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Geographical Factors for Geotourism Development by Geomorphological and Archaeological Sites in Wadi Dhahban Basin, Asir Region, Saudi Arabia

By

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Abstract

Wadi Dhahban is located in Al-Birk Governorate, which is one of the governorates of the Asir Region. Geodiversity, cultural and biological diversity are factors of tourist attraction in the study area. Wadi Dhahban is associated with processes and forms of geodiversity, that can contribute to the development of geotourism in the Asir region. In this research, tourism attractions are identified based on features of geodiversity, biodiversity, and cultural diversity. Additionally, Wadi Dhahban's mapping and geotourism grouping are based on integrated physical circumstances. Primary and secondary data are the foundation of the strategy. Approach for data analysis incorporates qualitative, content, map, and a qualitative descriptive method. Visiting geographical sites as geotourism demonstrates a differ sub-sector of natural area tourism, which is a pattern of tourism that is specialized focuses on the economic use of geological and archaeological heritage under the tourism industry's aegis. Wadi Dhahban in Saudi Arabia offers huge potential for geotourism development. Diverse topographic features are the geological and archaeological tourism resources of the regions. This research paper aims to review the tourism potential of the valley in terms of scientific, cultural and economic value, and to use these capabilities in terms of the degree and method of exploitation, was based on the study of geosites, in addition, the geomorphological features, agricultural terraces, coral reefs, and volcanic mountains. It is an attempt to classify the geographical locations of Wadi Dhahban from the perspective of geotourism mapping and seven sites were proposed in the valley for camping to aim of ensuring sustainability in the field of geographical heritage management, find that one of the main factors for tourist attractions in Wadi Dhahban is the diversity and diversity of surface manifestations between the mountain and the sea, in addition to the contribution of other factors such as agricultural terraces, waterfalls that occur after rain, monuments, and inscriptions.

Keywords: geosites; geoheritage; geotourism; geotouristic map.

Introduction

A specific kind of tourism focused on geosites is known as geotourism (Newsome and Dowling, 2006). To be more precise, the geographic sublayer and morphogenetic processes that affect certain elements of relief are represented by the landform known as geosite (Ilieş and Josan, 2009). The macro, meso, and micro landforms that are present in the landscape and garnering attention for their unique characteristics and recreational applications are referred to as geosites. These characteristics indicate the geological history of the area and the occasions and processes that shaped it because they are a mosaic of geological entities of unique scientific value, rarity, or beauty (Zouros, 2007). They may emerge on the earth's surface naturally or as

a result of cutting or quarrying the surface to meet economic demands like building roads or mining minerals. These geosites are also known as geomorphosites since they have a landform and a scientific significance (Neches, 2013). The third element, the landscape's recreational value, is added by geotourism. In such natural settings where geology and geomorphology are the key draws, geotourism will be especially relevant (Hose, 2000). Given the enormous potential for geotourism growth in the Subarnarekha basin, it is crucial to guarantee sustainability from the outset of building out the supporting infrastructure and superstructure.

If properly controlled from the start, the environmental effect of the aforementioned activities may exceed the threshold limits of tolerance. Therefore, particular care must be taken to preserve these priceless geomorphosites. Geotourism should follow the "Do's" and "Don'ts" of sustainable tourism since these priceless geomorphsites need to be protected so that future generations may enjoy them as well (Haj Aliloo and Nekooei Sadr, 2011). However, the concepts of identifying landforms that should be preserved and protected are the subject of study problems in the management of geomorphosites (Bini, 2009). The focus should be on preserving those geoheritages that are uncommon and distinctive in terms of beauty and importance while analyzing the development of landscapes, since it is not feasible to protect all geomorphosites. Such geomorphosite preservation may significantly advance local and environmental education (Bruno and Perrotta, 2011). The purpose of geotourism, which developed out of the desire to take in distinctive characteristics in the middle of a landscape, is to get a deeper knowledge of the planet with reference to its geological attractions (Adriansyah et al, 2015). Geotourism relies heavily on geosites and geomorphosites as a resource. Geomorphosites are broader and contain other values (such as cultural, artistic, and economic values), while geosites are defined as locations that have unique significance for understanding the history of the planet and primarily carry scientific values (Elassal, 2020).

Recently, tourism is one of the most vigorously emerging areas of the state economy in the Kingdom of Saudi Arabia, and it is one of the pillars of Vision 2030 and Asir's development strategy "Qimm and Shim". The natural and geographic features of Wadi Dhahban contribute significantly to the development of the tourism market in the Asir region. All the inhabitants of Wadi Dhahban work in agriculture, from the past to the present time. It is famous for its cultivation of (reed), palm cultivation and the production of dates. Wadi Dhahban combined the beauty of the marine nature and the mountainous nature. The valley is characterized by a charming nature and stunning views, as it forms a beautiful aesthetic painting after it is covered in a green suit in which water flows throughout the year.

The purpose of this research is to identify tourist destinations based on geodiversity categorization, biological diversity, and cultural variety so that the opportunity may be evaluated as a potential attraction for geotourism in the service of supporting the development of the Wadi Dhahban, located between the peaks of the Sarat Mountains and the Red Sea coast in the Al-Birk, where a large variety of terrain geomorphological and geoarchaeological topics are concentrated, with high potential and ingredients for the development of the geotourism industry in the region.

Study Area

Al-Birk governorate is where Wadi Dhahban is found. It combines the elements of the sea and the mountains. From the valleys of the Hilalians it descends from the mountains of Al-Mafraq, taking to the outskirts of the southern outskirts of Harrah Bani Hilal, so that it separates between the Hilaliyn and the Al-Munajaha clans. It is surrounded by towering hills, and its

torrent ends in Radhan and Masarh with palm groves located at the mouth of the valley near the sea, and from the tributaries of Wadi Dhahban: Wadi Al-Bakhin, Wadi Dhankan, Wadi Athleh, and Wadi Lanka. The mouth of Wadi Dhahban is 15 km to the south from the town of Al-Birk. Wadi Dhahban is the largest of the free valleys of Bani Hilal. Seven valleys flow into it: Wadi Al-Bakhin, Wadi Dhankan, Wadi Athleh, Wadi Linka, Wadi Maghnem, Wadi Al-Dibani, Wadi Al-Mlssa. Fig.1 shows that the entire length of the watercourses is 509.87 km2, and that the circumference is 162.068 km. The natural and physical features of the area, in addition to its rich historical and cultural history, are major contributors to the development of the tourist business in the region.

This paper explains the geological, geoarchaeological and geomorphological and diversity of Wadi Dhahban, linking the valley between the mountain and the sea. It represents a major site where a great diversity of terrain, geological themes and archaeological sites are focused. It is also important that the mouth of Wadi Dhahban is located on the coast of the Asir region in the Al-Birk, which has recently received attention to develop it into a coastal tourist destination for the Asir region, according to the Asir development strategy "Qimam and Shem". The data obtained and the field study demonstrate the high potential and good prospects for the development of the tourism industry in the region.

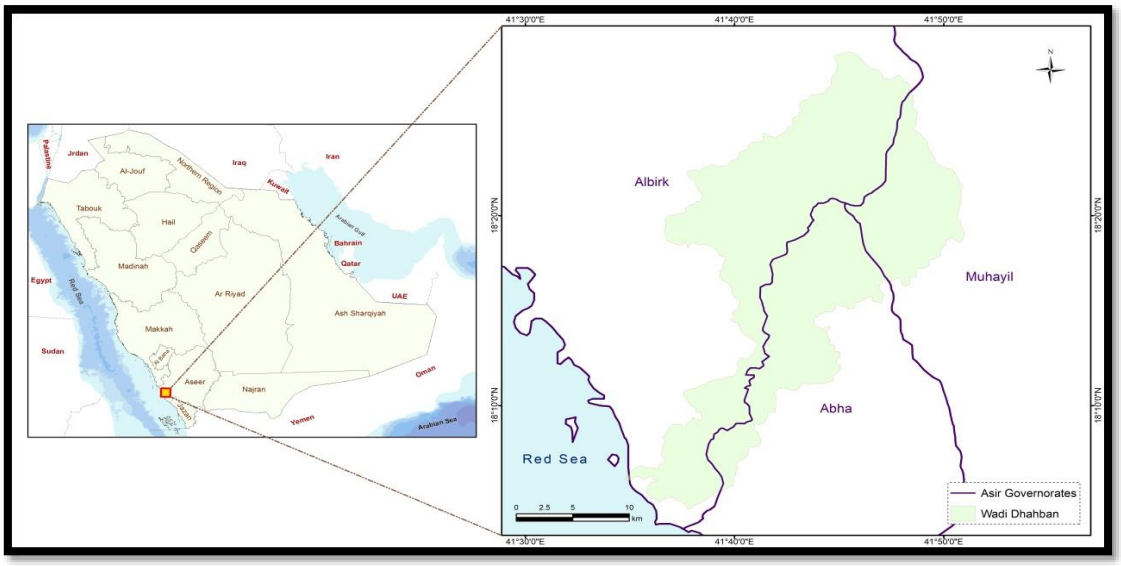


Fig.1. *Location of the study area.*

The Natural Characteristics of the Wadi Dhahban Basin

The surface of the earth varies in shape in the Wadi Dhahban basin**,** in terms of height, or surface level. Which is considered one of the important geographical factors in the diversity of tourism in the region.

