

## CLIMATE OF BHUTAN

Climate of Bhutan cannot be generalized because of its mountainous landscape. The geographic co-ordinates of Bhutan are Latitude 27.5 N and Longitude 90.5 E. Bhutan lies at par with New Delhi in India, Cairo in Egypt and Miami in USA. Bhutan being in same latitude with these cities, one may think Bhutan may be hot, and to some its location in Himalayas one may think, Bhutan will be cold, conversely, it experiences very pleasant weather throughout the year due to elevation of valley. With the exception of southern regions that border plains of India, and the northern frontier with Tibet, the middle valleys where most people live and tourists visit, enjoy pleasant temperate climate with moderate changes between winter and summer.

### **Factors affecting Bhutan's Climate:**

The climate in Bhutan is extremely varied, which can be attributed to two main factors-the vast differences in altitude present in the country and the influence of North Indian monsoons.

**1. Altitude:** Bhutan's climate is as varied as its altitudes and, like most of Asia. Weather and Climate in Bhutan depends upon the altitude. In the northern parts of the country where mountains rise up to 7,000m, weather conditions are similar to arctic. Southwards, closer to India, the weather is hot and humid in the summer and cool in winter. The monsoon rains are usually heavy. Winters can be a good time to visit the lower parts, but then the highest areas are freezing.

Depending on the altitude, the climate varies from semi-tropical to alpine (For every 1,000 m height increase the temperature drops about 7 degree Celsius). In Southern Bhutan, the climate is tropical in the monsoon season and may range from 15 degree Celsius in winter to 30 degree Celsius in summer. The east is also warmer than the west. The centre enjoys sub-tropical climate with very cool winters while the northern parts of the country have harsh climate including snowfall two to three times every winter. In Thimphu the temperature ranges from -2.5°C in January to 25°C in summer with a rainfall of 100 mm. In the high mountain regions the average temperature varies from 0°C in winter to 10°C in summer, with an average of 350 mm of rain.

It experiences very pleasant weather throughout the year due to elevation of valley. With the exception of southern regions that border plains of India, and the northern frontier with Tibet, the middle valleys where most people live and tourists visit, enjoy pleasant temperate climate with moderate changes between winter and summer.

Altitude is one notable factor that determines the weather especially for the places of interest like Thimphu, Paro, Punakha, Wandgi, Bumthang and places in eastern Bhutan like Mongar etc. The weather can vary due to changes in elevation. For instance, Punakha and Wangdue (1300 m) is warmer than Thimphu (2300 m) and Bumthang (2580 m) is colder than both, which is due to variation in altitude. Temperatures vary according to elevation. Temperatures in Thimphu, located at 2,300 meters above sea level in west-central Bhutan, range from approximately 15° C to 26° C during the monsoon season of June through September but drop to between about -4° C and 16° C in January. Most of the central portion of the country experiences a cool, temperate climate year round. In the south, a hot, humid climate helps

maintain a fairly even temperature range of between 15° C and 30° C year-round, although temperatures sometimes reach 40° C in the valleys during the summer.

Altitude of Places of Interest of Bhutan		
Place	Meter	Feet
Paro	2200	7217.85
Haa	2700	8858.27
Thimphu	2300	7545.93
Punakha	1350	4429.13
Gangtey	2900	9514.44
Trongsa	2200	7217.85
Bumthang	2650	8694.23
Tingtibi	600	1968.50
Zhemgang	1900	6233.60
Pangbang	300	984.25
Gelephu	280	918.64
Mongar	1600	5249.34
Trashiyangtse	1750	5741.47
Tashigang	1100	3608.92
Kanglung	1850	6069.55
Rangjung	1150	3772.97
Deothang	800	2624.67
Samdrup Jonghar	250	820.21
Phuentsholing	295	967.85

*Altitude of Places of Interest*

**2. Annual Seasonal Cycle:** Another factor that influences the Climate of Bhutan is annual seasonal cycle, which brings the climatic changes in annual cycle. As a whole the climatic conditions varies from sub-tropical in south to the Alpine in the north. Climatic conditions in Bhutan can be broadly categorised into four seasons:

**i. Spring Season:** It start from the March to June, the southern regions experience typical sub tropical weather like hot and humid conditions. Whereas in Thimphu, Paro, Bumthang valley has warmer days with cool night and clear blue sky. It is noticeably warmer in Punakha & Wangdi valley. This period also offers time windows to do high altitude trek like Jhomolari, Dagala, Druk path etc. Rhododendron and wild flowers blooms surrounds the trails whilst trekking especially at higher elevation. And also most likely to see the wild life as well, they comes out from hibernation after cold, long unforgiving winter.

