairly easy (all of the people including old, young, man or woman are able to visit it).
- 6-The dam area is a good potential for mountain climbing.
- 7-The Zagros-Makran frontier is accessible through Esteghlal dam's road.
- 8-The distinguishing features of this area is the formation of vertical scarps which are created due to the passing of Minab-Zendan fault.
- 9-There are distinct structures to the North and South of the Dam site.
- 10- The stress field pattern differs from North to the South of the site.
- 11- There are many Hotels and Restaurants near the dam.

4.The Geologic Setting of the Area

In this area and with the respect to vertical and horizontal movements of active faults especially Minab fault the Geological structures in the form of vertical scarps have been created .By investigating the Geological characteristics of these scarps we can measure the vertical slip factor which is due movement of these faults .The characteristic of this method is that the amount of measurements are small in comparison to real ones.

The numerical slip factor is calculated through: $X=D/T$

In this equation the D and T parameters stand for Elevation (Millimeter) and annual time unit respectively. The reason that, calculated values are smaller than the real ones can be accounted for the water and weather properties of the area. Of course there is not verified information about the old slips in this region and this can cause an error in calculations.

5.Conclusion

In this article the Esteghlal dam site is introduced as one of the first Geological attractions in Zagros-Makran Frontier, which has its own index and pattern.Geology of studied area shows that this area is one of the most active ones in Iran and is the main reason of beautiful morphology due to existing movement of faults in the area.

6.Suggestion

- 1) This place should be registered into Geological and national science database along with protected national places.
- 2) It's essential to add the name of this national heritage to Geotourism Atlas of the province.
- 3) The Geology and Mineral exploration organization along with Cultural heritage and Tourism organization and Hormozgan regional water organization, and the environmental protection organization all should try to introduce this Geological phenomenon.

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Figure 1: satellite Image of Minab Esteghlal dam area (from Google Earth)



Figure2: The location of Minab fault (the long red line) and dam setting (the short green line).



Figure3: A landscape from the Minab Esteghlal dam (view to E)

The name of the Phenomenon	Phenomenon classification	The privilege of being near cities	Being attractive for	The value of attraction for tourism	Access points	The natural outlook
Minab Esteghlal Dam	The index and the pattern	Hormozgan and Minab cities	Educational Investigation Mountain climbing and sightseeing	All the age groups especially , students , scholars and researchers	Asphalt road	Vertical scarps and layers with the slope greater than 70' and also beautiful lake than Dam



Figure 4: pictures of Minab Geotourism

- A) Sandstones and marl over thrust near Minab Dam.
- B) Sandstone and marl layers in a (N-S) trend view from Bame Minab .
- C) (N-S) trend of layers in Minab Esteghlal Dam site.
- D) (N-S) trend of layers view from Bame Minab (view toward E) .
- E) The vertical fault scarps due to the Minab fault.
- F) The Minab Esteghlal dam Echo system

Table2: The fault slip index

Station number	Elevation- D In Millimeter	Time unit -T In Million years	Fault Vertical slipRate (mm/yr)
1	0 1400	13000000	0.0010
2	30000	13000000	0.0023
3	17000	13000000	0.0013
4	18000	13000000	0.0013
5	24000	13000000	0.0018
6	15000	13000000	0.0011
7	22000	13000000	0.0016
8	20000	13000000	0.0015
9	12000	13000000	0.0009
10	29000	13000000	0.0022
11	15000	13000000	0.0011
12	48000	13000000	0.0036
13	27000	13000000	0.0020
14	24000	13000000	0.0018
15	30000	13000000	0.0023