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Climate Classification of Pakistan

Saifullah Khan[1], Mahmood-Ul-Hasan[2]

[1]Department of Social Sciences, Bahauddin Zakariya University, Multan, Pakistan
[2]Departmetn of Geography, University of Peshawar, KPK, Pakistan

*****Email: saifullahkhan33@gmail.com

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Abstract: The research covenants amid the evaluation and analysis of the weather data in regards to mean monthly temperature, precipitation, rainy days, relative humidity, wind direction, atmospheric pressure, evaporation, solar radiation and with the literature cited. The components getting fluctuation in the atmospheric condition comprise of global location, vicinity to ocean, geomorphic reliefs and continental extent, maritime affects, forests and landuse. Based on the daily and monthly temperature, the study area has divided into five localities consisting of hot, warm, mild, cool, and cold. Besides, the five precipitation zones namely arid, semi-arid, sub-humid, humid and undifferentiated highlands have been distinguished during course of work. Generally, eastern longitudes of the country get substantial downpours amid summers (monsoon season). Though the western areas in winters excluding Gilgit Baltistan, where it is from local thunderstorms. Pakistan encounters four precipitation seasons namely winter, pre-monsoon, monsoon, and post monsoon rainfall. Because of sub-tropical vicinity, the country has experienced two fundamental seasons explicitly winter and summer. Generally, the summer period goes on for five months in mountains and seven months in plains, whilst the winter period differs for seven months in mountains and five months in plains. The stated two essential rainy periods are auxiliary sub-isolated into four sub-spells to be precisely hot, warm, monsoon and cold season. Based on appropriation and fluctuation of climate variables, Pakistan is classified in five macro areas that auxiliary sub-curved up into 18 meso and 46 micro scale climate regions.

Keywords: Temperature, rainfall, relative humidity, evapo-transpiration, climate classification.

Introduction

As per Trewartha (1968) the climate classification is a procedure essential to all disciplines, comprising of perceiving people with definite imperative attributes in like manner and gathering them into a couple of classes or types. Griffiths (1978) has characterized climate classification as a strategy for orchestrating different atmospheric parameters either independently or assembled into orders or sets, along these boundaries as to improve the accumulation of data and to recognize similarities. Obviously, Critchfield (1987) has defined three main methodologies for the climate classification of a particular area that is experimental (Empirical), hereditary (Genetic) and functional. These methodologies represent the fundamental elements for the climate divisions; though, the facets of every one of the three methodologies might be joined in a solitary framework. Here and there, we divide climate of a locality dependent on convinced comparable upshots for instance, faction collectively a dry climate regardless of their basis for aridity. In this way, this sort of climate categorization is named like division of ease (Trewartha, 1954). Generally, numerous climate divisions exist mutually for the World as well as Pakistan. Several are the subjective portrayals, whilst the supplementary are quantitative in character. Permanide's in 5th BC, being the crucial, who classified the climate of the earth based on the climax of the solar radiation. Furthermore, Aristotle's (350 BC) had proposed galactic standards for these climate regions. Onward, the famous solar who have worked on the climate classification of the world as well as Pakistan are Koppen (1940), Thornthwaite (1948), Blair (1942), Griffiths (1978), Miller (1969). As far as Pakistan is concerned, the earlier contributors comprise of Kendrew (1941), Kazi (1951), Shamshad (1988), Nasarullah in 1968, Johnson (1979), Raja and Twidell in 1990, Khan (1991) and Khan (1993), Shah, Rehman and Salma (2012), Sadiq and Faisal (2009), Rasul and Chaudhry (2004), Athar and Nabeel (2017).

By means of location, Pakistan is situated in southwest Asia with grand Himalayas in the North and Arabian Sea in the South. The aphelion latitude is ahead of south of Pakistan. The study area stretches out from north-east to south-west between parallel 37^{0}N to 231/2^{0}N and meridians 60^{0}E into 75^0 East. The northwestern limits of Pakistan comprise of Hindukush ranges, while the middle latitudes as well as the eastern part are covered by Cholistan desert and the Indian Territory. Furthermore, a vast area of Kharan desert and Lut desert of Iran bounded the study area in the southwest (Kurreshy, 1988).

Materials and Methods

The present work is dependent on the dissemination of precipitation, temperature, rainy days, wind speed, relative humidity, solar radiation, evapotranspiration, air pressure, land topography and vegetation cover with soil characteristics and composition. The research auxiliary clarifies the regions of comparative weather condition and classifies the whole country into different climate classes. Furthermore, it is highlighted on the map using geographical

information system. The study depends on the normal data (1931-90) amassed as of climate data processing center, Karachi as well as UNO, World Food Program. To understand the divisions of different climate components, the annual data was isolated among winter and summer season, utilizing distinctive isotherms and isohyets. The winter in highlands is proposed from October to April (seven months) and in plain, it varies from November to March (five months). While summer season in rugged area goes on from May to September (five months) and in plains, it ranges from April to October (seven months). Summers and winters are additionally isolated into four sub-seasons consisting of cold, hot, monsoon and warm season. As there are about fifteen days gap (pressure gradient) between cold, monsoon and warm season, so each month has been divided by two and the average data of each half month is added to both seasons. The territorial climate division depends on the monthly and annual averages of normal data, though the rainfall and temperature are deemed as essential factors for choosing the limits of climate divisions. In climate divisions, apiece type of average atmospheric condition has been depicted by a formula comprising of a blend of letters, every single one of which has a literal purpose. The greater part of the letters has been chosen as of the earth's climate divisions. Nonetheless, intended for the humidity, novel letters have been presented with explicit importance in the science of weather and climate (Map-1 and Table-1). To build up an increasingly palatable scheme of climate characterization, maps demonstrating the circulation of climate and weather components have been superimposed on one another delineating the areas of same temperature, precipitation, humidity etc, and along these lines a map showing climate divisions of Pakistan has been readied. The variety charts have determined the accessible meteorological stations in addition to entire country have been divided into various macro, meso and micro climates. As far as the climate classification map is concerned, the principal letter demonstrates macro scale, second represents meso scale and third one for micro scale with unique characteristics and numerals (Map 1 and Table 1).

Results and Discussion

A. Arid Climates

It is described by stumpy precipitation and spreads an immense area in the south and north of Pakistan having total precipitation of less than 10 inches (254mm) annually.