**ii. Monsoon Season:** Beginning of July marks the advent of south east monsoon till the earlier September. Bringing much relieve after scorching summer heat in southern belt. And a boon to farmers for the cultivation of their seasonal crop mainly Rice. The rain in the valleys like Thimphu, Paro Punakha etc is relatively far less in proportion in comparison with southern belt. Southern regions are in first range to confront moisture laden south east monsoon so it shed bulk of its moisture in these regions. And also the valley in west and central Bhutan fall under leeward or rain shadow side, which makes the rain reach in fairly

less proportion. It carpets the valley and surrounding vegetation with greenery. This period brings the trekking into complete standstill as the trails get wet, slippery and muddy.

**iii. Autumn Season:** It normally starts from the tail end of September till November, when the weather tends to slowly stabilise after the monsoon. The sky starts to get clearer with warm autumn sun and continues offering a spectacular view of far off peaks. These months are considered as the best time for Trekking, these periods make conditions favourable for trekking with accessible high passes and stable temperature. It throws open small windows of time in a year, specifically, for the epic Snowman trek. As for other high altitude trek like Dagala, Jhomolari, Druk Path it is the best time as well.

**iv. Winter Seasons:** It starts from December till February. Specifically, it's the time of year when night tends to get cold with day being warm with bright sun. Blue winter skies serve a striking background to the snow-capped peaks. However, the higher passes like Docola, Pele La, Chele La experience snow but the valleys remain bereft of heavy snow with occasional light dusting of it. The possibilities of heavy snow remain only if there is sudden and dramatic change in temperature.

Higher passes remain closed due to snow so high altitude trek becomes a distant dream during winter, however weather in lower altitude places like Punakha experiences pleasant climate. It becomes a favourable time to do low altitude winter trek like Samtegang and Nabji Korphu.

Temperature of Places of Interest of Bhutan															
Month	Max/Min	Paro		Thumphu		Punakha		Trongsa		Bumthang		Mongar		Trashigang	
		<sup>0</sup> C	<sup>0</sup> F	<sup>0</sup> C	<sup>0</sup> F	<sup>0</sup> C	<sup>0</sup> F	<sup>0</sup> C	<sup>0</sup> F	<sup>0</sup> C	<sup>0</sup> F	<sup>0</sup> C	<sup>0</sup> F	<sup>0</sup> C	<sup>0</sup> F
January	Max	9.4	48.92	12.3	54.14	17	62.6	13	55.4	10.8	51.44	15.5	59.9	20.4	68.72
	Min	-5.8	21.56	-2.6	27.32	4.3	39.74	-0.2	31.64	-5.1	22.82	8.2	46.76	10.5	50.9
February	Max	13	55.4	14.4	57.92	19	66.2	13.9	57.02	10	50	15.9	60.62	21.7	71.06
	Min	1.5	34.7	0.6	33.08	7.8	46.04	0.4	32.72	-1.4	29.48	8.3	46.94	11.5	52.7
March	Max	14.5	58.1	16.4	61.52	22.8	73.04	16.7	62.06	16.2	61.16	20	68	24.8	76.64
	Min	0.6	33.08	3.9	39.02	10.4	50.72	4.4	39.92	3.5	38.3	11.6	52.88	14.4	57.92
April	Max	17.6	63.68	20	68	26.2	79.16	20.1	68.18	18.7	65.66	22.8	73.04	28.3	82.94
	Min	4.6	40.28	7.1	44.78	12.9	55.22	6.6	43.88	3.9	39.02	14	57.2	17	62.6
May	Max	23.5	74.3	22.5	72.5	29.1	84.38	21	69.8	21.3	70.34	25.1	77.18	30	86
	Min	10.6	51.08	13.1	55.58	17.7	63.86	11.6	52.88	9.5	49.1	17.4	63.32	22.6	72.68
June	Max	25.4	77.72	24.4	75.92	29.2	84.56	22.2	71.96	22.5	72.5	26.1	78.98	30.7	87.26
	Min	14.1	57.38	15.2	59.36	20.1	68.18	13.6	56.48	13.5	56.3	19.5	67.1	22.6	72.68
July	Max	26.8	80.24	25.9	78.62	30.4	86.72	25.3	77.54	24.1	75.38	27.1	80.78	31.5	88.7
	Min	14.9	58.82	15.6	60.08	20.5	68.9	15.3	59.54	13.6	56.48	19.8	67.64	23.1	73.58
August	Max	25.3	77.54	25	77	29.1	84.38	23.8	74.84	23	73.4	25.4	77.72	30.2	86.36
	Min	14.7	58.46	15.8	60.44	20	68	15	59	13.7	56.66	19.6	67.28	22.7	72.86
September	Max	23.4	74.12	23.1	73.58	27.5	81.5	22.6	72.68	21.6	70.88	24.7	76.46	30	86
	Min	11.7	53.06	15	59	19.1	66.38	14.2	57.56	12.1	53.78	19.4	66.92	21.9	71.42
October	Max	18.7	65.66	21.9	71.42	26.1	78.98	21.8	71.24	19.5	67.1	22.7	72.86	29.1	84.38
	Min	7.4	45.32	10.4	50.72	14.7	58.46	11.7	53.06	5.9	42.62	15.8	60.44	17.7	63.86
November	Max	13.9	57.02	17.9	64.22	22.6	72.68	19.8	67.64	16.1	60.98	19.9	67.82	26.1	78.98
	Min	1.4	34.52	5	41	9.6	49.28	6.4	43.52	-0.5	31.1	11.2	52.16	13.6	56.48
December	Max	11.2	52.16	14.5	58.1	19.1	66.38	18.2	64.76	12.3	54.14	17.7	63.86	23	73.4
	Min	-1.7	28.94	-1.1	30.02	6.3	43.34	2.5	36.5	-2.3	27.86	9.5	49.1	11.6	52.88