Geological formation:

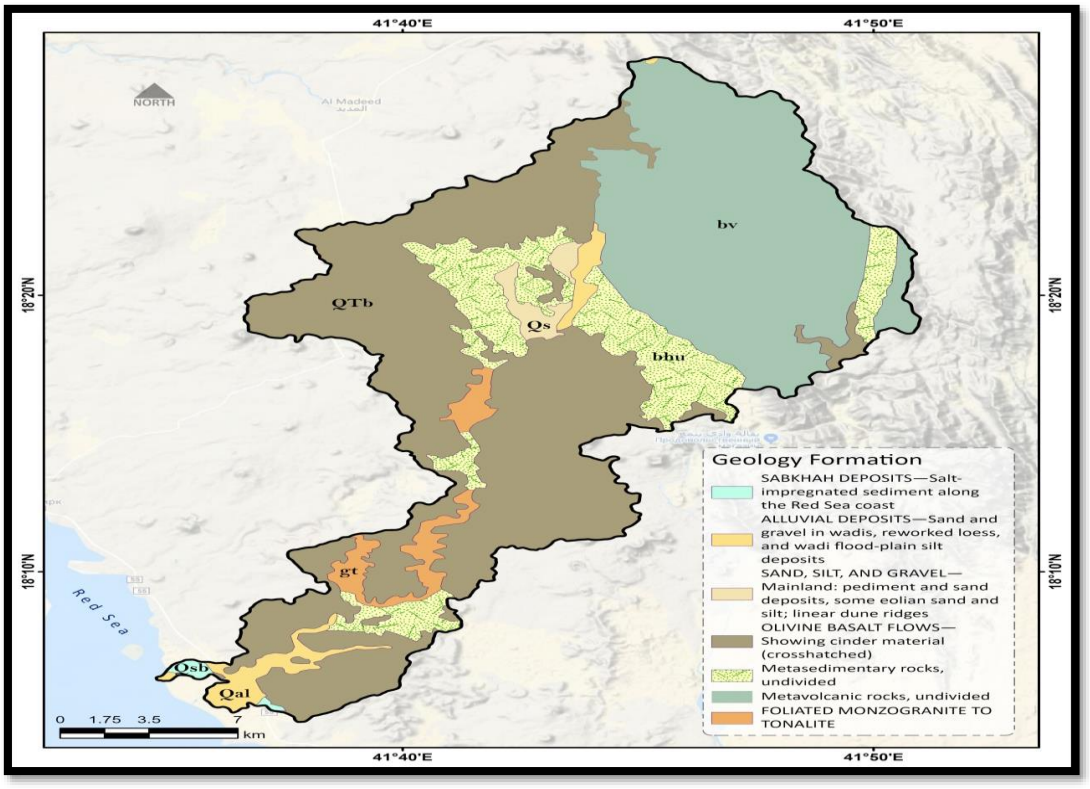
The formation of the Wadi Dhahban region dates back to the era of the Arabian Shield, which is distinguished by its complexity, and dates back to the pre-Cambrian period. It consists of a group of volcanic heats resulting from volcanic activity, which are characterized by steep slopes, and volcanic rocks cover most of the valley, especially in the upper and middle part of the valley. Wadi Dhahban originates from the volcanic hills of the Sarawat Mountains. The slope and height of these hills decrease towards the mouth of the valley course on the Red Sea

in the area of the ponds, and they have very steep sides. Therefore, the people established agricultural terraces on both sides of the valley

The topography of the Wadi Dhahban basin is made up of a variety of surface formations, each with its own distinct composition of rocks and geological age. These formations are made up of igneous and metamorphic rocks that date back to the time period known as the Precambrian. In addition, sedimentary rocks are present. The surface geology of the region under investigation may be broken down into seven categories as follows: Table.1, Fig. 2.

Table.1 *Classification and geological formation of the study area.*

classification	Formation	Time	Area (km2)
Qsb	Sabkhah deposits are salt-impregnated sedimentary deposits found along the Red Sea coast.	Quaternary	1.84
Qal	Alluvial deposits include wadi sand and gravel, reworked loess, and wadi flood-plain silt deposits.	Quaternary	13.86
Qs	Sand, Silt, and Gravel—Mainland: Linear dunes ridges, pediment and sand sediments, some eolian sand and silt.	Quaternary	7.06
QTb	Flows of Olivine Basalt displaying cinder material (crosshatched).	Proterozoic	245.13
bhu	undivided metasedimentary rocks.	Proterozoic	69.45
bv	undivided metavolcanic rocks.	Proterozoic	159.35
gt	Tonalite to monzogranite with foliation.	Proterozoic	14.74

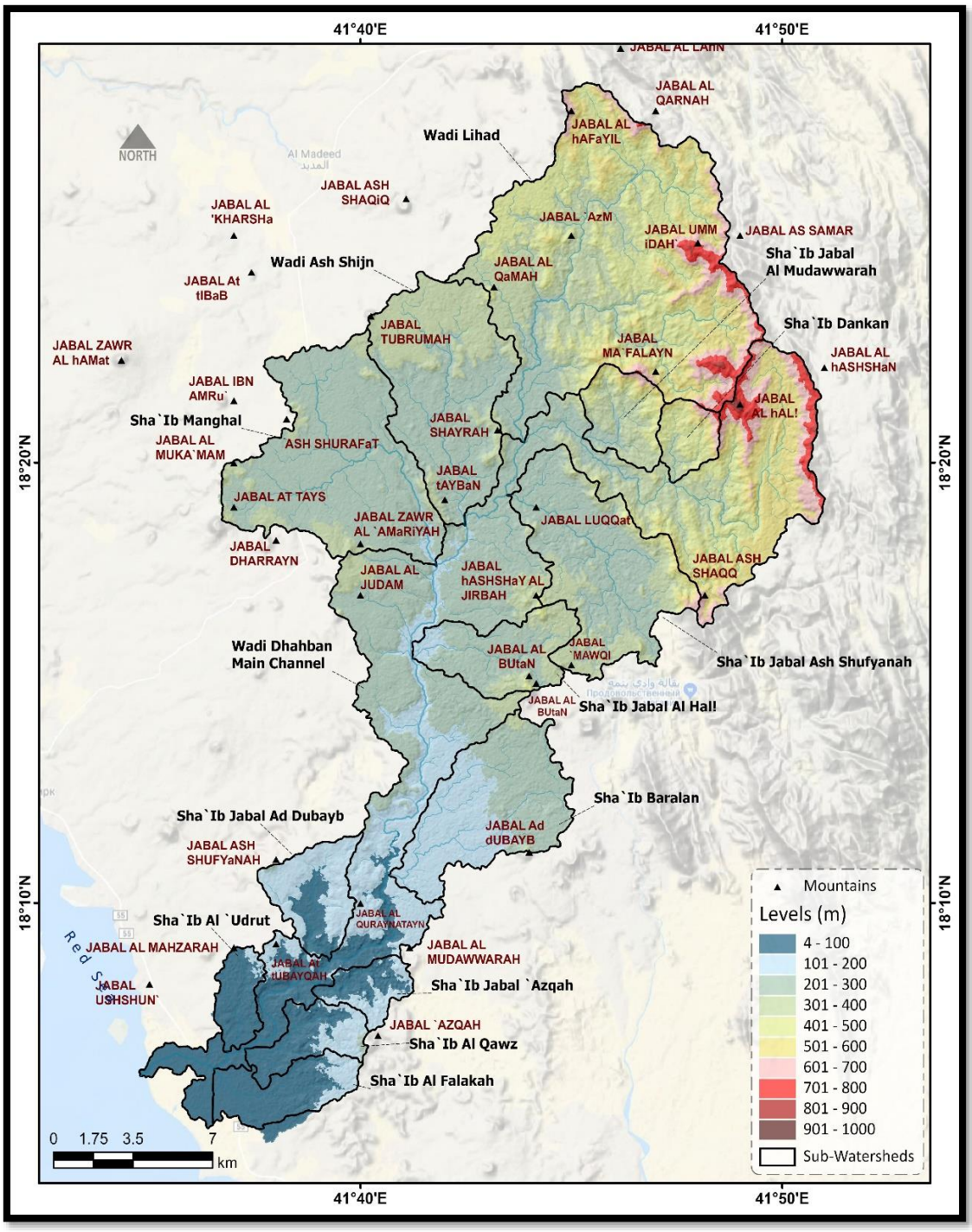


Source: *Elassal, 2021.*

Fig.2. *Geological formation of the study area.*

Topography of the valley surface:

The geology of Wadi Dhahban affected its topography, and by relying on the digital elevation model (DEM) of the area Fig.3, the following was noted: The average height of the basin surface is 550 m above sea level, where the surface of the valley basin ranges from a height of between 4 meters to zero at the mouth of the valley at the Al-Birk coast area, until it reaches a height of 1000 m in the north. This reflects the severity of the valley's topography, degrees of variation in elevation, as the terrain varies from the source in the north to the estuary in the south and between east and west.



Source: *Elassal, 2021.*

Fig.3. *Digital elevation model for the study area.*

Slope (degree)

The average slope in Wadi Dhahban is more than 30°, which is evidence of the many rocky cliffs in the valley. Young's classification was applied to the study area (Young, 1972, p.173), It was found that the dominance of cliff slopes is greater than 45 by 71%, very severe slopes 12%, and severe slopes 17%. Fig.4.

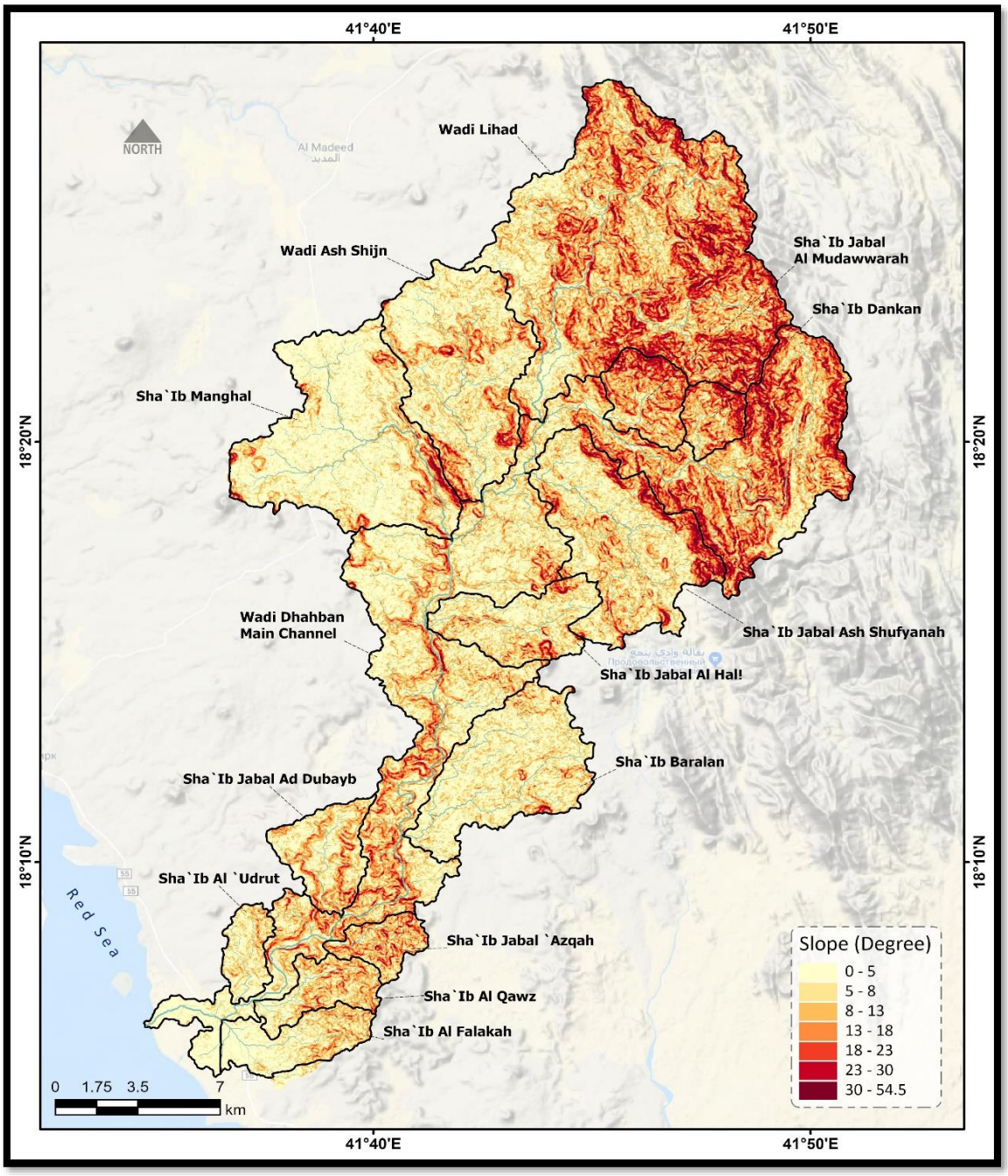


Fig.4. *Classification of slopes in the Wadi Dhahban basin.*

Climatic

Climatic factors control various human activities, especially tourism. Each factor of the climate has a role on the population and tourists, and therefore the characteristics of the climate factors that have an impact on tourism in the Wadi Dhahban region were studied in the period 1978 to 2020 AD (General Authority of Meteorology and Environment, Southern Region, KSA).

4-1 Temperature:

A study of the temperature data in the Wadi Dhahban region revealed that the average temperature is estimated at 19 °C. As it rises in the summer months, especially the valley estuary region on the Red Sea coast in the Al-Burks area, especially in the months of May, June, July and August, to record its highest average of 24 °C, In addition, the temperature does not drop in the rest of the year to below 14 °C, which made the Wadi Dhahban area an area visited by visitors from all over.

4-2 Precipitation:

The study area is characterized by receiving rising rains resulting from the effect of temperature differences between land and sea leading to upward movements accompanied by local thunder, as the region receives 216.1 mm annually. Half of the rain is concentrated in the spring. The months of March, April, May, and August are also considered rainy. January, February and July are considered transitional months, while the rest of the month is considered semi-dry. To calculate and study the spatial variation of rain in Wadi Dhahban, the method of equal rain lines was used, and the total annual amount of rain that falls on the Wadi Dhahban basin is about 127 thousand m³ annually.Fig.5.