A.1. Long Hot Summers and Short mild Winters (HsMw`)

It is characterized through scorching and dry climates having June mean monthly temperature more than 32ºC and November between 10^0C to 21^0C with summer temperature above 25^0C.

A.1.1. Dry Winters, Summer Rainfall, 55-60% relative humidity (wx`)

Obviously, Mirpur Khas, areas of Dadu and Hyderabad district covers having absolute precipitation of 5-10 inches (127-254 mm, 0.28 inch (7.1 mm) evapotranspiration and 8.2hours/day sunshine. The area has long hot and moist summers and short mild dry winters. During summer, the average temperature surpasses 25^0C, while in winters it lower than 15^0C. The locale is described by pleasant winters and extreme summers. The ever-noted maxima temperature is 50^0C in June, even as the lowest of 1^0C in January. High topsoil's and clayey portrays the region through several pediment plains closer to the Kirthar ranges. Horticulture is primary economic activity, yet there are additionally locales of heavy grazing, irrigated plantation and swathes of overwhelmed back swamps.

A.1.2. Winters Dehydrated, Summers Rain, 60 to 65% Relative Humidity (wv)

Northern Thatta and Badin districts (Sindh province) cover the area having mild short dry winters and long hot sodden summers. It gets quite a bit of precipitation during monsoon season. The sum of annual precipitation is 5 (127mm) to 10 inches (254mm) having heaviest fall in summers. The average temperature of the locale is 25-30^0C, in the midst of 35-40^0C maximum, and 15-20^0C minimum. The yearly evapotranspiration is 7mm (0.28inch) by means of 8.2 hours per day sunshine, 9.2 rainy days and 6.7knots wind speed. The area portrayed by sandy clayey soils has high water table, waterlogging and is not appropriate for agribusiness barring those parts, where irrigation is effectively accessible for watering. The flora takes after that of desert climate through the expansion of thorn scrubs and light scrubs timberland.

A.1.3. Unvarying Rainfall, Summers Concentration, 55-60% Relative Humidity (Usx`)

Dera Ismail Khan and Thal dessert have the areas incorporated in this region with less than 10^0C temperature in January and most blazing month of June surpasses 32^0C. The yearly absolute precipitation of the area is 5-10 inches (127-254mm). The region has recorded about 4.3mm or 0.17inch evapotranspiration and 8.4hours/day sunshine. At Dera Ismail Khan district, the average temperature is 20-25^0C having maximum of 37^0C and minimum of 13^0C. The temperature condition of the territory remains high both in summers just as in winter season. The ever-recorded temperature of 50^0C was observed in May with a lowest of -3^0C in January. Generally, the region has recorded 18 numbers of rainy days having 2 knots wind speed. The zone is portrayed by rare horticulture rehearses owing to non-accessibility of irrigation system and meager soil aside from Dera Ismail Khan even as the greater portion of the Thal desert has sandy top soils and characterized by summer's "Loo" (sweltering breeze) particularly in May and June. The

region consists of subtropical thorn as well as irrigated forests with wood lands.

A.1.4. Summers Dehydrated, Winters Concentration, 45-50% Relative Humidity (sy`)

It comprises of Punjgur as well as Turbat (Baluchistan) having moist short winters and dehydrated long summers. The absolute precipitation is under 5 inches (127mm) and is heaviest in winters. The summers are hot while winters are pleasant. The average temperature ranges from 20-25^{0}C having 30-35^{0}C maximum and 5-10^{0}C minimum. The extreme temperature of 45^{0}C has been noted in June (hottest) with a lowest of -7.8^{0}C in December (coldest). The region characterizes by a sum of 10 rainy days and 4.5 knots wind speed throughout the year. A sandy hot desert swathes the zone at the Iran fringe and coastal area of Makran. The region consists of sandy soil having desert dunes, gravely disintegrated by surface hydrology. Vegetation is firmly identified with soil dampness having grass alongside of dry streams, and acacia trees and bushes on piedmont plain near Makran hills.

A.2. Hot Long Summer and Cool Short Winters (HsCw`)

The locale is by and large, described by balmy desert, where temperature surpasses 32^{0}C in June and remains 0 to -10^{0}C in January having an average of more than 25^{0}C in summers.

A.2.1. Summers Dehydrated, Winters Concentration, 30-35% Relative Humidity (sz)

The Chaghi, Nokkundi and Kharan (moderately) observatories cover it with sum of precipitation below 5inches (127mm). The area is characterized by the ever-recorded lowest precipitation of 1.4inches or 35.6mm with long, hot summers and humid, cool winters. The region has a recorded 5.4mm (0.22inch) evapotranspiration, 8.5hours/day sunshine, 4 numbers of rainy days and 7.6 knots wind speed annually. The average temperature remains 20-25^{0}C, amid 35-40^{0}C maximum and 10-15^{0}C minimum. In June, the most extreme temperature surpasses 45^{0}C with a lowest temperature of -10^{0}C in December. The land is filthy having dry piedmont areas and desolate Chaghi mountain slopes, scours, trees and Karaze irrigation-based agriculture patches.

A.2.2. Summers Dehydrated, Winters Concentration, 35-40% Relative Humidity (sz`)

The region is covered by Dalbandin observatory and scraps of Kharan and Chaghi districts in the Southwestern Baluchistan, where there are long-dry summers and short soggy winters. The region gets the majority of the annual downpours in winter that is 5inches (127mm) having 5.1mm or 0.2inch evapotranspiration, 8.6hours/day sunshine, 8.7 numbers of rainy days and 3.2knots wind speed. The average temperature remains between 20-25^{0}C having 35-40^{0}C maximum and 5-10^{0}C minimum. In June, the ever-recorded temperature is above 50^{0}C, while in December it dropped to below 10^{0}C. The zone is seriously disintegrated having infertile hills especially the Chaghi mountains. Generally, Dalbandin area comprises of piedmont plain, whereas in the south, it consists of dunes, scours and shrubs and is used for grazing.

A.3. Hot Long Summers and Short Warm Winters (HsWw`)

It comprises of scorching arid region having a sizzling month as temperature in June is higher than 35^{0}C and in January it is between 21-32^{0}C and average summer temperature surpasses 25^{0}C.

