

Climate of Libya

Changing climatic phenomena have different effects on biological systems in general and vegetation in particular, and to know the effects of climate on the distribution and spread of ecosystems and natural vegetation cover in Libya, we will explain the most important climatic regions.

The impact of geographic location, topography and coast direction is reflected in Libya's climate, which is a mixture of marine and desert climate, and it is difficult to separate neighboring regions due to the overlap and similarity of the climatic components of those regions.

Based on the Emperger classification, bioclimatic ranges have been identified in Libya where seven regions are evident:

- 1-Semi-humid and warm climate.
- 2- Semi-arid and warm climate.
- 3- Semi-arid and hot climate.
- 4- Semi-arid and temperate climate.
5. Semi-arid and warm climate.
- 6 - Dry and hot climate.
- 7 - Dry and warm climate.

The coastal strip overlooking the Mediterranean is dominated by four types of climate:

The semi-humid and warm climate and unique in Shahat located in the green mountain which receive the highest amounts of rain in Libya (584 mm / year).

The semi-arid and warm climate in Misrata, the semi-arid and hot climate in Darnah and Tripoli,

The semi-arid and hot climate in Benina, Sirte and Zouara, all located in the former coastal area.

We also note the presence of three types of climate in the western mountain region:

The semi-arid and warm climate in Gharian.

The semi-arid and temperate climate in Zintan.

This is due to the asymmetry of rainfall in the two previous areas, because the second area (Zintan) falls under the shadow of the rain, while (Gharyan) is subject to mountain impact on the one hand, in addition to its proximity to the area of cyclonic activity on the other.

The dry and warm climate prevails in the rest of the western mountain represented by Nalut Wevern.

The dry and warm climate covers most of Libya; it extends to the central coastal area between Sirte and Ajdabiya and the eastern coastal region stretching from Darnah to the Egyptian border, due to low rainfall and high temperatures

Three geo-thermal regions appear whose boundaries are based on isothermal lines, with a range of two degrees from one line to another.

The first region: represents most of Libya except the areas of Al-Jabal Al-Akhdar, the Jabal Nafousa, the Jafara plain and the narrow coastal strip extending from Misrata to Ajdabiya and from Darnah to Tobruk.

The annual average temperature in its regions exceeds (20 degrees Celsius) and this region is considered the hottest areas of Libya because of its location within the continental orbit, which is dominated by dry continental air masses, especially in the summer.

Second Region: It covered the northeastern regions:

(Al-Jabal Al-Akhdar, the coastal area extending from Darnah to Tobruk, and the northwestern regions of (the Jabal Nafousa, the plain of Jafara, and the coastal area in the form of a narrow strip from Misrata to Ajdabiya).

Where the annual average temperature ranged between (18-20 degrees Celsius) and shows in this region the impact of sea factor on lower temperatures in addition to its location on higher latitudes compared to the previous region, and less affected by dry orbital air masses.

Third Region:

It appears in the northern high mountainous areas of Al-Jabal Al-Akhdar and Jabal Nafousa, and has an annual average temperature below (18 d. C), which is less heat than the previous two regions due to the elevation factor and the abundance of vegetation especially in Al-Jabal Al-Akhdar.

Five geographic regions for relative humidity:

The first: extends in the form of a narrow strip in line with the length of the coastline and disappears in some of its parts,

which is the area from the east of the city of Sirte to city of Benghazi and the area east of the city of Darna to the Libyan-Egyptian border,

This region recorded the highest annual average relative humidity exceeding 70%, due to relatively low temperatures and high rainfall, in addition to the impact of vegetation and water bodies.

The second region: extends to the south of the first region in the form of a strip from west to east, and be more breadth than the first, and the relative humidity rates range between (60-70%).

The third Region: extends in the form of a strip of the western border, passing through Mount Nafoussa, most of the plains of Sirte and the south of the Al-Jabal Al-Akhdar until the eastern border and the humidity rate ranges between (60-50%).

The fourth region: is located at the bottom of the third in the form of a strip of the western border, and expands all that we headed east, passing by most of the oases located in the Al-Jafra, Jallow, Jaghbob, and humidity ranges between (40-50%).

The fifth Region: It covers the entire southern region from Ghadames to the Kufra, and the southern border of Libya, humidity is less than 40%, so this region is considered the driest areas of Libya because of the lack of rainfall and high temperatures and distance from marine influences, in addition to being affected by dry tropical continental blocks.

The seasonal distribution of rainfall is characterized by a long period of near-complete interruption, from the beginning of May to the end of August,

This means that the period of drought is not limited to the astronomical summer months of June, July and August, but it extends to spring and autumn.

The length of this period, coupled with high temperatures, has exacerbated climate extremism in Libya.