**3. Impact of Monsoon:** The Indian summer monsoon begins from late-June through July to late-September and is mostly confined to the southern border region of Bhutan. These rains bring between 60 and 90 percent of the western region's rainfall. Annual precipitation ranges widely in various parts of the country. In the Northern border towards Tibet, the region gets about 40 millimetres of precipitation a year which is primarily snow. In the temperate central regions, a yearly average of around 1,000 millimetres is more common, and 7,800 millimetres per year has been registered at some locations in the humid, subtropical south, ensuring the thick tropical forest, or savanna. Thimphu experiences dry winter months (December through February) and almost no precipitation until March, when rainfall averages 20 millimetres a month and increases steadily thereafter to a high of 220 millimetres in August for a total annual rainfall of nearly 650 millimetres.

Bhutan's generally dry spring starts in early March and lasts until mid-April. Summer weather commences in mid-April with occasional showers and continues through the premonsoon rains of late June. The summer monsoon lasts from late June through late September with heavy rains from the southwest. The monsoon weather, blocked from its northward progress by the Himalayas, brings heavy rains, high humidity, flash floods and landslides, and numerous misty, overcast days. Autumn, from late September or early October to late November, follows the rainy season. It is characterized by bright, sunny days and some early snowfalls at higher elevations. From late November until March, winter sets in, with frost throughout much of the country and snowfall common above elevations of 3,000 meters. The winter northeast monsoon brings gale-force winds down through High Mountain passes, giving Bhutan its name-- Drukyl, which in the Dzongkha language mean Land of the Thunder Dragon.

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#### **Average Temperatures in Bhutan**

It should be noted that average temperatures are recorded from valley floors. There can be considerable divergences from the recorded figures depending upon elevation.

Month	Values.in.Celsius	...Paro...	...Thimphu...	...Punakha...	...Trongsa...	...Bumthang...	...Mongar...	...Trashigang...
Jan	Max	9.4	12.3	17.0	13.0	10.8	15.5	20.4
	Min	-5.8	-2.6	4.3	-0.2	-5.1	8.2	10.5

Feb	Max	13.0	14.4	19.0	13.9	10.0	15.9	21.7
	Min	1.5	0.6	7.8	0.4	-1.4	8.3	11.5
Mar ch	Max	14.5	16.4	22.8	16.7	16.2	20.0	24.8
	Min	0.6	3.9	10.4	4.4	3.5	11.6	14.4
Apri l	Max	17.6	20.0	26.2	20.1	18.7	22.8	28.3
	Min	4.6	7.1	12.9	6.6	3.9	14.0	17.0
May	Max	23.5	22.5	29.1	21	21.3	25.1	30
	Min	10.6	13.1	17.7	11.6	9.5	17.4	22.6
June	Max	25.4	24.4	29.2	22.2	22.5	26.1	30.7
	Min	14.1	15.2	20.1	13.6	13.5	19.5	22.6
July	Max	26.8	25.9	30.4	25.3	24.1	27.1	31.5
	Min	14.9	15.6	20.5	15.3	13.6	19.8	23.1
Aug ust	Max	25.3	25.0	29.1	23.8	23.0	25.4	30.2
	Min	14.7	15.8	20	15	13.7	19.6	22.7
Sept	Max	23.4	23.1	27.5	22.6	21.6	24.7	30.0
	Min	11.7	15	19.1	14.2	12.1	19.4	21.9
Oct	Max	18.7	21.9	26.1	21.8	19.5	22.7	29.1
	Min	7.4	10.4	14.7	11.7	5.9	15.8	17.7
Nov	Max	13.9	17.9	22.6	19.8	16.1	19.9	26.1
	Min	1.4	5.0	9.6	6.4	-0.5	11.2	13.6
Dec	Max	11.2	14.5	19.1	18.2	12.3	17.7	23.0
	Min	-1.7	-1.1	6.3	2.5	-2.3	9.5	11.6