A.3.1. Winters Dehydrated, Summers Concentration, 55-60% Relative Humidity (wx`)

Bahawalnagar, Bahawalpur, Multan and Mianwali district, Punjab province are included in this specific region. It is described by squat warm parched winters and sweltering long sodden summers. The yearly all out precipitation ranges from 5-10inches (127-254mm) with 5.5mm or 0.22inch evapotranspiration, 8-10hours/day sunshine, 10-15 numbers of rainy days and 2-4knots wind speed. The average temperature of the region remains between 25-30^{0}C having 35-40^{0}C maximum and 10-20^{0}C minimum temperature. The farthest ever recorded maximum temperature remains between 45-51^{0}C in May and June (hottest) and the minimum temperature ranges between 0 to -5^{0}C in January (coldest). The region is the augmentation of the Rajasthan desert because of well-created waterways framework, concentrated agribusiness is carried out in the area. The soil of the region is sandy; however, alluvium land is likewise created close to the Indus, Sutlej and Chenab rivers. The vegetation cover consists of xerophytic forests, bushes, grass land and inundated ranch.

A.3.2. Winters Dehydrated, Summers Concentration, 40-45% Relative Humidity (wy)

The Sibi and Kach territories plunge in this climate type. The summers of the area are sweltering, long and wet with temperate squat dehydrated winter season. The yearly all out precipitation of the zone ranges from 5-10inches (127-254mm) with 4mm or 0.16inch evapotranspiration, 8.2hours/day sunshine, 12 numbers of rainy days and 3knots wind speed. The average temperature ranges from 25-30^{0}C having 30-35^{0}C maximum and 10-15^{0}C minimum temperature. The Sibi has recorded 50^{0}C temperature thrice times in June (hottest) and sun burning area of country with a lowest of -3.3^{0}C in January. Aridity triumphs the entire area having low fertile soil with sand and pebbles. There is no vegetation in the Kachi plain and pure desert. Common vegetation are xerophytes with bushes

and meadows.

A.3.3. Winters Dehydrated, Summers Concentration, 50-55% Relative Humidity (wx)

It comprises of Northern Sindh and Khanpur district with total precipitation <5 inches (127mm). It is characterized by long, sweltering and clammy summers and warm short and dry winters with 6.7mm or 0.27inch evapotranspiration, 8.7hoursr/day sunshine, 5-10 rainy days and 2-4knots wind speed. The average temperature stands between 25-30^{0}C having 35-40^{0}C maximum and 10- 20^{0}C minimum temperature. The extreme maxima of the region remain between 45-52^{0}C (May and June) and the lowest minima of 0 to -5^{0}C (January and December). The loam is affluent clayey and loamy with horticulture, grazing, irrigated plantation and over flooded swamps.

A.3.4. Winters Dehydrated, Summers Concentration, 60-65% Relative Humidity (wv)

It comprises of Padidan and Nawabshah observatories, Sindh province having absolute precipitation of 5-10inches (127-254mm), summers fixation and short dry winters. The region recorded 7mm or 0.28inch evapotranspiration, 8.8hoursr/day sunshine, 5-10 rainy days and below 5knots wind speed. The average temperature ranges from 25-30^{0}C amid 35-40^{0}C maximum and 10-15^{0}C minimum temperature. The most extreme temperature surpasses 50^{0}C (June), whereas it tumbles to underneath solidifying in January. The loam, forests and physiography is same as represented in Awx locale.

A.3.5. Winters Dehydrated, Summers Concentration, 45-50% Relative Humidity (wy`)

Cholistan (Punjab) and Thar Desert (Sindh) covers the area with short pleasant dry winters and hot long wet summers. Annually the region receives a sum of precipitation between 5-10inches (127-254mm) excluding Cholistan desert where it is below five inches (127mm). Generally, the region experiences 5mm or 0.2inch evapotranspiration and 8hours/day sunshine. The average temperature fluctuates somewhere in the range of 25-30^{0}C having maximum of 35-40^{0}C and minimum temperature of 10-15^{0}C. The ever-recorded maxima temperature of the area reaches higher than 50^{0}C in June (hottest) and lowest of 0-5^{0}C in January (coldest). The arid land spreads over a vast area of eastern Sindh and southern Punjab province, which consists of a series of parallels linear and converse dunes locally called bets, situated southeast to northwest and experiences drought condition every year in summers. Cholistan desert comprises of sand having xerophytic forests, bushes and grazing fields.

A.4. Warm Long Summers and mild Short Winters (WsMw`)

The region is described by average temperature of 21-32^{0}C in June (hottest month) and 10-21^{0}C in November (warm month) having 25^{0}C in summer.

A.4.1. Winter Dehydrated, Summers Concentration, 55-60% Relative Humidity (wx`)

The territory described by maritime continental climate has a sum of 5-10inches (127-254mm) precipitation. It incorporates Dadu and Lasbela areas and portrayed by hot protracted humid summers and warm short dehydrated winters. Generally, the area experiences 4.4mm or 0.18inch evapotranspiration, 8.1hours/day sunshine, 14.5 numbers of rainy and 3knots wind speed throughout the year. Average temperature fluctuates somewhere in the range of 25-30^{0}C having 35-40^{0}C maximum and 10-15^{0}C minimum temperature. The extreme maxima temperature reaches 51^{0}C at Lasbela (May) with a minima of below freezing (January). The forests are firmly identified with soil dampness having grass lands down dry torrents and streams. The vegetation is an incredible factor as of totally infertile ground to average-thickness bushes and small trees.

A.4.2. Unvarying Rainfall, Winters Concentration, 65-70% Relative Humidity (Uwv`)

The region consists of western Karachi city having sum of precipitation between 5-10 inches (127-254mm). The zone gets winter and summer rainfall mutually with winter concentration. The area is characterized by ocean and land breeze having mild short winters and warm long summers. In June (hottest month) maxima temperature reaches to 32^{0}C, while in January (coldest month) it remains under 5^{0}C. The area experiences 4 mm or 0.16-inch evapotranspiration, 8 hours/day sunshine, 5-10 numbers of rainy days and 6.6 knots wind speed per year. The average temperature of the zone varies from 25-30^{0}C along with 35-40^{0}C maxima and 15-20^{0}C minima. The area recorded the most elevated maxima temperature of 45^{0}C in June and minima of 0^{0}C in January. The physical relief, loam and forests are alike to AUsv' region.

