The distinctive natural characteristics of the Al-Batnan and Al-Dafna Plateau in Libya

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Abstract : The Al-Batnan Plateau occupies an important geographical area on the Libyan map, as it is located in the northeastern part of Libya, and extends from the Dafna Plateau in the east to the eastern slope of the Green Mountain in the west, and from the Mediterranean Sea in the north to the lowland region in the south, that is, between longitudes (23-24) east. And two latitudes (30:31-20-32) north, where some areas of this plateau are characterized by their rugged terrain due to Due to the large spread of mechanically crushed rocks, valleys, and cracks in various places, this is due to the nature of the rock formations and geological structures of the Al-Batnan and Al-Dafna plateaus on the one hand, and the effect of erosion and mechanical weathering in the region on the other hand due to the nature of its climatic conditions. The terrain represents the topographical manifestations and natural features of the distinctive features of the surface. On the outside of the region, each terrain feature has its own distinctive topographical characteristics that create a natural environment of its own The terrain controls the nature of the relationship between the features of the Earth's surface and the human activity based on it, as the areas of Al-Batnan and Al-Dafna were known as Mar Marika, and Al-Batnan means that range extending from the southeast of the Bay of Bamba towards the east to Tobruk, and Al-Dafna refers to the plateau extending from the city of Tobruk to the Salloum Plateau. This local area extends beyond the Al-Jaghbub area in the south, and they represent a single plateau extending from the Bay of Bamba in the west to the village of Al-Bardi in the east in one straight line along It reaches (250 km) and rises to about (220) meters above sea level, and is separated from it by a narrow coastal plain whose width varies from one place to another, but does not exceed (40 km). The city of Tobruk is the border between the two plateaus, and this plateau extends in general next to a line The winding coast, and takes a peaceful shape in the northern coastal areas due to the steep slope of its northern facade towards the coast, and the slight slope towards the south, and then many terraces appeared that vary in breadth from the area To another, it is spread over a group of longitudinal depressions that permeate its surface, reaching a width of several kilometers, and they are called sheds, which are known locally as the shed. It is believed that the origin of these sheds (plural of shed) results from the exposure of the earth to tectonic movements in addition to marine erosion factors, and the two sheds are separated from The other are high hills known locally as (Al-Hajjaj), or Al-Dhahr, and there is a large group of sheds with local names such as: Atbireek. Al-Zaafarana, Halfaz, Al-Shuwairat Al-Kharga, Al-Qobba Al-Qababa.

Keywords: Characteristics – Natural – plateau - The two stomachs - The burial.

the introduction:

Natural characteristics are among the most important natural components of the state, as they determine its internal and external behavior, Studying the land is in order to become familiar with all the natural geographical characteristics that distinguish it, which aims primarily at a comprehensive analysis of the natural characteristics that affect the state's entity economically and socially, or that affect its production capabilities.

And exploiting the natural resources available therein, as the geographical location and natural characteristics of each region are among the most important elements of the state's strength and the influencing factor in its internal policy and international relations, to the point that some of them believed that the location is a commodity that the state can obtain from it, Material or moral returns, although Art Toffler believes that many countries have lost these returns due to the deterioration of the value of their location or the failure of the major countries to accept it, Therefore, the geographical location is one of the natural factors affecting the region's politics, the state's sovereignty, its national security, and its political interaction with its neighbors, Therefore, it has many economic and social consequences. The astronomical location is also an influential factor through its impact on human activity, as it affects agriculture and forest resources (Hamdan, 1996) Libya is located astronomically between longitudes (9 - 25) degrees east, and latitudes (19 - 33) degrees, and thus it extends over (15.7) longitudes, and thus the difference between the east and west of the country is large, including It is more than an hour, i.e. (62.8) minutes. Moreover, it is along a factor of (141) latitudes, and the Tropic of Cancer penetrates its southern parts, which was one of the causes of drought and desertification because the climate It is characterized by its desert, and accordingly, Libya falls within the desert climate except for the northern parts (Al-Hadithi, 2020). The Al-Batnan Plateau is one of the regions in the State of Libya that is distinguished by characteristics

that distinguish it from other regions in Libya, as the landforms in the Al-Batnan Plateau are a reflection of the natural conditions inherited from the rainy era. And the climatic conditions currently prevailing, and that geomorphological processes are the force that changed and still plays an effective role on the surface of The study showed that water erosion and sedimentation processes had a significant impact on the morphology of the northern plateau, which led to the formation of multiple and disparate landforms, some of which were legacies of the rainy era, And from the results of the study of water erosion on the surface of the plateau, the extent of water erosion in the northeastern region reached.

The study measured 175 m3/km2/year, in its northwest it reached 80 m3/km2 year, and in the middle and south of the plateau it reached 376 m3/km2. 2 years) according to the levels of water erosion, and the gully erosion reached (8127 m3/km2) according to the bergsma classification, Very severe gully erosion prevails in the north of the plateau, and it is not a product of the current climate, but rather a legacy of the Pleistocene era during rainy periods, As for the intensity of water erosion According to Fortier's equation, it reached 32 in the northeast of the plateau, 59 in its northwest, and in the center and south of the plateau, 13, and these values ranged from weak to moderate erosion, and they varied from one place to another on the surface of the plateau according to natural influences, Given the importance of the locations of many regions in Libya, many researchers and those interested in this aspect devoted themselves to studying it and studying the geography and natural characteristics of a number of regions in Libya. It is of great economic and social importance, and even in all aspects and areas, and one of those studies is this study, which aims to identify the natural characteristics of the Batnan Plateau within the framework of a plan aimed at identifying the geography of Libya, And learn about the distinctive characteristics of each region.