### **Climatic Zones of Bhutan:**

Southern Bhutan has a hot and humid subtropical climate that is fairly unchanging throughout the year. Temperatures can vary between 15-30 degrees Celsius (59- 86 degrees Fahrenheit). In the Central parts of the country which consists of temperate and deciduous forests, the climate is more seasonal with warm summers and cool and dry winters. In the far Northern reaches of the kingdom, the weather is much colder during winter. Mountain peaks are perpetually covered in snow and lower parts are still cool in summer owing to the high altitude terrain. Koppen divided the climate of Bhutan into five sub climatic groups. They are:

**i. Cold semi – arid climate:** This type of climate is found in the extreme north western part of Bhutan. The high altitudinal peaks of Mt. Chomolhari is experiencing cold semi arid climate. Here winters are severe cool and summers are cold with average temperature below 0° Celsius.

**ii. Cool continental climate:** The climate of Ha, Paro, Gasa, Punakha, Thimphu, Dzong are falling under this group. Winters and summers are cool and dry with average temperature ranging between 0° to 10° Celsius.

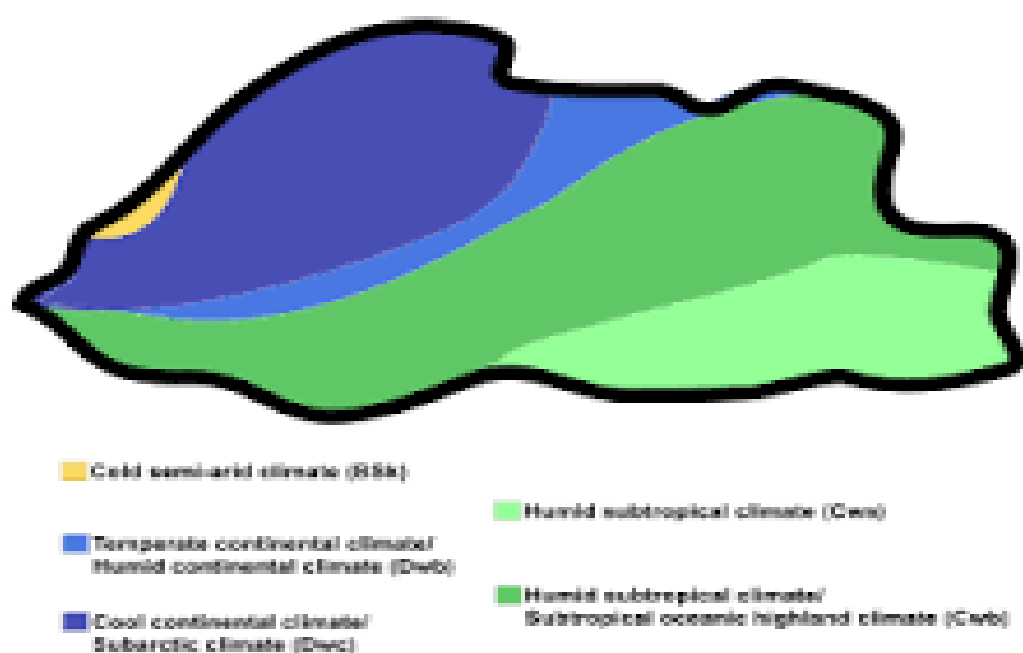
**iii. Temperate continental climate:** The central valleys of Phodrang, Trongsa, Bumthang are enjoying temperate continental type of climate. In this climate winters are cool with less than 5° Celsius and summers are warm and moist with 10° to 25° Celsius temperature.

**iv. Humid subtropical climate (Subtropical oceanic highland climate):** The eastern central valleys of Trongsa, Mongar and the southern foothill regions of Bhutan are enjoying humid subtropical climate. The winters are cool and dry and summers being warm and moist are receiving heavy amount of precipitation. Winter temperature is between 5° to 15° Celsius and average summer temperature is 20° to 30° Celsius.

**v. Humid tropical climate:** Extreme western fringes of Tashigang and southern foothill regions of Bhutan are experiencing humid subtropical climate. Here winters are cool and dry and summers are hot and moist. Winter temperature is between 10° to 20° Celsius and average summer temperature is 25° to 40° Celsius.



Bhutan map of Köppen climate classification



Distribution of Average Temperature in Bhutan