A.4.3. Summer Dehydrated, Winters Concentration, 70-75% Relative Humidity (su)

The marine coastal climate characterizes the Pasni and Jiwani area having sum of precipitation less than 5 inches (127mm) mild short winters and warm long summers (winter concentration). Yearly evapotranspiration exceeds 4mm or 0.16inch, whereas it recorded 8.3hours/day sunshine, 6.5 rainy days and 6.9knots wind speed. Average temperature of the region ranges from 25-30^{0}C having 35-40^{0}C maximum and 15-20^{0}C minimum temperature. The most noteworthy maxima temperature reaches up to 47^{0}C in June and minima of 2^{0}C in December. The area is likewise portrayed via ocean and land breezes amid scant bela, mangroves forests and saline sandy soil.

A.4.4. Summers Dehydrated, Winters Concentration, 75-80% Relative Humidity (su`)

Ormara and Jiwani fall in this region having short mild clammy winters and warm long dry summers. The all-out precipitation of the territory is 5-10 inches (127-254mm) having lower than 5mm or 0.2inch evapotranspiration, 9hour/day sunshine, 5-10 rainy days (winter concentration) and 5-8knots wind speed. The average temperature varies from 25-30^{0}C having 30-40^{0}C maximum and 15-20^{0}C minimum temperature. The average recorded maxima temperature reaches to 48^{0}C in June and the minima remains between 0-5^{0}C in January. The soil and vegetation characteristics of the region are alike Asu climate type.

A.4.5. Unvarying Rainfall, Summer Concentration, 65-70% Relative Humidity (Usv`)

This climate type is characterized by maritime climate and covers the coastal belt of Indus Delta (Thatta) and Malir district, Karachi city. Annually, sum of precipitation of the region ranges as of 5-10inches (127-254mm) in the midst of 4.9mm or 0.2inch evapotranspiration, 8.1hours/day sunshine, 10 rainy days and 6.6knots wind speed. The average temperature remains between 25-30^{0}C amid 35-40^{0}C maximum and 15-20^{0}C minima temperature. The ever-recorded maximum temperature of the area approaches 48^{0}C in May (hottest) and tumbles to 0^{0}C in January (coldest). Physiographically, Karachi city has a flimsy swathe of loam over endured substratum with a couple of stumpy slopes ascending to over 15meters. The forests in most part of the area consists of bela having some watered ranch on Indus river and road sides. The territory is described by ocean and terra firma breezes amid sandy loam and scanty agricultural activities.

A.5. Warm Short Summer and Cool Long Winter (Ws`Cw)

Area incorporates localities with 21-32^{0}C average temperature in June, 0-10^{0}C in January and higher than 15^{0}C in winter season.

A.5.1. Summer Dehydrated, Winter Concentration, 40-45% Relative Humidity (sy)

It comprises of Chaman, Kalat and Loralai district in Baluchistan province. These regions have wet cool long winters and warm short dehydrated summers. The region receives a sum of precipitation in the range of 5-10inches (127-254mm), 5mm or 0.2inch evapotranspiration, 8.7hours/day sunshine, 15-20 rainy days and 3knots wind speed. Average temperature ranges from 15-20^{0}C having 25-30^{0}C maximum and 0-5^{0}C minimum. The ever-recorded maxima temperature at Kalat is 38^{0}C in June (hottest) and minima temperature 0 to -18^{0}C in January (coldest). The area is described via broad forests having numerous bushes. Exorbitant wood and domestic deforestation have totally debased these forests, leaving numerous previous timberland regions as grassy steppes. The land is lithosols and regosols having a number of ripe alluvial loams in the valleys as well as slopes.

A.5.2. Summers Dehydrated, Winters Concentration, 30-35% Relative Humidity (sz)

This climate type covers Chagai (parts) and Noshki district, Baluchistan and receives 0-5 inches (0-127mm) total precipitation with cool mild and moist winters and long hot dry winters. It experiences 5mm or 0.2inch evapotranspiration, 8 hours/day sunshine, 20-25^{0}C mean temperature, 30- 35^{0}C maximum and 5-10^{0}C minimum temperature. The loams comprise of gravels, sands (regosols), rocks and are exceptionally non-fertile. The vegetations are for the most part scours with fields desolate terrains and hills.

A.5.3. Unvarying Rainfall, Summer Concentration, 35-40% Relative Humidity (Usz`)

It comprises of Khuzdar district with long warm summers, cool short winters and all out precipitation of 5-10inches (127-254mm). It recorded 5mm or 0.2inch evapotranspiration with 8hours/day sunshine, 19.3 rainy days, 3knots wind speed, 20-25^{0}C, 30-35^{0}C maximum and 5-10^{0}C minimum. During July (hottest month), the ever-recorded maxima temperature is 43^{0}C, whereas the minimum temperature remains between –5 to -10^{0}C in January (coldest month). The locale is described via soak slants with fields and inadequate bushes; however, it is for the most part, desolate. Primarily, the terra firma is suitable for fauna grazing having isolated patches. The area is famous for different kind of fruits like plums, peaches, graphs, apricots and apples.

A.6. Warm Short Summer and Cold Long Winter (Ws`C*w)

The mean temperature varies from 21-32^{0}C in June, January less than freezing and above 15^{0}C in winter season.

A.6.1. Winters Dehydrated, Summer Concentration (local thunderstorms), 40-45% Relative Humidity (wty)

It covers Gupis observatory, Gilgit-Baltistan province, where the absolute precipitation is under 5inches (127mm) having wet short summers and long cold dry winters. The winter season is exceptionally chilly, even as the summer season is balmy. Annually, observatory recorded 2.8mm or 0.11inch evapotranspiration, 6.6hours/day sunshine, 13.8 rainy days and 2.6knots wind speed. The physical reliefs are for the most part, bumpy, having inadequate forest and agriculture activities. The average temperature varies from 10-15^{0}C having maximum of 20-25^{0}C and minimum of 5-10^{0}C. The extreme maxima temperature of the locality reaches 41^{0}C in July and minimum temperature between –10 to -15^{0}C in January. The zone is described all in all; by icy

masses, profound v-shape basins, terraces and alluvial as well as glacier fans. The slopes of mountain is characterized by deprived loams. However, the basis of valleys are profound, depositional rich loams on lower inclines. The vegetations are all in all, deciduous having medium heights and orchards.