With the long period of rainfall, it does not mean that Libya has a rainy climate throughout this period. Some months of the rainy period are less than 1mm and sometimes no rainfall at all.

In general, the highest raining during winter, followed by spring and autumn, while the near-total drought prevails in summer.

The geographical distribution of the annual total rainfall is influenced by a combination of factors that have made the general trend of rainfall vary from region to region and decreases from north to south.

Most of Libya is located in two climatic zones:

1-The sub-tropical climate range of the so-called Western continental shores (Mediterranean climate) occupies most of the eastern coastal region and the western coastal zone at the edges of the cyclone activity zone.

2- The continental orbital climate zone, in which the interior and south are located, as well as the central coastal area (Gulf of Sirte) and the coastal zone extending from Ain Ghazala to Salloum, located in the eastern part of Libya.

Libya is divided into ranges according to annual rainfall rates as follows:

1-The region with an annual average rainfall of more than 500 mm is a small area of Shahat located in the Al-Gabal Al- Akhder in the northeastern region.

2-The region with an annual rainfall of between (500 - 400 mm) and includes the following areas: Al-Baida, Al-Marg, Awailiya, Abraaq, which is located in the Al-Gabal Al-Akhder in the northeast region.

3-Three areas with annual rainfall ranging between (400-300 mm), is the coastal area between the area of Janzour and Ghanima in the northwestern section, and the mountainous area around the areas of Gharyan and Yefren in the Jabal Nafousa.

4-Three areas with annual rainfall ranging between (300-200 mm) and include:

a- The coastal area between Janzour in the east and Zawarah in the west, which extends inland to include the areas of Al-Ajailat, Al-Zahraa, Nasiriyah and Al-Aziziyah in the northwestern section.

b-The coastal area between Benghazi and Toukra and extends inward, then proceeds east in the form of a strip ends in the Mediterranean coast at Darna, and includes the areas of Al-Rjmah, Al-Abiar, Taknes, Marawa, Sulnta in the north-east.

c- The area between Jado and Zintan, then the area of Sidi Essid, Tarhouna and Al-Amamra, ends on the Mediterranean coast in the area of Misrata.

5-Two areas with annual rainfall of (100-200) mm:

a-The coastal area between Ajdabiya and Benghazi, the southern regions of Al-Jabal Al Akhdar, and coastal area extending from Umm Al Rizm to Salloum.

b-The southwestern region of the Jaffara plain, extending eastward to Bir al-Ghanam, Then head north-west to end at the Mediterranean coast to include(The area between Abu Kammash and Ras Jdair), the area also heads south, encompassing the western parts of Jabal Nafousa

Around the Wazen, Nalut, and southern regions of this mountain, then head north-east to end at the Mediterranean coast at the Tarugha region.

6-Areas with annual rainfall of between (100-50 mm) and include:

The area, which extends in the form of a strip from west to east, includes the areas of Sinawn, Mizda, Al-Qurayyat, south of the Jabal Nafousa.

The central region south of Sirte and Ben Jawad, and the coastal area between Ben Jawad and Brega.

The area south of Al-Jabal Al Akhdar and the coastal area between Um Rizm and Tobruk and some upper parts of Mount Tibesti in Libya.

7-Areas with annual rainfall between (50-25 mm) , and also extends in the form of a strip from west to east to include:

The northern parts of Al-Hamada Al-Hamra, the central oases of Hun, Wdan, Sukna and Galo, and the low parts of Mount Tibesti in Libya.

8-Areas with annual rainfall between (10 - 25 mm), and stretches in the form of a strip that expands in the west and narrows as we head east and includes:

Some of the southern oases (Sabha-Barak), and are heading northeast to include the Jaghboub oasis.

9-Areas with annual rainfall ranges between (5-10 mm) and include: A large area in southwest Libya, which includes most of the oases of Fezzan, and stretches from it a narrow strip that takes two directions:

Northeast: To the north of the Tazerbo depression.