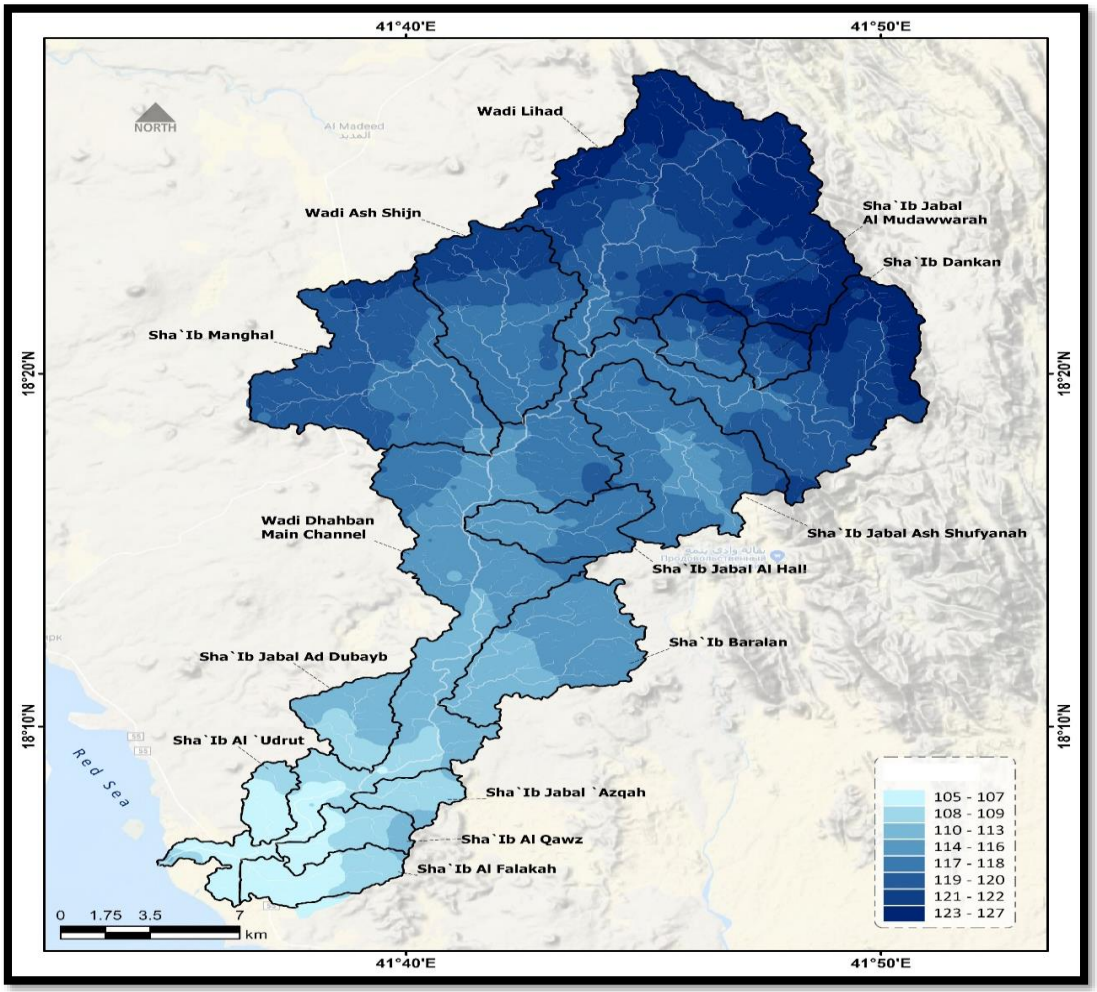


Fig.5. *Lines of equal rain in the basin of Wadi Dhahban***.**

Morphometric and hydrological characteristics

The morphometric and standard indicators, in addition to the efficiency of the hydrographic network, are among the primary factors that intervene in the dynamics of valley

erosion. The area of the Wadi Dhahban basin was calculated as 509 km², Perimeter of the basin was 162 km, compactness factor was 2.025, length of the valley basin was 40.893 Km, width of the valley basin was 12.468 Km, Drainage texture was 6.479, Flow rate was 0.892 (m/s), slope index was 17.342%, average altitude 305.6 (m), hydrographic density was 0.559 (Streams/km2), drainage density was 2.142 (km/km2), number of streams in the valley basin were 1345, Total length of watercourses 1092.2 (km). As a result, it has been calculated that the estimated runoff concentration is 12 hours and 30 minutes. Fig.6.

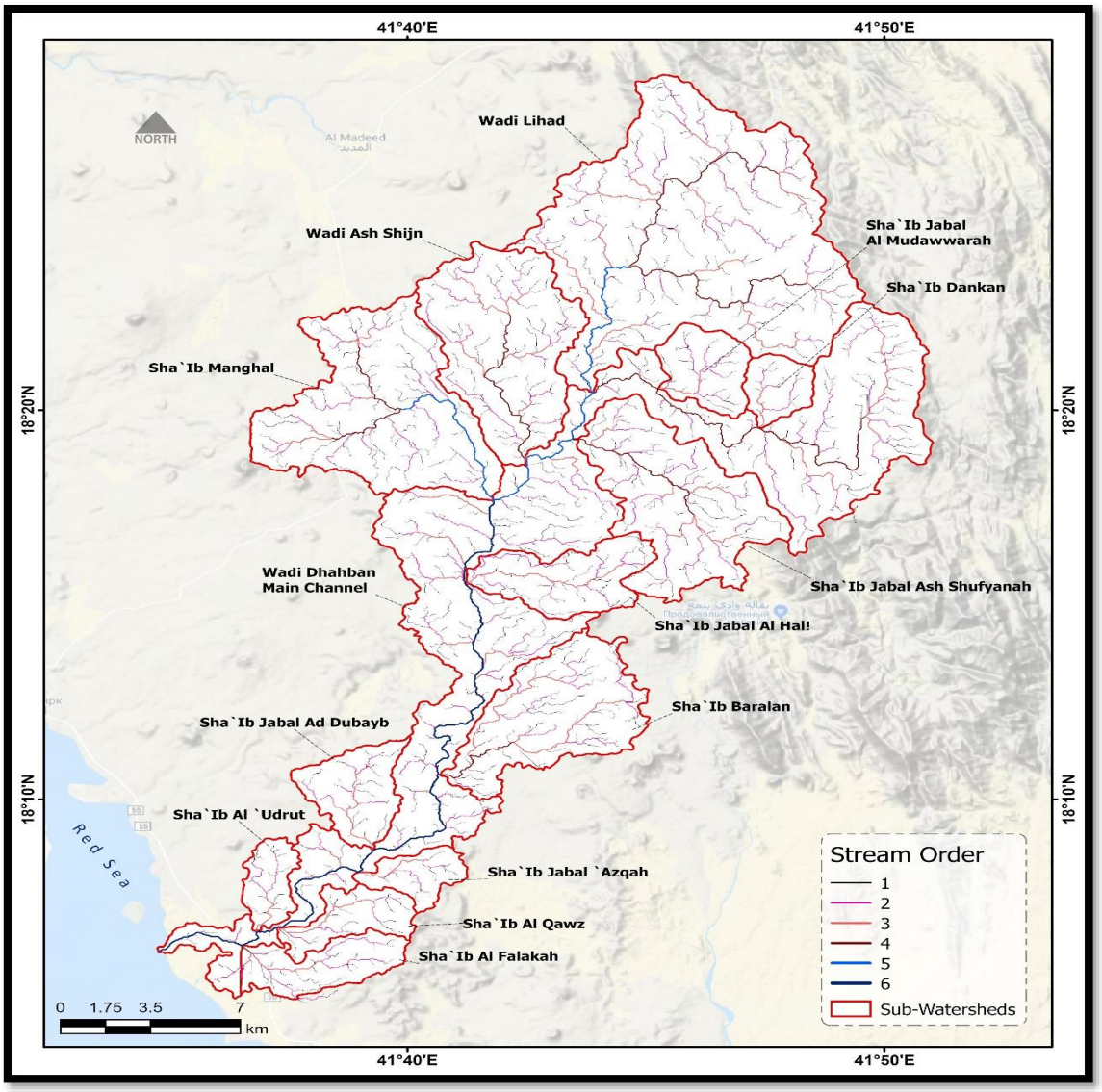


Fig.6. *Stream order and sub- Watersheds of the basin of Wadi Dhahban.*

Vegetation cover

The natural vegetation cover in the study area ranges from semi-desert groups of plants, which represent a mixture of scattered grasses, shrubs and trees that overlap with distinctive patterns of evergreen forests. The area is characterized by its ruggedness, and this helped protect the forests in the area. The forests consist of juniper, wild olives, wild pistachios, and some conifers on narrow belts with deep soil. In addition to, at the downstream area, thorns such as cactus, frankincense, and myrrh trees are spread, and perennial wild herbs are spread, such as aloe vera, forage thymam, thyme weed, sap shrubs, and acacia. Some annual and seasonal herbs are also found, such as chicory and the palm of Mary. The terraces and rainwater

traps located on both sides of the valley have been rehabilitated, to be used for growing vegetables, fruits and grains. This is done by leveling the terraces, constructing the terraces' walls, constructing concrete water tanks and implementing irrigation networks. It is considered one of the best practices in the agricultural and rural tourism industry, as it gives the valley an aesthetic view.