Study problem:

Geographic studies are concerned with logical and scientific analysis to highlight various phenomena on the Earth, Geography has proven its ability to communicate Earth sciences clearly, as its studies have included everything that concerns the Earth, including studying the nature of the Earth's composition, including plateaus, mountains, types of rocks, natural mines, valleys, and volcanoes. Rivers, oceans, and the features of that terrain that resulted from natural, environmental, and climatic factors that greatly influenced the shape of that terrain, Given the importance of this science, many From researchers and those interested in this aspect by studying it and studying the geography and natural characteristics of many regions in Libya to understand these important geographical features, and given the importance and strategic location of the Batnan Plateau and Al-Dafna and the natural features located in this region, the researcher conducted this study to shed more light on the importance of those areas and the importance of their location, The strategic and effects of climatic factors on the formation of its terrain and features serve the importance of the individual and society, and from this standpoint and through the researcher's observation of the importance of these studies and those areas whose features are unknown to many, and whose features are They all supported the importance of this study, which aims to identify the natural characteristics of the Batnan and Dafna Plateau, The researcher shed light on the characteristics of this region and its geographical features.

Study questions:

The study questions are the following:

1-What are the distinctive natural characteristics of the Al-Batnan and Al-Dafna plateaus?

Study objectives:

This study aims to:

.Identify the natural characteristics of the Al-Batnan and Al-Dafna plateaus

Importance of the study:

The importance of the current study lies in several points, including:

1-The study is useful in identifying the most important natural characteristics of the Al-Batnan and Al-Dafna plateaus.

2-The originality of the study, as this study is considered one of the few, if not the first, studies in the local environment that monitors and identifies the most important distinctive natural characteristics of the Batnan and Dafna plateaus.

3-This study is a scientific contribution to defining the geography of Libya.

4-Reaching results on the basis of which a number of recommendations and proposals can be presented that may help specialists in this aspect benefit from the geography and nature of some regions economically, socially, and politically.

Study terms:

The terminology of the study is represented in the following terms:

Al-Batnan Plateau: Al-Batnan is a plateau located in the Tobruk region, The Al-Batnan Plateau extends from Tobruk in the east, to Wadi Boufrais in the west, It is located to the east and south of Jabal Al-Akhdar, It is terraces and terraces whose height does not exceed (500 m) and approaches the coast in some areas to form steep, receding rocky cliffs. And regression list.

Limitations of the study:

1-**Objective limit**: Identifying the most important natural characteristics of the Al-Batnan and Al-Dafna plateaus.

2-**Spatial limit**: This study was conducted on the Al-Batnan and Al-Dafna plateaus.

.3-**Time limit**: This study was conducted during the year 2024 AD

Study curriculum:

For the purpose of understanding all aspects of the study, we relied on the descriptive approach by listing some scientific facts and data.

Theoretical framework:

General natural characteristics of the study area:

Geology of the Batnan and Dafna Plateau:

Geomorphological phenomena are the product of the interaction of the erosion process on the one hand and the rock structures and lithological characteristics of the rocks on the other hand, The study of geological aspects is one of the topics on which the geomorphological study depends, Our study of the geological situation of the region was based on previous geological studies, and we will study the following topics:

1-**Stratigraphic succession**:

From studying the stratigraphic column of geological formations, we find that formations appear on the surface that belong to the third period, from the middle Oligocene - upper to the lower Miocene, and they are homogeneous in composition, with fish swallowing about (20 - 100 metres) approximately (Industrial Research Center, 1977) and they are limestone rocks, It is rich in fossils of homogeneous composition, in which layers appear in the lateral sections of the slopes and edges of sea cliffs, Limestone rocks constitute about (90%) of its components. It was deposited on the southern edges of the Sea of Tets, Quaternary sediments cover parts and areas of the region, represented by marsh deposits, coastal sand dunes, beach sands, and aquatic sediments. Accordingly, the limestone rocks in the region were divided into the following geological formations.

2-**Geological formations**:
Geological formations are divided into:

Formations of the third tense: -
It was represented by five geological formations (Al-Khawaimat Formation "lower member" / Al-Abraq Formation / Al-Fadah Formation / Al-Jaghbub Formation / Qarat Maryam Formation from the Oligocene to the Miocene), Their thickness varies from one formation to another, and their distribution on the plateau varies from one place to another, The following is a study of the formations, The third time in the region:

1-Al-Khawaimat Formation, the lower member: The Al-Khawaimat Formation represents the oldest visible rocks, It covers the northern part and extends parallel to the Mediterranean coast, It extends in the form of a very small strip at the lowest slopes, confined between Wadi Al-Raheb and Wadi Rizq, west of the Bardiya area, and extends in the Bab Al-Zaytoun area for a distance of (2 km), Only the upper part is visible, and it consists of hard, cohesive, fine-grained dolomitic limestone with interspersed sand, rich in fossils and shellfish, and characterized by a brown color, It is pale yellowish grey, its grains range from micro-crystalline to coarse-grained, and appear in layers, Fossil and rock evidence indicates that it was deposited in deep, open seas due to the presence of floating micro-fossils.