A.6.2. Summers Dehydrated, Winters Concentration, 50-55% Relative Humidity (sx)

Skardu (Pakistan), Ladakh (India) as well as abutting China covers the region with a total precipitation of 5-10inches (127-254mm), especially as ice and snow during winters. It receives 4.4mm or 0.18inch evapotranspiration, 6.8hours/day sunshine, 21.5 numbers of rainy days, 1.1knots wind speed, 10-15^{0}C average temperature, 20-25^{0}C maximum and 0^{0}C minimum temperature throughout the year. The most noteworthy maxima temperature is 41^{0}C in August, and the minima temperature of -20 to -25^{0}C during January. The territory portrayed by infertile hills and icy masses has infertile soil on slopes and fertile loams at foothills. It characterizes by deciduous timberland in the valleys, foothills, fans and terraces.

A.7. Hot Long Summer and Cool Short Winter (HsCw`)

It is described through hot weather condition, amid above 32^{0}C temperature in June, 0-10^{0}C in January and surpasses 25^{0}C temperature in summers.

A.7.1. Winter Dehydrated, Summer Concentration (local thunderstorms), 40-60% Relative Humidity (wtY)

Bunji and Gilgit district, Gilgit Baltistan province covers the area, where the total precipitation is between 5-10inches (127-254mm); 0.11inch (2.7mm) evapotranspiration, 6.5hours/day sunshine, 14-20 rainy days and 0-3knots wind speed. The area experiences a dry cool winters and hot wet summers. The average temperature varies from 15-20^{0}C having 25-30^{0}C maximum and 0-10^{0}C minimum temperature. The most astounding maxima temperature of the locale is 45-50^{0}C in June as well as August and the lowest minima temperature is -5 to -15^{0}C in December and January. The locale comprises of main valleys and taller snow- and ice-covered hills. Forests are Alpine scrubs of little deciduous, coniferous and evergreen woods with porch horticulture at the base of mountains.

A.7.2. Unvarying Rainfall, Summers Concentration (local thunderstorms), 35-40% Relative Humidity (Ustz`)

Parts of Kohistan district and Chilas (Gilgit Baltistan) are incorporated into this zone having a sum of precipitation from 5-10inches (127-254mm), elevated desolate Himalayas and frigid geology. The region experiences 3.3mm or 0.13inch evapotranspiration, 6.5hours/day sunshine, 17.3 rainy days and one knot wind speed. The average temperature remains between 20-25^{0}C amid 30-35^{0}C maximum and 5-10^{0}C minimum temperature. The extreme maxima temperature reaches 48.1^{0}C in August and the lowest minima temperature of -4.4^{0}C in January. The hills' inclines comprise of infertile soils yet the basins are fertile soils particularly in glacial fans and terraces that are suitable for the cultivation of wheat, maize, walnuts, plums, apricots and deciduous backwoods.

B. Semi-Arid Climates

It consists of Southwestern Khyber Pakhtunkhwa, Northern Punjab, parts of Gilgit Baltistan and Baluchistan province having total precipitation of 10-20inches (254-508mm) per year.

B.1. Hot Long Summer and Mild Short Winter (HsMw`)

It is characterized by 32^{0}C temperature during June, 10-21^{0}C in November and 25^{0}C average temperature in summer season.

B.1.1. Winter Dehydrated, Summer Concentration, 55-60% Relative Humidity (wx`)

Sahiwal as well as Faisalabad district, central Punjab province covers the region with total precipitation of 10-15inches (254-381mm). The winters are short and mild, while the summers are sweltering having Lu winds during June. The region recorded 5mm or 0.2inch evapotranspiration, 7.8hours/day sunshine, 15-25 rainy days and 0-3knots wind speed. The average temperature is 20-25^{0}C having 35-40^{0}C maximum and 10-15^{0}C minimum temperature. The ever-recorded maxima temperature of 48^{0}C noted in May as well as June, whilst the minimum temperature of -5^{0}C in January. The Rachna doab has profound, clayey loamy and sandy soils reasonable for farming. The forests are tropical thorn, plantation timberlands.

B.1.2. Unvarying Rainfall, Summer Concentration, 55-60% Relative Humidity (Usx`)

Sargodha as well as Khushab district is included in this climate type, wherever the sum of precipitation remains 15-20inches (381-508mm). The region recorded 5.1mm or 0.2inch evapotranspiration, 8.4hours/day sunshine, 20-25^{0}C average temperature, 40-50^{0}C maxima in June and July, 0-15^{0}C in January as well as February. The physical relief, loams and forests are equivalent to expressed in Bwx' sub-climate type.

B.1.3. Unvarying Rainfall, Winters Concentration, 50-55% Relative Humidity (Uwx)

The Karak and Bannu district, Khyber Pakhtunkhwa falls in it. The total precipitation remains between 10-15inches (254-381mm), 5mm or 0.2inch evapotranspiration, 8.4hours/day sunshine, 20-25 rainy

days and 0-3knots wind speed. The average temperature lingers between 20-25^{0}C having 30-35^{0}C maximum and 10-15^{0}C minimum. The extreme maxima temperature surpasses 45^{0}C in June, although, it diminishes to underneath the point of solidification during January and February. It consists of thin profound vales and shingles. Escalated agribusiness rehearses in all around inundated zones; however, the majority of the Karak area is rainfed with thorn woods.

B.1.4. Unvarying Rainfall, Winters Concentration, 45-50% Relative Humidity (Uwy`)

Peshawar vale with total precipitation of 10-15inches (254-381mm), mild short winters and hot long summers fall in this zone. The average evapotranspiration is 4.5mm or 0.18inch, 7.9hours/day sunshine, 25-30 rainy days and 0-3knots wind speed. The average temperature remains between 20-25^{0}C having 30-35^{0}C maximum and 10-15^{0}C minimum temperature. During May as well as June, the day by day temperature remains 50^{0}C, whereas during January, it decreases to -3.9^{0}C. The loam is usually depositional having shingle flat surface at the base of hills. Concentrated agribusiness is done in sound-inundated regions of Mardan, Charsadda, Peshawar, and Swabi district with thorny and irrigated forests.

B.2. Warm Short Summer and Cool/Cold Long Winter (Ws`C/C*w)

The region is characterized by 21-32^{0}C average temperature in June, 0-10^{0}C or below in January and 15^{0}C in winter season.