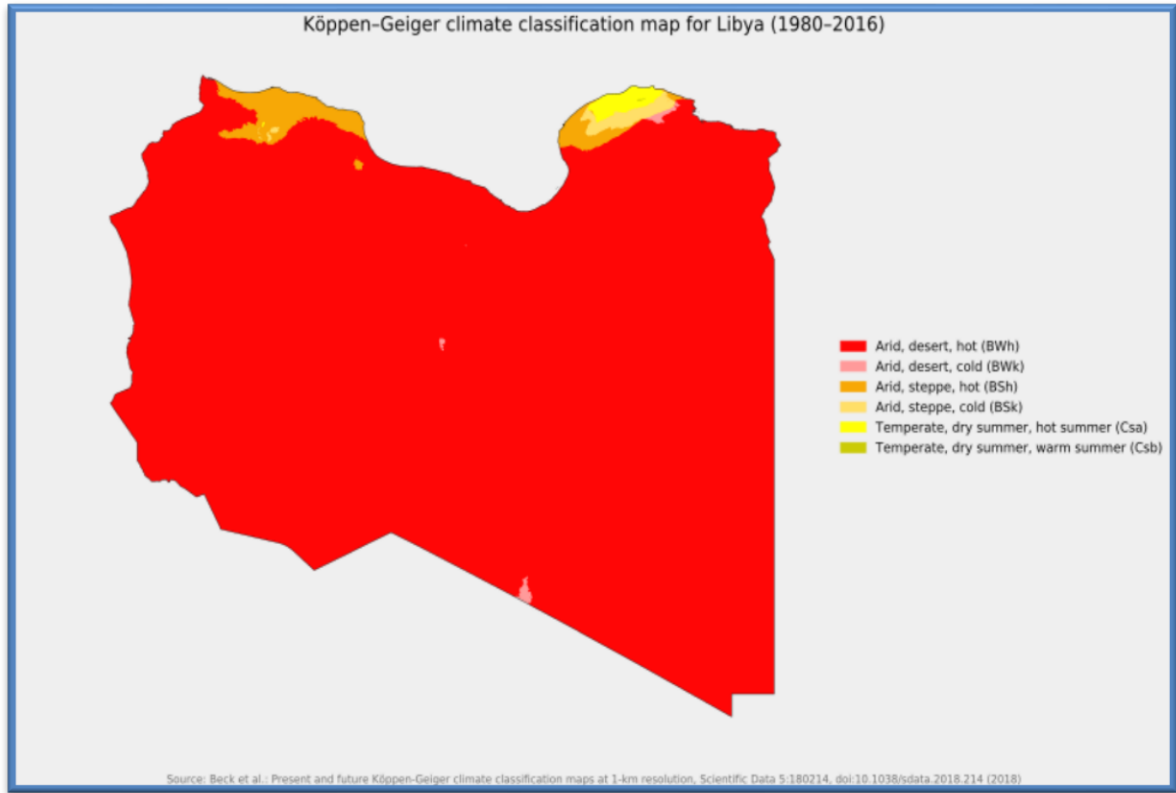
Southeast: includes the northern areas around Mount Tibesti.

10- Areas with annual rainfall of less than (5 mm) include:

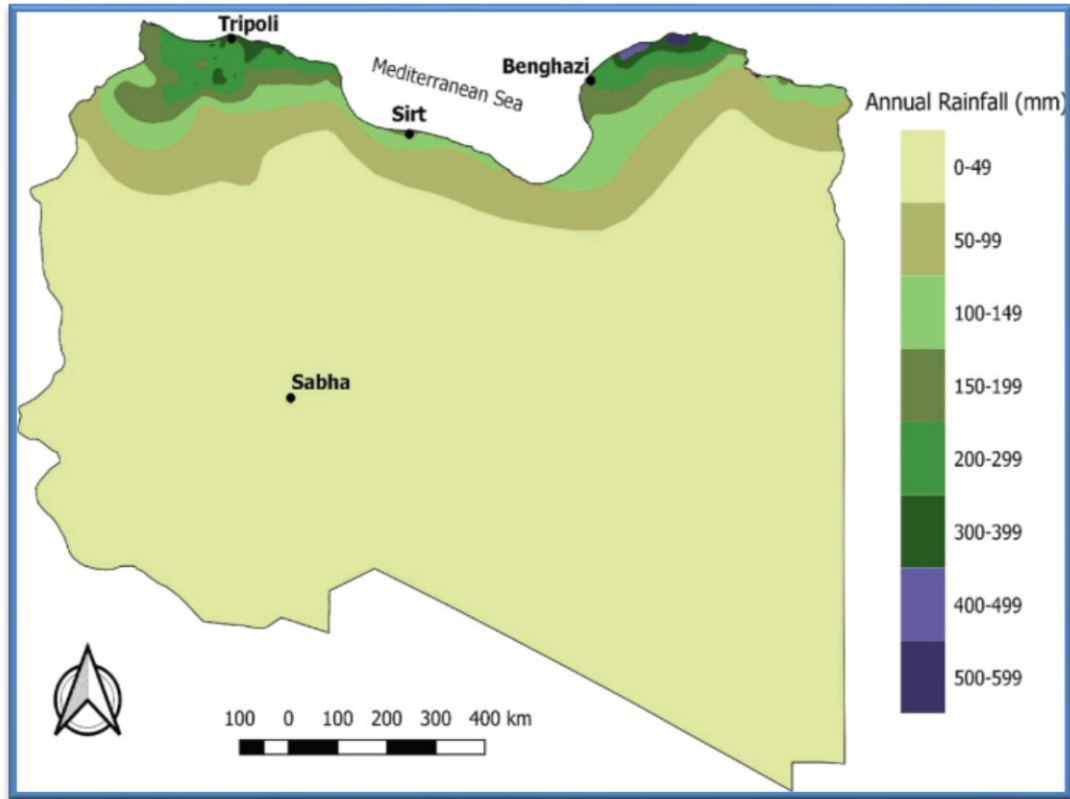
The southeastern parts include the oases of (Kufra, Tazerbo, Bizma).