2-Al-Abraq Formation: The Oligocene (Upper - Middle): The Al-Abraq Formation represents a sedimentation cycle characterized by calcarenite rocks and their somewhat dolomitic character, which is predominantly brown in color mixed with rust and calcilutite, with interspersions of limestone containing fossils, most of which are of the algal type, Among the results are: Paleontological examination shows

that the deposits of the Abraq Formation date back to the period between the middle to upper Oligocene era (reserch centre, 1974, p: 4-5)

3-Al-Faidiya Formation: (Upper Oligocene - Lower Mocene): The formation covers the slopes of the Bardiya area, a distance of (37 km) parallel to the coastline, It also covers the northwestern part of the Bab al-Zaytoun area for a distance of (15 km) from the area in the form of a longitudinal strip below the slopes, The total apparent thickness of this formation is about 82 m (geological map of Libya al bardia sheet, 1977, 1:250,000), Its rocks are made of chalky limestone, rich in fossils and shells, with a layer of calcareous clay and marl. Its color ranges from whitish to yellow, and it overlaps in some places with calcarenite rocks (Al-Mabrouk, 2006, pp: 37-38), There is also a mismatch between the Al-Faidiyah Formation and the Al-Khawaimat Formation, It indicates that the Faidah Formation was deposited in deep basins, and sedimentation continued from the upper Oligocene to the lower Miocene, (Taher, 1990).

4-Al-Jaghbub Formation: (Lower Miocene - Middle Miocene): The Jaghbub Formation is the most widespread in the region, as it consists of layers of limestone and chalky limestone rich in fossils, whose color ranges between white and yellowish-white, with redness in some of its parts due to the presence of oxide, Iron, its grains range from microscopic to coarse, with some quartz in its layers, Jaghbub rocks are generally horizontal, with a slope in areas, It is affected by some geological structures and faults, with the presence of conglomerate layers in parts that indicate terrestrial movements (Al-Mabrouk, 2013, p: 25), The Jaghbub Formation represents one pattern in the marine sedimentary environment, and the sediments of the Quaternary Period cover the formation homogeneously, and the total apparent thickness reaches (130 m), (Industrial Research Center, 1977)

5-Qart Maryam Formation: The rocks of this formation consist of fossil-rich limestone of medium hardness, white in color with chalky limestone, and light green shale limestone, which overlaps with the upper part of the rocks of the Jaghbub Formation, The rocks of the formation were deposited in shallow water during the middle Miocene era and spread This formation is in the southwest of the study area, and the layers of this formation are mostly horizontal, except for the areas that were subjected to tectonic movements (Industrial Research Center, 1977, p: 7).

Formations of the fourth time: -

It covers large parts of the region, most of which are deposits that include aquatic sediments, flood clasts, shale, silty sand, gravel, consolidated pebbles (conglomerates), sabkha deposits, beach sands, and coastal sand dunes. These deposits are evidence that indicate the occurrence of climate changes that were It has environmental impacts on the area.

A-Ajdabī Formation (calcarenite rocks): This formation covers parts of the coastal area intermittently and in the form of a narrow strip whose height ranges between (2 to 6) meters, and consists of calcarenite rocks, shell fragments, and seashells that are predominantly white to rough gray in color, It is medium to light yellow, solid to brittle, and is characterized by intermittent stratification (Al-Mabrouk, 2013, p: 25).

For,**B-Sabkha sediments**: They are loose sediments of clay, silt and sand, They are wind and water deposits carried by running water to the sabkha, They appear along the coastal strip and at the mouths of most valleys, and are sometimes covered with a crust of salt resulting from evaporation during periods of drought, Water also covers these sabkhas,

During the winter, as a result of rainfall, a group of plants grow there, such as tamarisk, el-dis, and hajna.

C-Aerial sediments and beach sand: They include sediments of coastal sand dunes and reach a height of (15) meters, They are limited to the coastal strip area and consist of marine shell fragments with quartz grains, and sand ripples appear on them as a result of wind gusts (Al-Mabrouk, 2013, p: 25)**.**

D-Water sediments: They are the most widespread, sediments and are found at the bottoms of depressions and flat areas, (Industrial Research Center, 1977, p: 7) They appear in the form of flats consisting of reddish clay soil and in the form of sandy soil deposits (Jaber, 2019, p: 51) It has shallow extensions of limited depth mixed with brown gravel with deposits of limestone and sandy shale. (Al-Mabrouk, 2013, p: 25)

3-Climatic characteristics:

The study area, like other regions of northern Libya, was subjected in the fourth period to a successive series consisting of four to five rainy periods separated by dry periods (Jawda, 1973, p: 17), It can be said that the rainy periods in the northern range of Libya coincide with cold or icy periods in central Europe, and this similar repetition of ice and rain conditions is accompanied by a decrease in temperature and an increase in humidity rates, and that these periods had the greatest impact on the processes of water sculpture and in changing the geomorphology of the region, and the transfer of Large amounts of sediment into depressions and the mouths of valleys, and in the emergence of many depositional geomorphological forms (Al-Mabrouk, 2013, p: 46), The prevailing winds in this region are generally represented by northwesterly winds with a percentage of (49.9%) of the total prevailing winds, and the percentage of directions varies, Other winds range between (18.2%) for the northern winds and (1.1%) for the northeastern winds, The role of the wind as a transport