B.2.1. Unvarying Rainfall, Summer Concentration (local thunderstorms), 50-55% Relative Humidity (Ustx)

It comprises of Northern Mansehra (Khyber Pakhtunkhwa) and Astore (Gilgit Baltistan province) having snow and ice with moderate temperature in winter season. The region recorded a sum of 15-20inches precipitation, 2.5mm or 0.1inch evapotranspiration, 6hours/day sunshine, 43.1 rainy days and 2.2knots wind speed. The average temperature differs somewhere in the range of 5-10^{0}C amid 20-25^{0}C maximum and 1^{0}C minimum temperature. The most extreme maxima temperature surpasses 35^{0}C during August, whereas it is decreased to -21^{0}C during January as well as February. This area wraps larger acreage of vales and elevated lasting snow topped hills. The common forests are generally evergreen and coniferous woodlands at peaks and deciduous timberlands at the hills base having certain farmlands. The horticulture rehearses on spring and rainfed lands of the region.

B.2.2. Summer Dehydrated, Winter Concentration, 50-55% Relative Humidity (sx)

The region consists of parts of Kohistan, Chitral (Khyber Pakhtunkhwa) and Gupis observatory (Gilgit Baltistan province) having dry short summers and cool long winters. The Chitral district gets major part of its shower in the shape of snow and ice from westerlies, whereas the excluding region gets it in the form of downpours in summers. It receives a total of 15-20inches (381-508mm) precipitation, 5mm or 0.2inch evapotranspiration, 6hours/day sunshine, 37.3 rainy days and 6knots wind speed per year. The average temperature of the districts remains between 15-20^{0}C having 25-30^{0}C maximum temperature and 0-5^{0}C minimum temperature. In June, the maxima temperature reaches to 40^{0}C, whereas the minima temperature declines up to –16^{0}C during January. The area comprises of tremendous sharp vales with infertile loams at hills and fertile depositional soils at the foothills as well as valleys secured by deciduous, coniferous timberlands and some irrigated farmlands having agriculture in isolated patches.

B.3. Warm Short Summers and Cool Long Winter (Ws`Cw)

The average temperature in June is 21-32^{0}C, January (coldest months) 0-10^{0}C, and 15^{0}C mean winters temperature.

B.3.1. Unvarying Rainfall, Winters Concentration, 45-50% Relative Humidity (Uwy`)

Obviously, Muslim Bagh and Zhob district (Baluchistan) is incorporated into this locale having sum of precipitation 10-15inches (254-381mm), long cool winters and moderate short summers. The physical relief is bumpy and hilly amid low fertility at the slopes and fertile loam in the vales. The flora is normally scrubs having coniferous and deciduous woods on ridges and pasture land at the foothills. Majority of the land is rainfed, however there are some areas watered by Karaze/tube wells and irrigation patches aside Zhob river. The region recorded 3.2mm or 0.13inch evapotranspiration, 8.4hours/day sunshine, 28.2 rainy days and 3knots wind speed, 15-20^{0}C average temperature, 30-35^{0}C maximum and 5-8^{0}C minimum temperature. The extreme maxima temperature raises up to 43^{0}C in June and tumbles to -9^{0}C during January.

B.3.2. Unvarying Rainfall, Summers Concentration, 45-50% Relative Humidity (Usy`)

Barkhan district (Baluchistan) includes in it with a total precipitation of 15-20inches (381-508mm), cool long winters and short warm summers. It experiences 5mm or 0.2inch evapotranspiration, above 7hours/day daylight, 38.2 rainy days; 3.8knots wind speed, 20-25^{0}C average temperature, 30-35^{0}C maximum and 10-15^{0}C minimum temperature. The extreme maximum temperature approaches to 45^{0}C during June and -5 to -10^{0}C minima temperature during December. The flora comprises of grasslands near streams with trees on mountains and bushes.

B.3.3. Summers Dehydrated, Winters Concentration, 50-55% Relative Humidity (sx)

Quetta and areas of Kandahar (Afghanistan) includes in it, where the sum of precipitation is 10-15inches (254-381mm) with cool long wet winters and short warm summers. It experiences 5mm or 0.2inch evapotranspiration, 9.2hours/day sunshine, 23.1 rainy days, 3.8knots wind speed, 15-30^{0}C mean temperature, 30-35^{0}C maximum and 0-5^{0}C minimum temperature throughout the year. Because of cold Siberian lows, in winters, the night time temperature falls to -18^{0}C in January and 40^{0}C in June. The area portrayed by deciduous forests having bushes and prairies. In plain areas, the soil is clayey loamy and suitable for grazing with horticulture activities in irrigated plains.

B.3.4. Unvarying Rainfall, Winters Concentration, 50-55% Relative Humidity (Uwx)

The region covers Waziristan areas (Khyber Pakhtunkhwa province) with absolute precipitation of 10-15inches (254-381mm) with short warm summer and long moist winters. It experiences 5mm or 0.2inch evapotranspiration, 8hours/day sunshine, 25-30 rainy days, 0-5knots wind speed, 15-20^{0}C average temperature, 30-35^{0}C maximum temperature, 5-10^{0}C minimum temperature. The ever-recorded maxima temperature surpasses 45^{0}C in June and beneath frosty in January. The loam is patchy that is infertile soil on slopes and fertile in vales. The flora is generally relying upon soil dampness, with sparse shrubs near waterways and foothills, however some alpine scrubs are located at Miranshah.

C. Sub-Humid Climates

It comprises of a large territory of Northern Khyber Pakhtunkhwa, Northern Punjab and areas of Azad Jammu and Kashmir having absolute precipitation of 20-40inches (508-1016mm).

C.1. Hot Short Summers and Cool/Cold Long Winter (Hs`C/C*w)

Drosh as well as surrounding areas cover the region along with absolute precipitation of 20-25inches (508-635mm), above 32^{0}C temperature in June, 0-10^{0}C or below in January and average winter temperature of 15^{0}C. During winter season, the hilly areas are characterized by snow, whereas the vales experiences heavy precipitation. The area recorded 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 52.3 rainy days, 3.1knots wind speed, 15-20^{0}C, 20-25^{o}C maximum and 10-15^{0}C minimum temperature. The ever-recorded maxima temperature reaches to 47^{0}C in June with a minima temperature of -9^{0}C in January. Physiographically, it is characterized by deep narrow vales having infertile soil at hills and fertile loam in vales. The flora consists of alpine forests at high altitudes having patches of conifers and deciduous forests.

C.2. Hot Long Summer and Mild Short Winter (HsMw`)

The average temperature in June exceeds 32^{0}C, November 10-21^{0}C and 25^{0}C in summer season.