On the coast, the wind usually blows from the north-east or north, hot in summer and colder in winter. In spring and fall, a hot, dry, dust-laden wind called ghibli blows over the country.

This south wind lasts from one to four days, and the dust storms and sandstorms it raises often affect the countries north of the Mediterranean.



https://en.wikipedia.org/wiki/File:Koppen-Geiger_Map_LBY_present.svg



https://link.springer.com/chapter/10.1007/978-3-030-66368-1_1

Monthly rainfall (mm) in Libya for the period (1945-2009)

Region	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Des	Total
North west	Zwarah	36.4	22.1	17.3	12.3	5.6	1.0	0.0	0.7	13.5	35.0	38.1	46.3	228.3
	Tripoli	75.5	35.1	21.6	10.9	5.8	0.3	0.4	0.5	7.7	23.6	62.4	63.5	307.5
	Nalut	16.1	19.2	26.0	16.5	10.7	2.4	0.0	0.2	5.3	18.6	14.0	18.5	147.6
	Yefren	51.4	37.5	39.6	14.4	10.6	2.1	0.4	3.2	4.1	26.8	26.8	51.4	268.3
	Khomus	62.7	48	31.8	12.3	3.9	0.4	0.1	0.2	10.1	23.1	44.3	56.7	293.6
	Musratah	56.5	29.0	21.8	9.8	4.5	1.1	0.0	0.5	11.3	37.9	45.9	58.4	276.6
North central	Sirt	38.8	23.2	15.2	4.5	3.0	0.8	0.0	0.0	10.0	23.3	24.5	43.4	186.8
	Ajdabyia	39.1	20.4	11.1	3.4	2.5	0.1	0.0	0.0	1.5	9.1	18.9	44.7	150.6
North east	Benghazi	66.0	40.9	25.9	6.3	4.4	0.3	0.0	0.2	3.2	19.4	34.5	66.3	267.6
	Shahat	123.8	87.5	66.9	22.7	8.9	1.4	0.9	1.7	9.2	52.2	68.5	116.3	560.1
	Darnah	60.1	39.6	23.6	8.3	5.7	2.4	0.0	0.4	5.6	34.7	28.7	56.8	265.8
South	Ghadames	5.3	5.5	5.7	2.9	1.8	0.5	0.0	0.3	1.1	3.4	1.7	5.3	33.6
	Al-Garyat	8.7	8.7	4.3	7.9	3.5	4.6	1.4	0.3	0.2	4.1	8.8	6.6	5.7
	Jalo	1.5	1.5	1.8	1.3	0.8	0.6	0.0	0.0	0.0	0.1	1.1	0.8	1.4
	Jaghbob	3.6	3.6	2.6	2.7	0.8	0.6	0.1	0.0	0.0	0.4	0.5	0.6	3.1
	Sabha	1.8	0.9	1.0	0.7	0.6	0.3	0.0	0.1	0.2	1.2	1.5	0.8	9.2
	Al-Kufrah	0.4	0.3	0.2	0.2	0.4	0.0	0.0	0.2	0.1	0.1	0.0	0.1	2.0

The annual, winter and summer temperatures for the period (1945-2009) in Libya

Location	Station	Latitude(N)	Elevation (m)	Annual (°C)	Winter (Dec-Feb)	Summer (Jun-Aug)
North west	Zwarah	32.53	3	19.8	13.3	25.8
	Tripoli	32.54	25	20.2	14	26.4
	Nalut	31.52	621	19.1	10.5	27.2
	Musratah	32.19	32	20.4	14.1	26.2
North central	Sirt	31.12	13	20.5	13.4	25.5
	Ajdabyia	30.43	7	20.5	13.5	26.5
North east	Benghazi	32.05	129	20.1	13.4	26.1
	Shahat	32.49	621	16.5	10.1	22.8
	Darnah	32.47	26	20	14.8	25.1
South	Ghadames	30.48	357	21.9	11.8	31.4
	Ghadames	30.48	357	21.9	11.8	31.4
	Jalo	29.02	60	22.4	14.1	29.8
	Jaghbob	29.5	-1	21.3	12.9	28.8
	Sabha	27.01	432	23.4	12.8	30.6
	Al-Kufrah	24.13	436	23.3	14.2	30.8

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Distribution of mean annual precipitation (mm) in Libya, 1946-2009

<https://www.ros.hw.ac.uk/handle/10399/2699>