and deposition factor appears in the formation of some phenomena. Geomorphologically, however, the wind speed did not reach a strong force to form large wind forms, and they were represented by some beds and sand covers, and in the formation of some small clouds, Rain also falls abundantly in the period between October and April, while the rest of the months are without rain, The annual average rainfall is estimated at (190.2) mm, and the amount of rain decreases to a minimum of about (70) mm, and reaches a maximum of about (250) mm, and rainfall amounts are concentrated on limited days, mostly in the winter in the months of December, January, and February, and such concentration in rainfall has a role in shaping some geomorphological phenomena resulting from water flow, The annual average humidity is about 71.6%, and high humidity rates are observed in the summer as a result of high temperatures, which activates the evaporation processes of sea water, The northern winds coming from the sea also work to increase the humidity level in addition to the activity of the sea breeze, which reaches its peak during this period, The spring season is considered the lowest season in terms of humidity, as a result of the influence of the hot and dry Qibli winds that blow frequently during this season on the region, which leads to a rapid drop in air humidity and works to raise temperatures (Al-Mabrouk, 2006, p: 52)

External factors shaping the surface of the Batnan Plateau:

Which are:

First: Morpho-climatic processes: These include external changes affecting the Earth's crust, which cause continuous changes in it, which are summarized in the disintegration and decomposition of rocks, and then erosion factors transport and deposit them in other places, Among these factors are both types of weathering, whose effects appear on the Earth's surface, They include several climatic processes, including: The most important of them are:

1-Weathering processes: This means the process of disintegration and decomposition of rocks by the prevailing atmospheric factors in the air and hydrospheres affecting the slopes of the study area, resulting in new shapes or changing old appearances according to the difference in the rock composition and the period of time to which the slopes are exposed due to weathering, and the products remain in place or are transported by Transport factors down these slopes include weathering: mechanical weathering and chemical weathering, and it is unlikely that either process will work completely alone (Sparks, translated by Laila Muhammad, 1983, p: 31).

A-Natural or physical weathering: It is the process of disintegration of rocks and transforming them into different sizes and shapes without changing their mineral or chemical properties (Al-Khashab, et, al, 1978, p: 66), There are a group of geomorphological factors that help in the activity of this type of weathering on the slopes of the study area, which are:

-Thermal (radiative) weathering: It means the thermal range in the study area, as the thermal range is characterized by daily, monthly, seasonal and annual variation, and its lowest values are during the month of January, and the highest are during the month of August, and it ranges on the coast between (17.5 - 29.7), Due to the influence of marine influences, while in the center and south of the plateau through the Nasser Meteorological Station - between (11.7 - 25.6) and the temperature rises during the month of August, It reaches (40) during the day, and at night it usually does not exceed (19) (Al-Darrat, 2019, p: 59), which helps activate mechanical weathering on the slopes and the surface of the plateau, as the temperature range causes the rocks to expand and contract, and due to the variation in their components, In minerals, there is a variation in expansion and contraction, which leads to cracking at varying levels, and the thermal change is limited to the

surface layer only due to the weak degree of thermal conductivity of the rocks, which leads to the phenomenon of fracture, And peeling and cracking in them and the widening of their openings (Masoub, 2002, pp: 88-89), A distinction must be made between natural or mechanical disintegration and chemical disintegration, This type of weathering is widespread at the top of the slope faces in the study area due to the exposure of surface rocks due to soil erosion**.**

-Salt weathering: It refers to the role of crystallization of salts in the disintegration of rocks, and despite some chemical aspects of this process, its role in the disintegration of rocks is primarily a physical role (Mahsoub, 2002, p: 84), and sea spray is one of the most important factors in Weathering processes on the surfaces of the northern slopes of the plateau, where it settles in fine rock cracks and works to expand them, occurs regularly on the slopes and may be concentrated in specific weak spots such as weathering pits or... Rock caverns, where limited precipitation and high temperature help to form salt crystals, especially at the feet of slopes, highlight the role of salt weathering on slopes in cavitation disintegration (Pitty, 1973, p: 186), which results in a rock surface in the form of honeycombs, that is, full of holes. As for the cavities The eldest, so you know Tavoni (Sparks, translated by Laila Muhammad, 1983, p: 42).

The most important manifestations of natural weathering on slopes:

The most important manifestations of natural weathering on slopes are the following:

1-Flaking: It means the separation of the outer parts of the rock in the form of flakes and they remain on its surface until they fall or are transported by erosion factors (Sharaf, 1979, p: 265), It is formed due to repeated expansion and contraction in areas of geological weakness due to the variation in the daily and seasonal temperature range, and it was

monitored. Many slope surfaces were affected by the phenomenon of rock crusting along the northern edges of the plateau, The thickness of the rock crusts ranges between (2-9) cm and is characterized by sharp angles, With the passage of time, it disintegrates into smaller particles, and this phenomenon also spreads along the banks of the northern valleys without exception.

2-Granular flaking of the rock: This phenomenon occurs as a result of the difference in the mineral composition of the rocks and the difference in the response of its mineral components to daily thermal variation, and from here comes the phenomenon of disintegration, which may take the form of blocks, grains, crusts, or sharp-angled rock sheets (Al-Sayed, 2008, p: 63).