As for the coast of the study area, which is represented by the mouth of Wadi Dhahban, it is a distinct ecological unit in which plant groups grow, the most important of which are: mangrove trees, acacia, Sidr, Mark and Dom palm trees (Ministry of Municipal and Rural Affairs, Coastal Detail Plan Project in Asir Region, 2010, pp. 20-30), In general, the coast of the study area enjoys dense and rich assemblies of mangrove trees, where the scattered lagoons receive fresh water from Wadi Dhahban, allowing the formation of a suitable living environment for the growth of mangrove trees, which spread as a green growing strip. Moreover, we find Jabal Dhahban Island facing the mouth of the valley in the sea contains dense and very rich assemblies of mangroves (Ministry of Municipal and Rural Affairs, Coastal Detail Plan Project in Asir Region, 2010, p. 28). Wadi Dhahban is one of the most important areas of natural beauty, as it is characterized by the diversity of vegetation cover from the top at the source to its end at the estuary. It includes plants, weeds, herbs and palms, in addition to the ecologicality of the coastal plain's plants. Thus, we find that Wadi Dhahban is a distinct environment in which diverse and different plant groups grow and is a factor in attracting tourists to it throughout the year. Fig.7.

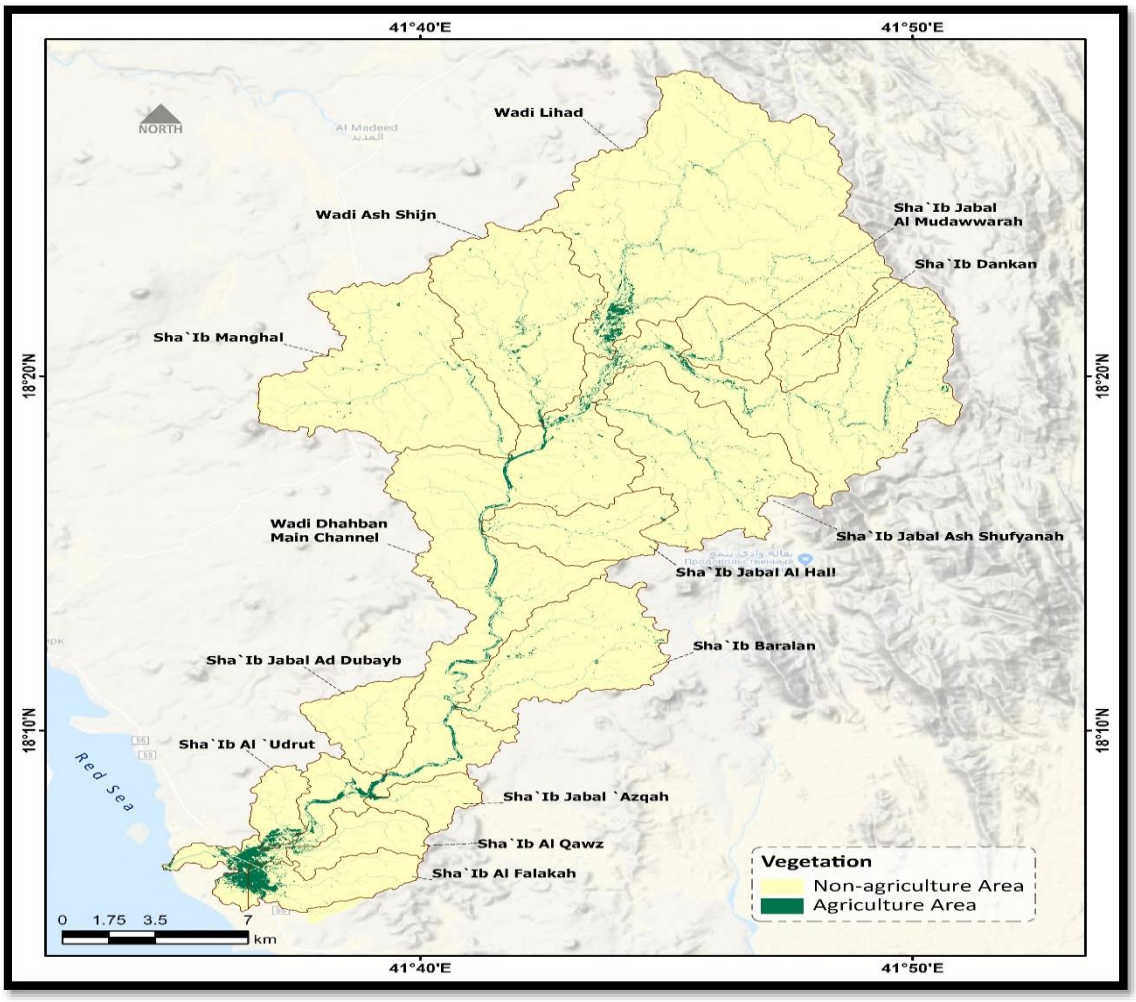


Fig.7. *The vegetation cover index in the study area.*

Wildlife

Live in the heights of the Wadi Dhahban region, many wild animals such as baboons, which are present in large numbers. There is also the Arabian leopard, which is endangered due to hunting. While the region abounds, different types of insects such as butterflies, birds, Arabian partridge, Arab woodpecker, Yemeni shady, hornbill, and white-horned starling. In addition to some birds of prey such as the sparrow, the brown eagle, the Arabian woodpecker, the Moroccan peregrine falcon, and the Asiri magpie.

The mouth of Wadi Dhahban, on the coast of the Red Sea, also enjoys the presence of many African migratory birds, such as: olive crescent, seagull, flamingo, grouse, pelican and seagull. And many birds of prey such as: the sparrow, the brown eagle, the Arab woodpecker, the Moroccan peregrine falcon, in addition to the crows, which are represented by the Asiri magpie) Ministry of Municipal and Rural Affairs, Coastal Detail Plan Project in Asir Region, 2010, p. 32). Wadi Dhahban is an integrated and diverse ecosystem between the mountainous and marine environment, as it works to attract marine and terrestrial organisms, sea and wild birds, and is characterized by the diversity of wildlife, and thus contributes mainly to attracting large numbers of tourists.

Results and Discussion

Geographical diversity is the main aspect to determine the attractiveness of geotourism, which is incentivised through cultural and biodiversity in the development of geotourism in each tourist site in Wadi Dhahban, as mentioned in the following:

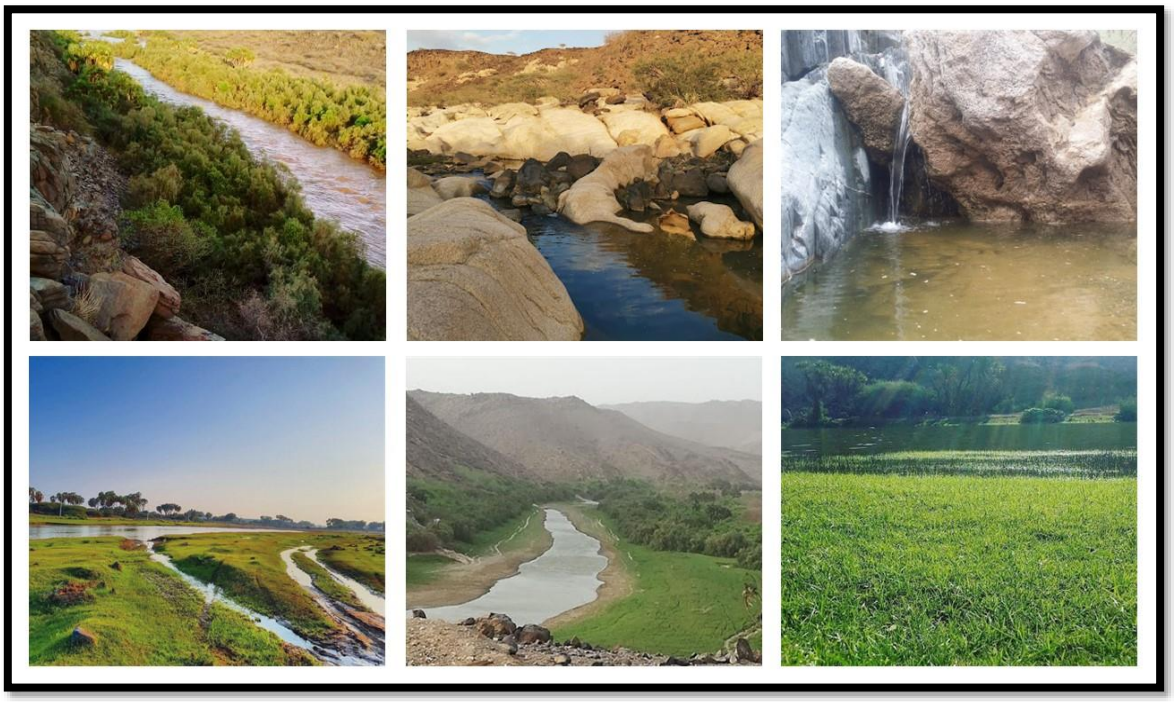
Wadi and Lake Dam Dhahban:

Wadi Dhahban, one of the most prominent valleys of the coast of Asir, and one of the most important tourist destinations, Wadi Dhahban combines coastal and mountainous nature, which embraces many elements of tourist attractions. Wadi Dhahban is a unique tourist attraction, where there are fresh waters descending from the highest mountains and the salty waters of the Red Sea.