C.2.1. Unvarying Rainfall, Summers Concentration, 60-65% Relative Humidity (Usv)

The area comprises of Gujranwala and Lahore, Punjab province having sum of precipitation 20-25inches (508-635mm), 4.4mm or 0.18inch evapotranspiration, 8.4hours/day sunshine, 31.4 rainy days, 1.6knots wind speed, 20-25^{0}C mean temperature, 35-40^{0}C maximum, 10-15^{0}C minimum temperature. The most noteworthy maxima temperature reaches 48^{0}C in May and -2^{0}C in January. Soil is for the most part profound, clayey topsoil and sandy, however some briny loam has likewise existed beside the river banks. The area is underneath extensive lucrative arable horticulture, nourished by waterways having farms, manmade forests and thorn trees.

C.2.2. Unvarying Rainfall, Summers Concentration, 65-70% Relative Humidity (Usv`)

The Gujrat, Jhelum and Sialkot district, Punjab province, and Jammu (Occupied Kashmir) covers it, where the absolute precipitation varies from 35-40inches (889-1016mm), 5mm or 0.2inch evapotranspiration, 8hours/day sunshine, 45 to 50 rainy days, 0-2knots wind speed, 20-25^{0}C average temperature, 30-35^{0}C maximum, 10-15^{0}C minimum temperature. The most elevated maxima temperature approaches 45-50^{0}C during May and June with minima of 0-5^{0}C in December and January. The physical reliefs, laom and flora are equivalent to CUsv climate type.

C.2.3. Unvarying rainfall, summers concentration, 45-50% relative humidity (Usy`)

The Hangu and Kohat district of Khyber Pakhtunkhwa province falls in this region, where the sum of precipitation remains 20-25inches (508-635mm), 5mm or 0.2inch evapotranspiration, 8hours/day daylight, 41.8 rainy days, 4.4knots wind speed, 15-20^{0}C average temperature, 30-35^{0}C maximum and 10-15^{0}C minimum temperature. The extreme maxima temperature exceeds to 47^{0}C in June and the minima upto 1^{0}C in January. The land is wealthy in loamy clayey and reasonable for horticulture however infertile loam have likewise existed in excess of slopes and mountains basis with concentrated farming in the watered zones, thorn forests and farm lands.

C.2.4. Unvarying Rainfall, Winters Concentration, 60-65% Relative Humidity (Uwv)

The area comprises of Malakand Agency and Lower Dir, Khyber Pakhtunkhwa province, where the sum of precipitation remains 25-30inches (635-762mm), 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 43.9 rainy days, 3.7knots wind speed, 20-25^{0}C, 30-35^{0}C

maximum and 5-10^{0}C minimum temperature. The ever-recorded maxima reach 45^{0}C in June with minima of -9^{0}C in January. The area is described via barren mountains, fertile soil at valleys, coniferous, deciduous forests and terraces agriculture.

C.2.5. Unvarying Rainfall, Winters Concentration, 50-55% Relative Humidity (Uwx)

The areas of Kohat and Cherat district, Khyber Pakhtunkhwa cover it having precipitation 25-30inches (635-762mm), long and moist summers and moderate short winters. The physical barriers are mostly rough having deep valleys and sterile hills, sub-tropical deciduous trees and irrigated farms. The area recorded 5mm or 0.2inch evapotranspiration, 8hours/day sunshine, 43.3 rainy days, 1.4knot wind speed, 15-20^{0}C average temperature, 25-30^{0}C maximum and 5-10^{0}C minimum temperature. The most noteworthy maxima temperature is 42^{0}C in June and -7^{0}C during January.

C.2.6. Unvarying Rainfall, Summers Concentration, 55-60% Relative Humidity (Usx`)

The Potwar plateau, Punjab includes in this zone, where the annual precipitation remains 35-40inches (889-1016mm) with long moist summers and short moderate winters, 5mm or 0.2inch evapotranspiration and 8hours/day sunshine. The geography of the terra firma is rough, and portrayed by concentrated horticulture. The timberlands are composed of sub-tropical thorn having watered and ranch trees. At Rawalpindi, the soil is mature, whereas in excluding region, petty residual and corroded loess have enlarged. In certain spots, there is enormous, powerless to disintegration, and unequivocally gullied, creating a dismembered land feature and barren wasteland geology. The average temperature is between 20-25^{0}C having 25-30^{0}C maximum and 10-15^{0}C minima and 15^{0}C mean daily temperature.

C.3. Warm Short Summer and Cool Long Winter (Ws`Cw)

The Parachinar observatory and adjoining areas of Afghanistan made the zone with average temperature of 21-32^{0}C in June and 0- 10^{0}C in January and above 15^{0}C temperature in winter season. The zone gets both winters and summers downpours having winter fixation, from western depressions. The region receives a sum of 30-35inches (762-889mm) precipitation, 3.2mm or 0.13inch evapotranspiration, 8hours/day sunshine, 64.3 rainy days, 2.7knots wind speed, 15-20^{0}C mean temperature, 25-30^{0}C maximum and 0-5^{0}C minimum temperature throughout the year. The extreme maximum temperature approaches to 39^{0}C during June with -15^{0}C in December. The geography is rough with snow cap mountains and mixed alpine and coniferous forests and farm lands.

D. Humid Climates

The area comprises of Northern Punjab, Malakand division, Azad Jammu and Kashmir having total precipitation of 40-80inches (1016-2032mm).

D.1. Hot Long Summers and Mild Short Winter (HsMw`)

Mean temperature above 32^{0}C in June, 10-21^{0}C in November and average summer temperature higher than 25^{o}C.

D.1.1. Unvarying Rainfall, Summers Concentration, 60-65% Relative Humidity (Usv)

The Islamabad (Capital city) and encompassing territories are incorporated into this area having long hot summers, moderate winters and total precipitation of 45-50inches (1143-1270mm). The region recorded 5mm or 0.2inch evapotranspiration, 8.3hours/day sunshine, 57 rainy days; 1.8knots wind speed, 20-25^{0}C, 30-35^{0}C maximum and 5-10^{0}C minimum temperature. The ever-extreme maxima temperature reaches to 46^{0}C during June with minima of -4^{0}C in January. The loam in valleys and slopes is infertile having an increasing trend in fertility towards Rawalpindi, conifers scrubs on mountains and deciduous forests.