B-Chemical weathering: refers to the reactions that change the chemical composition of rock minerals and ultimately lead to their disintegration in the form of separate crystals or crystalline groups, Geological weaknesses are the most affected, where joints, cracks, and stratification allow water and air to penetrate, leading to the rocks being split into pieces, Large masses (Mahsib, 2002, p: 91) are the mutual relationship between the atmosphere and the hydrosphere and the rock formation, which works to transform some of its mineral components into other compounds, and among the effects resulting from Chemical weathering on plateau slopes is:

-The process of dissolution and carbonation: The process of dissolution is of great importance on the most resistant rocks, and its effect at a later stage is on the weathering products of rock fragments, weathering holes, notches, etc, As for the carbonation process, it is the result of the dissolution of carbon dioxide gas with rainwater, forming diluted carbonic acid, Which reacts with limestone rocks and leads to their conversion into soluble and decomposable bicarbonates, whose

effects appear in the shapes of dissolution pits of different sizes, It may reach the phenomenon of cavitation (Al-Ajili, 2005, p: 65). These processes prevail on most of the slopes of the plateau, where most of its rock components are limestone formations, The activity of these processes depends on the amount of running water, the amount of water vapor in the air, and the response of the rocks**.**

-The oxidation process: This process means that oxygen combines very slowly with some of the elements and compounds involved in the composition of rocks, The speed of this process depends on the percentage of humidity in the atmosphere and the type of those minerals, so minerals oxidize quickly in humid areas, and we can infer the oxidation of rock minerals from the red color, It is acquired due to the high iron oxide in it, while bauxite formations are yellow or white in color due to the high aluminum oxides in it, They are the most common examples in sedimentary rocks, so many types of Laterite soil is the result of the presence of iron compounds that are brown or red in color (Al-Zamili, 2007, p: 101). These oxides are weakly resistant and quickly disintegrate, and if they mix with rocks or soil, they give them their color (Sharif, 1979, p: 268).

-The process of hydration: This process means the combination of water with some minerals to form what are called hydrated minerals, This process leads to an increase in the size of the rocks, and this increase may sometimes reach (88) of the original size, which leads to adding more pressure inside the rocks and its effect is mechanical, However, it is often added during the decomposition process of these minerals, and an example of this process is the transformation of anhydrite (calcium sulphate) into gypsum (Fayed, 1972, p: 81), and the majority of rocks were affected. Sediment by the process of hydrolysis (hydration), especially in wet periods, is less resistant to erosion processes.

C-Biological weathering: It means the impact of animal and plant organisms and human activities on the surface of the Earth, It includes both natural and chemical weathering, as the natural or mechanical aspect is represented by the effect of plant roots in breaking and disintegrating rocks as the roots extend into the rock masses through cracks and joints, which leads to their expansion and fragmentation, Animals with claws and rodents work to disintegrate and crumble the soil while digging their burrows, Likewise, humans, through various activities of plowing and logging, work to disintegrate the soil that is underneath, As for the various erosion factors, the chemical aspect is represented by the microorganisms present in the soil (bacteria), which play a major role in determining the amount of soluble materials through the process of organic decomposition, which includes the formation of organic acids from rotting plant remains, producing organic matter (humus), The dissolution of these acids with water affects the soil and rocks and causes their decomposition, and affects the weathering of rock surfaces, as they appear in the form of weathering pits and notches on their surfaces (Creel, 1986, p: 96).

Second: erosion processes:

Erosion processes are complementary factors to weathering processes, and both of them have an effective role in shaping the surface topography, They are considered one of the most important geomorphological processes that constantly change the Earth's surface and its features in accordance with the activity and effectiveness of these external processes, The effect of the erosion process varies from one region to another according to the nature of the rock formations , surface topography, climatic factors, and the type of density of natural vegetation (Daoud, 2002, p: 70)

A-Water erosion: The geomorphological processes resulting from running water following rainfall are among the most important, widespread and influential matters on the slopes of the northern slopes of the plateau due to the nature of the prevailing limestone formations and topography and the lack of natural vegetation therein, and the nature of the cyclonic rains that characterize the northern parts of the plateau, Water erosion takes a toll on The slopes have several forms, including the following:

-Scattered raindrop erosion: The mechanical action of raindrops begins, which is known as spray erosion (Al-Khafaji, 2017, p: 1). When raindrops collide directly with soil particles, they break up their cohesive grains and small-sized rock fragments, which leads to their transformation into scattered particles in the air, relatively far from their original positions towards the bottom of the slopes due to gravity, and this depends on the size, concentration and quantity of falling rain drops, and that the characteristics of Raindrops in terms of quantity, intensity, speed, direction, and size are all factors that affect the separation of soil particles and their transfer. Slope also affects the effectiveness of raindrop erosion, so their scattering on flat areas is not very effective and is more effective on slopes, especially on the steepest slopes (Cook & Doornkamp , 1974, p:28).

- Laminar erosion or surface flow: Studies have shown that the amount of rain exceeding (30) mm/hour has a very high potential to wash away the soil (Al-Sheikh, 1987, p: 175).

-Flume erosion: This pattern is active on the slopes of the northern rocky slopes, and shallow channels are created as a result of surface runoff, known as flumes, Flume erosion is formed, which leads to the rapid removal of the soil surface through the torrent paths as a result of the drainage of running water that arises from heavy and sudden

rainstorms, and it changes in shape, Covering flow into concentrated flow in the form of a fine network of waterways that has a great ability to cause surface sculpting of the soil and transport sediments up to feet, Cliff slopes and low-lying areas (Cook & Andrew, 1977, p: 157)

-Gully erosion: It is an advanced stage of torrent erosion, where the initial streams or flumes turn into gullies when they begin to deepen and widen their courses during vertical and lateral carving, Gully erosion is the most destructive of the previous patterns of water erosion, and they vary in terms of their numbers, lengths, and depths in the area, The study is based on the structure and rock formations, the degree of slope, and the concentration of the prevailing rain, which results in soil erosion from the slopes of the northern edges of the plateau. It is deposited under the feet of the slopes and in the upper parts of the northern valley basins, and most of the rock formations of the study area are spread by faults and joints, which are geological formations characterized by their weak resistance to water erosion processes.