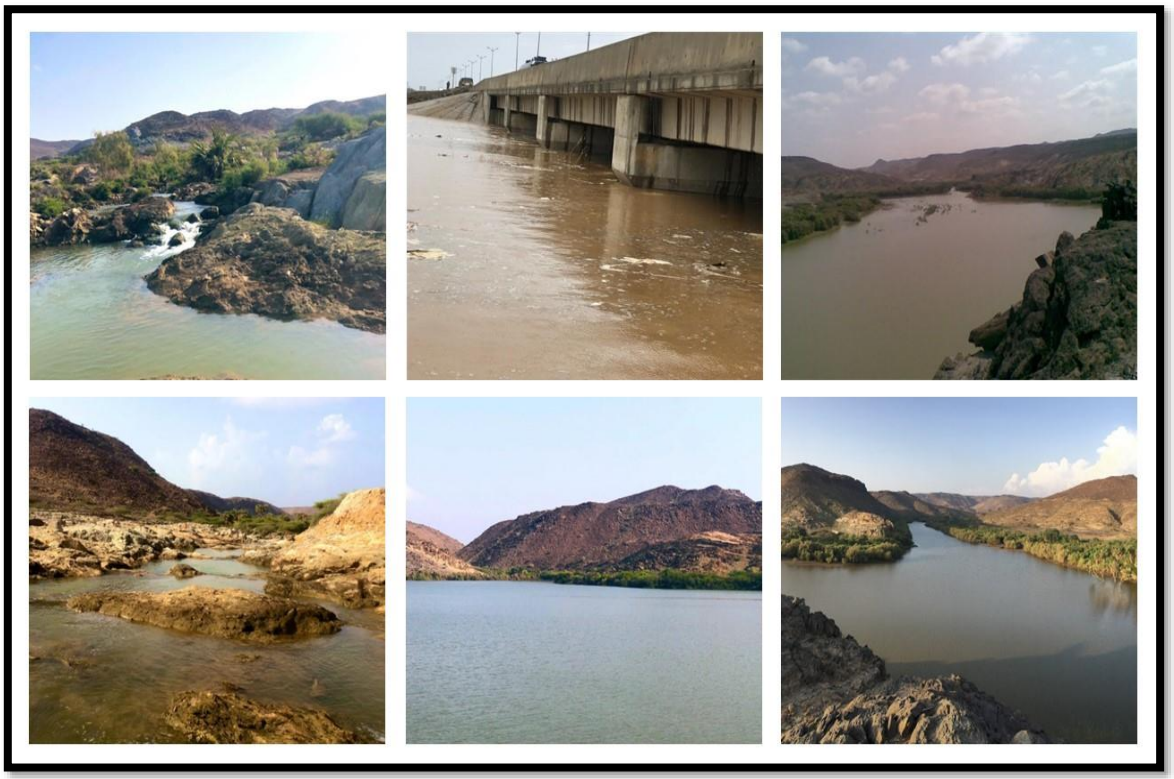
Wadi Dhahban is characterized by the wideness of its stream. Which spreads on both sides of many of the green spaces are represented by farms, palm trees and weeds, and farms and villages are distributed along its path. The valley's sources come from the Al-Sarat Mountains in Asir, the most prominent of which are Wadi Mudiyah, Drai' Al-Jib, Linka, Al-Atiq, Athleh, Dhankan, Al-Bakhin, Al-Nakhil, Archen, and Al-Doma. The valley includes natural geographical phenomena such as tall mountains, agricultural terraces, caves, waterfalls, rock formations such as al-Tafuni, and lakes.

The dam of Wadi Dhahban is located between two Harrats at the bottom of the valley on the receiving point of three valleys. It has a low side left due to the large number of rain-fed farms at its bottom, from after the dam in the west to its mouth in the Red Sea. The dam was built in 1417 AH, the length of the dam is 262 m, and the height of the dam is 15 m. The Wadi Dhahban Dam and its lake are one of the most prominent tourist attractions. On both sides of the dam and the lake there are a group of hills that can be exploited by making them overlooking points or public parks for tourists.

Among the best sites in Wadi Dhahban, which are visited by visitors: Al Shatba, Saqr, Al Sadd, Al Mahwan, Al Jiwar, and Al Mutarad, Wadi Dhahban is an important park for the residents of the Asir region and a source of livelihood for most of the valley's residents, especially during the dates season.



https://mobile.twitter.com/dhban_official
Fig. 8. *Geographical features in the course of Wadi Dhahban.*



https://mobile.twitter.com/albark07
Fig.9.*The Dam and Lake of Wadi Dhahban.*

Agricultural terraces:

Terraces are a kind of resource that serve a variety of other purposes outside producing agricultural goods. For instance, they may be utilized as training grounds for agricultural

practice by students, research bases for academics, gorgeous tourist attractions, homes for wildlife, and soil preservation. These features have the potential to draw a variety of visitors to terraces. Terraces are advantageous for promoting tourism because of this. Today, a number of terraces throughout the globe are well-known tourist sites, such as the Ifugao terrace in the Philippines (Bantayan et al, 2012).

Terraces in Northern Vietnamese highlands, Hani terraces in Southwest China, terraces in Qingtian County in Southeast China, (Sun et al., 2013) (Hoang et al, 2018). Tourism growth has a favorable impact on terrace preservation in these terraced locations. For instance, it provided lots of non-farm work for the residents to supplement their income sources, motivated local farmers to continue farming owing to price increases of agricultural goods, or raised farmers' understanding of conservation for terraces. Therefore, these terraces in Wadi Dhahban must be preserved and better developed to be used for tourism investment Fig.10.

Fig.10. *Agricultural terraces in Wadi Dhahban.*

Jabal Al Ish

The mountain of the Al Ish is located, or as it is called by the residents of the region, "Mount Umm Ish.", on the coast of the Red Sea directly, at the southern bank of the mouth of Wadi Dhahban. This mountain was found ancient archaeological inscriptions dating back about 400 years before the mission of the Prophet Mohamed, may God bless him and grant him peace, these inscriptions were written in the script of the ancient Arab kingdoms that were in the south. The font in which these inscriptions were written is known as the Musnad script (Al-Saeed, 1417 AH. P.121), these inscriptions bear the names of ancient gods and celebrities such as Antar, Zhuhir and Yalav, so that the writing of these inscriptions is intact and clear so far, Fig.11. On its southern side, the mountain contains a group of quarries that were used for mining purposes. In its southwestern part, a mosque was built of stones Fig.12., the walls of which are approximately one meter in length (Al-Saeed, 1417 AH. P.122).

http://www.tihamh-qn.com/?p=98160

Fig.11. *The inscriptions in the script of the ancient South Arab kingdoms (Al-Musnad script).*

http://www.tihamh-qn.com/?p=98160

Fig. 12. *Jabal Al Ish Mosqu.*

Archaeological city of Dunkan

The Dhankan Mine is located in the upper part of Wadi Dhahban from the east, so that it is about thirty kilometers from the mouth of Wadi Dhahban into the sea in the eastern direction. It is an area of gold prospecting, and the Dhankan Mine is bordered on the east by a high mountain range, which is an extension of the Tihama cliffs series, Asir, from the north, Harrat Bani Hilal, from the west by Wadi Dhahban, and from the south by mountains overlooking Wadi Uthma (Al-Naama, 1983AD, pp. 518-519).