B-Wind erosion: Wind erosion is one of the geomorphological processes that constitute the general appearance of most of the plateau's surface, especially the center and south of the plateau, where the semi-arid climate prevails on its northern edges and the dry climate in the center and south of the plateau, The role of wind erosion depends on the formative and geological factors, and the surface and soil characteristics, Climate, which includes the amount of solar radiation, temperatures, wind speed and direction, precipitation, evaporation, humidity, and plant characteristics, Naturally, the effectiveness of the wind is linked to its speed to influence the size and quantity of fragments on the surface, as it lifts fine sediments and fragments to the top by means of convection (the size of which ranges between 0.15-0.30 mm), and its activity depends on increasing the speed, which depends greatly on the degree of surface grinding to create currents,

Turbulent air, which increases the force of air pushing fine sediments and fragments more than the force of friction (Daoud, 2002, p: 70), and the wind works to Moving the surface granules of dry soil and rolling them according to the direction of the wind, and the pressure forces resulting from the falling of the granules by jumping and colliding with stable granules lead to their shattering, facilitating their transportation, and the forces of gravity and the extent of their influence through the weight of the granules and their specific density form a direct relationship between the weight of the granules and the necessary speed of the wind to expose surface materials. As for fine grains with diameters less than 0.1 mm, they are more cohesive to each other than coarse sediments, so the resistance of clay and silt deposits is It is less resistant to movement and erosion than sandy sediments (Wali Muhammad, 2000, p: 52).

Previous studies:

Among these studies are the following**:**

1-Study of the Institute of Water Resources, Belgrade, Yugoslavia (1974): This study aimed to create a base of geological and climatic data for the purpose of constructing dams at the mouths of the valleys, This study was about (25) valleys in the coastal area of Tobruk, including the Western Plain Valley, The study also examined (23) valleys from the Dafna Plateau, and two valleys from the Al-Batnan Plateau, including the Western Plain Valley.

2-Quality study (1975): It was included in the book “Researches in the Geomorphology of the Libyan Territories”, The first study dealt with Cyrenaica and Al-Batnan in the late Third Period, and during the Fourth Time a study in climatic geomorphology touched on the regional geomorphological development of Cyrenaica and Al-Batnan, and dealt with the Wadi Basin of the Western Plain, In the Al-Batanan Plateau.

3-The study of Al-Sharif, et, al (1990): This study aims to conduct a comprehensive economic survey of the Al-Batnan region, The study also contains information on geology, natural and water resources, soil, climate, agriculture, and industry, The main objective of the study was to evaluate the economic situation of the region. For the purpose of developing and exploiting natural resources and establishing economic projects.

4-Al-Mabrouk's study (2013): entitled: The Dafna Plateau in northeastern Libya, a geomorphological study. Doctoral dissertation, Ain Shams University, The study dealt with the geology of the Dafna Plateau and the coastal region, the morphometric characteristics of the valleys, weathering, and the movement of materials on the slopes, It also dealt with the forms of sculpture. And sedimentation, The study examined (85) valleys of the plateau, and the number of streams reached (13,765) streams.

5-Study by Al-Mabrouk et al. (2022): This study aims to draw a geomorphological map of the Wadi Basin of the Western Plain on the Batnan Plateau and identify the geomorphological phenomena and forms that spread along the Wadi Basin, in addition to building an information base for the morphometric characteristics of the Wadi Basin, To achieve the objectives of the study, The descriptive approach, the analytical approach, and the quantitative statistical approach. The study relied on geological maps, topographic and satellite visuals, in addition to the field study, The coefficients were extracted Morphometrics of the valley basin based on the digital elevation model (dem) with a resolution of (12) meters from satellite visualization (srtm) using the program (arc gis 10.2), The study reached a set of results, the most important of which are: that most of the geological formations in the valley basin belong to the Oligocene Tertiary period - Miocene to modern Quaternary time, The study also found that the water drainage

networks of the valley basin reached the fifth level, and the total number of waterways reached (362), Its length is about (177.8) km, and the average rate of bifurcation in the valley basin is (3.3) streams, This indicates a clear increase in the number of streams in the first and second order, as the longitudinal section of the valley appears to be concave in general, and the degree of slope decreases in general along the longitudinal section of the valley from the source, Even downstream.

6-Study by Bu Halifa, et, al (2023): This study centered on rain-fed agriculture on the Dafna Plateau, as it is one of the most important economic activities practiced by the inhabitants of the plateau, This study aimed to identify rain-fed agriculture and the natural, economic, social, and political factors affecting it and the extent of its contribution to life, This study also followed the descriptive and analytical approach to achieve its objectives, It also used some tools, namely books, theses, and scientific research, Geographical maps, satellite visualizations and their analysis using (GIS), observation, and interviews with some farmers, The results of this study reached a number of conclusions, the most important of which is the influence of rain-fed agriculture on natural factors and its contribution to the economic life of the inhabitants of the plateau, The study recommended the necessity of conducting scientific research that provides modern techniques in this field, Type of agriculture, farmers are supported by the government.

Comment on previous studies:

Due to the scarcity of studies that examine the subject of the researcher's study, which is to identify the distinctive natural characteristics of the Al-Batnan Plateau and Al-Dafna, the researcher used some previous studies that studied the Al-Batnan and Al-Dafna Plateau in multiple aspects, Al-Mabrouk's (2013) study dealt with the geology of the Al-Dafna Plateau and the coastal region, and the

morphometric characteristics of the valleys, And weathering, and the movement of materials on the slopes. It also dealt with the forms of sculpture and deposition, The study dealt with (85) valleys, The plateau, and the number of streams reached (13,765) streams, while the study of the Water Resources Institute Belgrade, Yugoslavia (1974) aimed to form a base of geological and climatic data for the purpose of constructing dams at the mouths of the valleys, as this study was about (25) valleys in the coastal area of Tobruk, Including the Western Plain Valley, The study also dealt with (23) valleys from the Dafna Plateau, and two valleys from the Batnan Plateau, including the Plain Valley, Al-Gharbi, as for Judeh's study (1975), came in the book "Researches in the Geomorphology of the Libyan Territories, The first study dealt with Cyrenaica and Al-Batnan in the late third period, and during the fourth era, a study in climatic geomorphology touched on the regional geomorphological development of Cyrenaica and Al-Batnan, and dealt with the Wadi Basin of the Western Plain, Al-Batnan Plateau, while the study of Al-Sharif et, al (1990) aimed at a comprehensive economic survey of the Al-Batnan region, The study also contains information on geological, natural and water resources, Soil, climate, agriculture, and industry, as the main objective of the study was to evaluate the economic situation of the region for the purpose of development, exploitation of natural resources, and the establishment of economic projects. As for the study by Al-Mabrouk, et, al (2022), it aimed to draw a geomorphological map of the Western Plain Valley Basin in the Batnan Plateau and to identify geomorphological phenomena and forms, Which are spread along the valley basin, in addition to building an information base for the morphometric characteristics of the valley basin, To achieve the objectives of the study, the descriptive approach, the analytical approach, and the quantitative approach were used. The study relied on geological maps, topography and satellite visualization, in addition to field study, The morphometric parameters of the valley basin were extracted based on the digital elevation model (DEM) with a

resolution of (12) meters from satellite visualization (SRTM) using the (ARC) program, gis 10.2 The study reached a set of results, the most important of which are: that most of the geological formations in the valley basin belong to the third Oligocene-Miocene time to the modern fourth time. The study also concluded that networks The water drainage of the valley basin reached the fifth rank, The total number of waterways reached (362) streams, and their length was about (177.8) km, The average bifurcation ratio in the valley basin was (3.3) streams, and this clearly indicates an increase in the number of streams in the first and second ranks, as the section shows, The longitudinal valley of the valley is generally concave, and the degree of slope generally decreases along the longitudinal section of the valley from the source to the mouth, Finally, the study of Bouhalifa, et, al, focused on (2023) about rain-fed agriculture on the Dafna Plateau, as it is one of the most important economic activities practiced by the residents of the plateau. This study aimed to identify rain-fed agriculture and the natural, economic, social, and political factors affecting it and the extent of its contribution to the economic life of the residents of the plateau, This study also followed the method descriptive and analytical to achieve its goals, and some tools were used, namely books, dissertations, scientific research, geographical maps, and satellite visuals, and analyzed them using (gis), observation, and interviews with some farmers, The results of this study reached a number of conclusions, the most important of which is the influence of rain-fed agriculture on natural factors and its contribution to the economic life of the inhabitants of the plateau, The study recommended the necessity of conducting scientific research that provides modern techniques in this type of agriculture, and supporting farmers from Before the government, and despite the diversity of these studies and their different goals, we find that all previous studies took the Batnan Plateau and Al-Dafna as the subject of their studies, including the researcher's study, and this indicates the importance This region, the climate and the distinctive nature of this region because of

its social and economic effects on the population, and by comparing the results of the researcher's study with the results of previous studies, despite the differences in the objectives of each study from the other, all the results reached by all these studies shed great light on the Al-Batnan and Al-Dafna plateaus and the geography of this area, The region in many ways.

Benefits from previous studies:

It is possible to summarize what the researcher has benefited from previous studies in the following points:

1-The researcher benefited from previous studies in obtaining information of scientific value that is considered a scientific basis against which the researcher can measure his information.

2-Through these studies, the researcher has the ability to know how other researchers deal with this topic, and thus the researcher is able to reach the gaps that they did not talk about, and he talks about them as a scientific precedent and adds new information.

3-The researcher benefited from these studies in knowing the general structure of the research and getting to know closely how the research is written in order, its complete elements, and the nature of each of these elements.

4-The study was based on previous studies in determining the starting and starting point for his study, He stopped at the matters on which those studies depended, then continued and added new information to them.

5-The presence of many previous studies confirms the importance of the topic that the researcher addressed in his current study, thus convincing the reader of this importance and increasing the attraction of readers, Through the survey and intellectual nourishment that the researcher took from these studies, he was able to determine the elements of his study, or rather determine the hypotheses and variables that his study will be based on.

6-Previous studies were basic sources of information for the researcher, Through these studies, the researcher extracted a lot of information, and the researcher also conducted many cognitive processes such as discussions, analyses, and comparisons through these studies.