The Dhankan mine is now in ruins, of which nothing remains of its features except its foundations buried among the rubble. It is a large factory located on the southwestern side, and there are still remains of kilns built of stone, and some basins for refining, and these basins are scattered around the kilns. The mine is hidden among the rubble. At the entrance to the mine there are burnt iron slag, broken pottery, and burnt golden clay juice. The rest of the furnaces and factories are spread intermittently on the surface of the mine. In the course of Wadi Dhankan, behind the mine from the west, there is a well buried, which was feeding this mine with water. Now, the Dunkan mine is surrounded by a wall and is affiliated with the General Authority for Tourism and National Heritage. The Dunkan mine needs to be developed, by making it a place to relive its ancient past, so that it becomes a museum open to tourists.

Archaeological fort:

overlooks the mouth of Wadi Dhahban, 15 kilometers south of Al-Birk Governorate, and its remains from the eastern side are still visible to the visitor. Its location overlooks the palm groves, the harbor, and the land route for the passage of pilgrims and trade. The western part of it was buried due to the encroaching sand (Munjihi, 1428 AH - 2007 AD).

Al Dhahban Village:

It is considered one of the largest heritage villages in the region. It is distinguished by its stone buildings, which reach a height of one and two meters to support its base with mud. Al-Natf (stone) was used between the mud to protect it from rain, and is characterized by the presence of corridors called "Al Shadfa" that are roofed with local wood, The village consists of a number of buildings that mix mud, thatch and stone foundations, one meter high. Also, a stone (Al-Natf) was used between mud and straw to protect these buildings from rain, and it was chosen very carefully and with certain sizes, as the buildings were roofed with local timber, and there is a water well in the center of the village, and it was used by the residents of the village, Fig.13.

Fig.13. a-b-d *remains of the houses of Dhahban village,* ***c*** *Village water well.*

Dhahban beach:

The beach of the study area is characterized by soft, golden, flat sands of varying depth and devoid of coral reefs for long distances that are suitable for bathing, practicing marine

sports and water games, mangrove trees, natural herbs and coral reefs that are suitable for diving, in addition to the hobby of land and sea fishing. The beaches are of great importance in tourist attractions, In addition to the marine parks that are located at the end of the valley, the most prominent of which are: Al-Hamma Beach, Al-Jamara, Al-Ish, and Al-Mamlah Beach, as well, coral reefs and islands close to the coast, which are located at the mouth of the valley, such as Jabal Island, Hasar Island, Aqam Island and Jabal al-Ish, which are the focus of tourists' attention when they visit Wadi Dhahban. Fig.15.

Fig.14. *Wadi Dhahban mouth beach.*

Jabal Dhahban Island:

Jabal Dhahban Island is located at the mouth of Wadi Dhahban. The area of the island is about 1 km2 and it is about 0.30 nautical miles away from the coast (Saudi Geological Survey - Facts and Figures, 2012, p. 80.), and this island was previously home to the camel people for protection. Jabal Dhahban Island has natural ingredients that qualify it to be one of the most prominent tourist places, due to its white sand bordering its beaches, coral reefs that penetrate deep into its depths, as well as mangrove trees with a height of no more than a meter, while rock formations emerge in some of them due to erosion and wave movement. Mangrove trees have various types of sea birds such as seagulls, swans, and wild pigeons, in addition to the presence of groups of “Dolphin” animals, surrounded by coral reefs rich in fish, the most famous of which is Al-Nagel, and it is considered one of the most famous places that fishermen go to for fishing.

Geotouristic map:

The research led to the creation of a geotourism map, which can be used to promote and publicize local geotourism, geological and geomorphological items, topography, and mountain and coastal landscapes. The map outlines the most significant components of the geographical heritage in Wadi Dhahban, which distinguish Wadi Dhahban, because it combines the mountain and the sea. Wadi Dhahban combined the beauty of the marine nature through Al-Fuhood Beach, and the beauty of the mountainous nature that characterizes “Wadi Dhahban” with a charming nature and stunning views, after it was covered in a green suit in which water flows throughout year, amid good vegetation cover, and the sea beaches, and exploiting its picturesque nature. Which is a ready-made raw material for tourism, and it needs some services necessary to attract, and thus turns into a tourist attraction site to be an additional tourist tributary in the Asir region.

The activity of eco-tourist camps is one of the most important means of tourist attractions, and the camps have developed in recent years, many new patterns have emerged, and these camps have spread clearly in the desert, mountainous and coastal regions of the Kingdom, in order to develop the tourism sector and push the wheel of tourism development in all the patterns that characterize the Kingdom, including the ecotourism pattern, which depends in its development on the importance of Developing eco-tourist camps that give visitors (citizens and residents) the opportunity to enjoy the landscape and the attractive natural atmosphere.

In Wadi Dhahban, some safe sites have been proposed that are suitable for setting up camping sites according to a number of criteria, which are the distance from the sites of high voltage lines of electricity by about twenty meters at least, far away from the streams and estuaries of the valleys, far away from wells and dams, in addition to having a safe and easy way to reach the site. Moreover, based on the Guide to Licensing Standards for Tourism Environment Camps in Saudi Arabia, draw a map of the camping sites according to the safe sites, for draw a map of the camp sites according to the suitability location, Wadi Dhahban was divided according to sustainability criteria into five regions: (Not suitable, least suitable, Medium suitable, suitable, and most suitable). Accordingly, a number of proposed sites for the establishment of a camp were proposed, fig.15.