7-Previous studies do not only benefit the researcher and the study, but also benefit the reader, Perhaps this aspect has not been paid attention to by many, but those who think about it will find that this benefit is seriously felt by the reader, whether the reader notices it or not, One of them is that the reader through The presence of information extracted from these studies creates diversity in the presentation and creates a template for discussion and dialogue among researchers, as each study represents the point of view of its author, This makes the reader integrate with what he reads, continue reading, and benefit from the information widely, Likewise, the When the reader finds analyses, discussions, and comparisons, he will have seen diversity in the way information is presented, Through these studies, the reader can understand the approach of the researcher's writer and anticipate the results that the researcher will reach through his treatment of previous studies, The reader can also carefully examine the information extracted from the studies, The previous experience makes him able to distinguish many of the strengths and weaknesses of the study he reads, These studies, in general, can be considered material that presents many aspects of the subject of study to the reader, It can also be said that these studies benefit the reader in that they have a historical presentation in many ways, Often the reader learns about the nature of the topic's treatment over different dates.

Study results:

The Al-Batnan Plateau occupies an important geographical area on the Libyan map, as it is located in the northeastern part of Libya, and

extends from the Dafna Plateau in the east to the eastern slope of the Green Mountain in the west, and from the Mediterranean Sea in the north to the lowland region in the south, that is, between longitudes (23-24) east, And two latitudes (30:31-20-32) north, where some areas of this plateau are characterized by their rugged terrain due to Due to the large spread of mechanically crushed rocks, valleys, and cracks in various places, this is due to the nature of the rock formations and geological structures of the Al-Batnan and Dafna plateaus on the one hand, and the effect of erosion and mechanical weathering in the region on the other hand, due to the nature of its climatic conditions, and the terrain represents the topographical manifestations and natural features of the distinctive features, The external surface of the area and each terrain feature has its own distinctive topographical characteristics that create its own natural environment and thus control Topography in the nature of the relationship between the features of the Earth's surface and the human activity based on it, as the areas of Al-Batnan and Al-Dafna were known as Mar Marika, and Al-Batnan means that range extending from the southeast of the Bay of Bamba towards the east to Tobruk, and Al-Dafna refers to the plateau extending from the city of Tobruk to the Salloum Plateau, and it extends This local area extends beyond the Al-Jaghbub area in the south, and they represent a single plateau extending from the Bay of Bamba in the west to the village of Al-Bardi in the east in one straight line with a length of up to It reaches (250 km) and rises to about (220) meters above sea level and is separated from it by a narrow coastal plain whose width varies from one place to another but does not exceed (40 km), The city of Tobruk is the border between the two plateaus, and this plateau extends in general next to the coast line, It takes a peaceful shape in the northern coastal areas due to the steep slope of its northern façade towards the coast, and the slight slope towards the south, Then, many terraces appeared that varied in width from the area To another, it is spread over a group of longitudinal depressions that permeate its surface, reaching a width of

several kilometers, and they are called sheds, which are known locally as the shed, It is believed that the origin of these sheds (plural of shed) results from the exposure of the earth to tectonic movements in addition to marine erosion factors, and the two sheds are separated from The other are high hills known locally as (Al-Hajjaj), or Al-Dhahr, and there is a large group of sheds with local names such as: Atabiriq Al-Zaafarana, Halfaz, Al-Shuwairat Al-Kharga, Al-Qobba Al-Qababa.

Recommendations:

After the journey we went through in this study and going through its chapters, the researcher recommends:

1-Paying attention to all regions in Libya and studying their geography, topography, climate, and the impact of climate factors on them.

2-Educating community members about the importance of geographical studies because they represent a scientific effort that highlights the most important distinctive natural characteristics, not only of the Al-Batnan and Al-Dafna plateaus, but also of all regions of Libya, east and west, north and south.

3-Identify the natural features of each region of Libya because of their great importance to humans.

. 4-Work on studying climate, population, and Earth's surface features

5-Work to determine the relationships between various natural manifestations and between humans and the environment, because this is of great importance to humans.

6-Understand geographic distribution.

7-Identifying the distribution of human settlements and stable population movements throughout the ages, because of their prominent role on city locations and population distribution.

8-**Keeping pace with globalization**: The world is in rapid and continuous development and geography, with its comprehensive studies, keeps people informed of these developments.

9-Understanding the cultures of other peoples, as geographical location may have a direct impact on the customs and cultures of those peoples, Through the science of geography, it is possible to understand how people live in different parts of the world.

10-Determine the appropriate locations for various activities, such as choosing the appropriate location to build an industrial facility, the effective location to establish a social institution, or easy-to-access locations for service and health care buildings.

11-Being aware of climate changes, which helps us make appropriate decisions to deal with this continuous change.

12-Interest in studying geography because of its positive impact on identifying energy sources.

13-Studying the dangers, whether these dangers are environmental, such as earthquakes, floods, and volcanoes, or human, resulting from irresponsible development and the resulting wastes and pollutants, and the science of geography provides solutions and treatments for them.

Suggestions:

The researcher suggests:

1-The researcher proposes to conduct several geological studies that examine the subject of the study more accurately and in more depth.

2-Those responsible in this regard must take the results of this study and the results of previous and subsequent studies into consideration and place them within the framework of the research.

3-Forming a number of scientific and specialized committees in each field separately to study the geography of this region, its climate, its topography, and the developments that have occurred since ancient times until our present era.

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