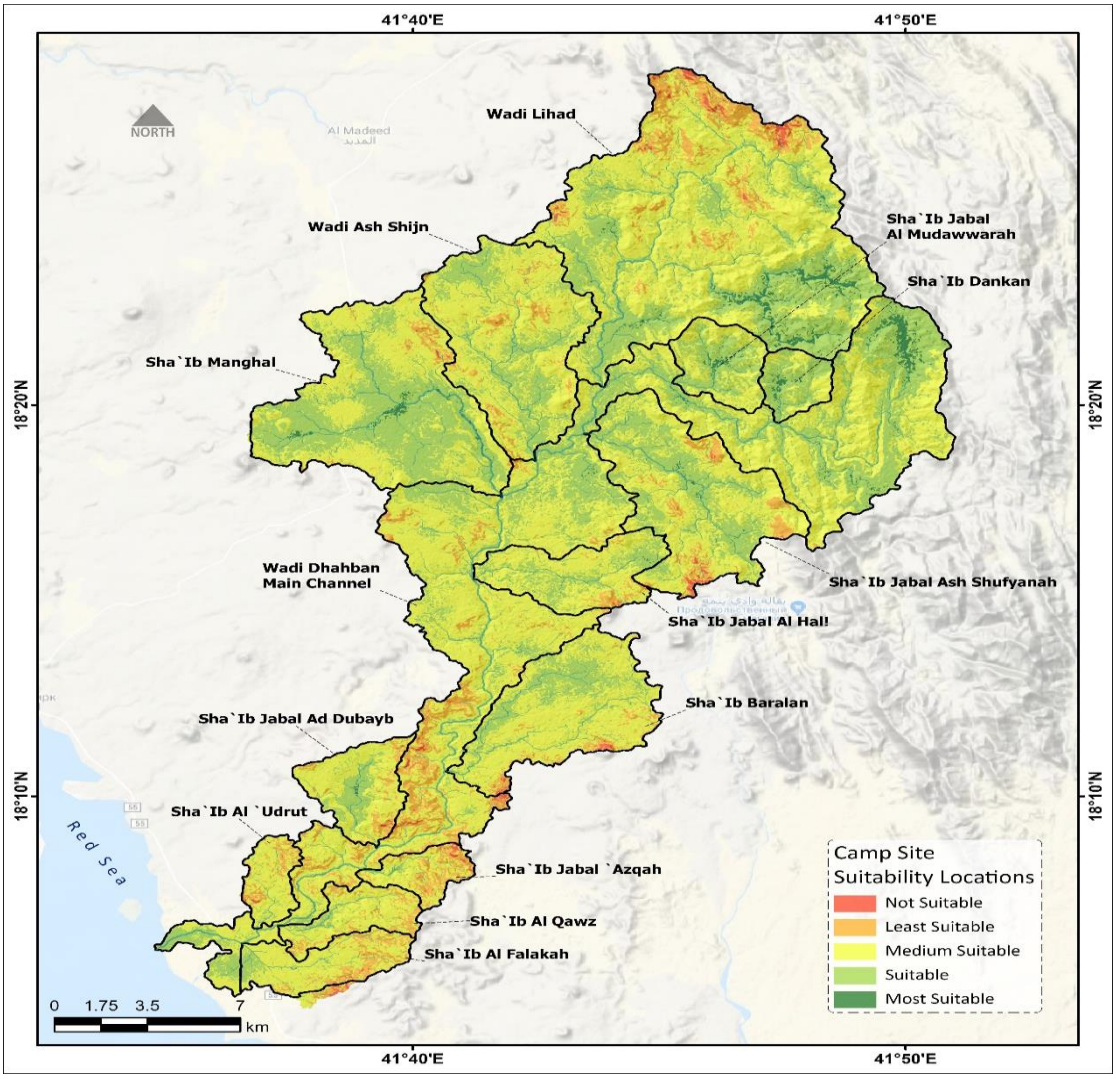


Fig.15. *Suitability locations for Camp sites of the study area.*

The geotourism map is a powerful means of valuing and promoting geotourism in mountainous regions, especially to sites that have not yet been sufficiently explored and promoting geotourism. This media combines geomorphological and geological aspects, cultural sites (archaeological and historical), and tourist information, making it an effective approach to convey to the general public the significance of geographical areas. The geological map that is being displayed illustrates the many applications for employing geological and geomorphological data, information, and expertise that are accessible to the average visitor. The tourist map of Wadi Dhahban includes the most important tourist sites, which are the focus of attention for tourists, such as Jabal Dhahban island, Zuhib Alnakhil park, Wadi Dhahban Park, Ambtilah park, Wadi Dhahban Dam, archaeological city of Dunkan, jabal Aleish, Archaeological fort, Dhahban village, agricultural terraces, coral reefs, Volcanic mountains, one of the most important results of the tourist map was the suggestion of sites to set up camping, Fig.16.

The management and conservation of sites that are important from the standpoint of sustainable development may be improved with the use of knowledge in the field of geotourism. The geotourism map's primary purpose is to increase investment, and as the majority of these locations are unprotected, it also aims to add these locations to lists of regional, national, and worldwide geographic heritage. This new development is intended to inspire the local populace to value its history. According to his expansive concept of geotourism, cultural attractions like the major historical and cultural monuments are included to boost the allure of the visited places (Rodrigues et al. 2011). This is explained by the fact that the examined region is well known and often visited due to its natural beauty and rich cultural heritage.

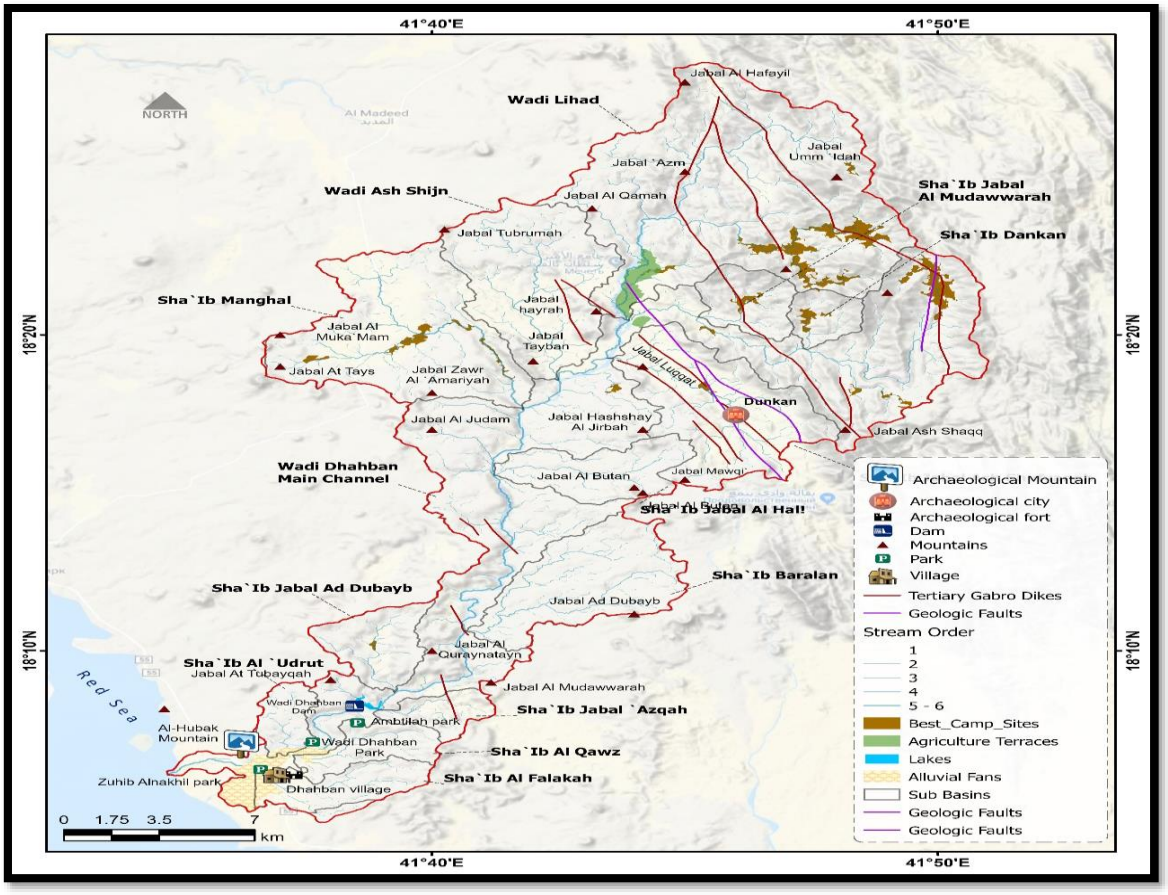


Fig.16. *Geotouristic map of the study area.*

Conclusion

The growth of geotourism in support of Wadi Dhahban was covered in this research. The key factor promoting the growth of geotourism is geodiversity; in addition, the presence of biological and cultural diversity adds value for visitors and aids in its preservation. where its terrain varies in the mountains, valleys, agricultural terraces, Dhahban Dam, Lake Dhahban Dam, gardens, coastal plain, and Wadi Dhahban estuary on the Red Sea and the islands. In addition to other tourist attractions such as: archaeological sites and historical inscriptions. The study proved the diversity of tourist attractions in Wadi Dhahban. It relied on the study of sites in Wadi Dhahban. The study concluded that Wadi Dhahban is a promising geographical tourist area. Due to its vast geographic variety, the study region offers high potential for the growth of geotourism, according to the findings of our study. Additionally, it has a strong geomorphological legacy that has produced several geological sites with significant scientific importance. Finally, the multiplier effects that tourism has on revenue and jobs may help the region's economy. It is intended to incorporate sustainability as a new development paradigm via the promotion of natural, wildlife, and cultural tourism by governmental and non-governmental organizations.

Recommendations

- Interest in the region as it is one of the promising areas in the field of geo-tourism, by developing the infrastructure such as: road network, water, electricity, and communication service.
- Application of augmented reality technology because of its great importance in attracting many tourists and providing them with information, pictures and maps about the most important geographical and geomorphological phenomena, which the tourist can enjoy watching and recreation.
- Making media propaganda for Wadi Dhahban to visit it and enjoy watching it and camping next to it, organizing camping and being affiliated with Saudi Commission for Tourism and National Heritage.
- Preserving and maintaining the natural environment from tampering and destruction, placing signs and guiding panels, and a simplified explanation of geo- tourism sites.
- Paying attention to and developing caves by identifying the roads leading to them, restoring them and strengthening their roofs with modern methods used to strengthen global caves, and setting guidelines to facilitate the movement of tourists entering and exiting them, and lighting them.
- Regulating forms of tourism within Wadi Dhahban, by exploiting the different forms of the earth's surface without human intervention in modifying any form of the earth's surface. In various forms of tourism, such as: mountaineering tourism, roaming, balloons, horse riding, paragliding, listening to landscapes, whether mountainous or coastal, and making a cable car that connects the valley between the mountain and the sea.
- Developing the structure of the tourism sector through the establishment of hotels, camping areas, restaurants and cafeterias in the tourist sites in the valley, especially the dam area and the mouth of Wadi Dhahban.
- Restoration and rehabilitation of castles, forts and archaeological areas, in order to become sites that invest in tourism, while preserving the ancient urban heritage, and the necessity of choosing an urban plan that is compatible with environmental conditions and inspired by the style of Asirian architecture.

- Establishment of a wild zoo, to enjoy and preserve biological diversity and wild animals and protect wildlife.

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