D.1.2. Unvarying Rainfall, Summers Concentration, 55-60% Relative Humidity (Usx`)

It covers Punch as well as Kotli (Pakistan) and Anantnag (India) having long hot summers, moderate short winters, 50-55inches (1270-1397mm) annual precipitation, 5mm or 0.2inch evapotranspiration, 8hours/day sunshine, 71.9 rainy days, 2.3knots wind speed, 20-25^{0}C mean temperature, 30-35^{0}C maximum, and 10-15^{0}C minimum temperature. The extreme maximum temperature approaches to 46^{0}C during June and lowest of -2.8^{0}C in January as well as February having rough geography at the base of hills and arable soil in the valleys. Mostly, terraces have horticulture practices in the area which is fed by rains and streams having evergreen coniferous and sub-tropical deciduous forests.

D.2. Warm Short Summer and Cool Long Winter (Ms`Cw)

Murree and the abutting Khyber Pakhtunkhwa makes the region having warmest month (November) temperature 10-21^{0}C, coldest month (January) 0-10^{0}C, and above 15^{0}C temperature in winter season. The zone gets mutually winter and summer precipitation, however the input of summer downpours from monsoon is more when contrasted with winter downpours. The region recorded 65-70inches (1651-1778mm) total precipitation, 5mm or 0.2inch evapotranspiration, 6-8hours/day sunshine, 91.4 rainy days, 5.6knots wind speed, 10-15^{0}C average temperature, 20-25^{0}C maximum and 0-5^{0}C minimum temperature. The ever-recorded maxima temperature is 33^{0}C in June and the minima of -12^{0}C in January as well as February. The area is hilly having terraces horticulture, evergreen

coniferous and deciduous forests.

D.3. Hot Long Summer and Cool Short Winter (HsCw`)

In June, the average temperature exceeds 32^0C, January 0-10^0C and 25^0C temperature in summer seasons.

D.3.1. Unvarying Rainfall, Summers Concentration, 60-65% Relative Humidity (Usv)

The area comprises of Muzaffarabad district (Pakistan), Baramulla and Uri district (India) having short cool winters and hot long summers. The total precipitation seems among 60-65inches (1524-1651mm), 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 80-90 rainy days, 4knots wind speed, 15-20^0C average temperature, 30-35^0C maximum and 5-10^0C minimum temperature. The extreme maximum temperature is 45-50^0C in May as well as June and minimum of 0 to -10^0C during January. The region has rough geology with V-shape vales, infertile soil at mountains, fertile loam at foothills, evergreen deciduous and coniferous forests.

D.3.2. Unvarying Rainfall, Summers Concentration, 55-60% Relative Humidity (Usx`)

Balakot, Kaghan, Naran (Mansehra district) and Allai (Batagram district) fall in this zone having absolute precipitation of 65-70inches (1651-1778mm) and hoary winters. The late spring period of the locale is hot with cool long winters. The region experiences below 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 87.2 rainy days, 1.4knots wind speed, 15-20^0C average temperature, 30-35^0C maximum and 5-10^0C minimum temperature. The highest maximum temperature reaches to 43.3^0C in May with a lowest of -3^0C in January. The area is hilly having evergreen conifers backwoods on the slopes and inundated timberlands in the vales, nonetheless, due to forest cutting; the mountains are barren with terraces agriculture.

D.4. Mild Short Summer and Cool Long Winter (Ms`Cw)

The average temperature of November (warm month) is 10-21^0C, January (cold month) 0-10^0C and winter temperature above 15^0C.

D.4.1. Unvarying Rainfall, Summers Concentration, 55 To 60% Relative Humidity (Usx`)

Mansehra, Batagram and Abbottabad observatories incorporate into this zone with 50-55inches (1270-1397mm) total precipitation, winter snow fall, short pleasant summers and cool long winters. Annually, the region experiences 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 64.3 rainy

Table1 List of Acronyms to Map 1.

acronym	Meaning	Acronym	Meaning
A	Arid.	z	Relative humidity 30-35%.
B	Semi-arid.	z`	Relative humidity 35-40%.
C	Sub-humid.	u	Relative humidity 70-75%.
D	Humid.	u`	Relative humidity 75-80%.
E	Undifferentiated highland.	v	Relative humidity 60-65%.
w	Winter dry and summer rainfall.	v`	Relative humidity 65-70%.
s	Summer dry and winter rainfall.	y	Relative humidity 40-60%.
U	Uniform rain (summer and winter).	i	D4-Uwv`
t	Rainfall from local thunderstorms (spring).	ii	D4-Uwv
s`	Short summers.	iii	D3-Usx`
w`	Short winters.	iv	D2-Ms`Cw
C	Cool	v	D3-Usv
C*	Cold	vi	D4-Usx
H	Hot	vii	D1-Usv
W	Warm	viii	C2-Uwv
M	Mild	ix	C3-Ws`Cw
x	Relative humidity 50-55%.	xi	C2-Usy`
x`	Relative humidity 55-60%.	xii	C2-Uwx
y	Relative humidity 40-45%.	xiii	Usx`
y`	Relative humidity 45-50%.	xiv	C1-Hs`C/C*W
Us	Uniform rains with summer rainfall.	uw	Uniform rains with winter rainfall.
A1.	HsMw`	A2.	HsCw`
A3.	HsWw`	A4.	WsMW`
A5.	Ws`Cw	A6.	Ws`C*w
A7.	HsCw`	B1.	HsMw`
B2.	WS`C/C*w	B3.	WS`Cw
B4.	HsMw`	C1.	Hs`C/C*w
C2.	HsMw`	C3.	Ws`Cw
D1.	HsMw`	D2.	Ms`Cw
D3.	HsCw`	D4.	Ms`Cw

days, 2knots wind speed, 15-20^{0}C mean temperature, 25-30^{0}C maximum and 5-10^{0}C minimum temperature. The ever-recorded maxima temperature is 46^{0}C in June and the lowest of -5 to -10^{0}C in January. Geologically, the area is rocky with rough geography, snow topped hills, deep vales, infertile soil at slopes, loamy rich soil in valleys, evergreen coniferous, deciduous backwoods and ranch trees.

D.4.2. Unvarying Rainfall, Winters Concentration, of 60-65% Relative Humidity (Uwv)

It incorporates Buner, Torghar, Kohistan, and Swat district having a sum of precipitation 40-45inches (1016-1143mm), short mild summers and cool long winters (snowfall). June is the most blazing month accompanied by 32^{0}C maximum temperature and January (coldest month) amid underneath the point of solidification. The locations recorded 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 60.6 rainy days, 1knots wind speed, 10-20^{0}C mean temperature, 30-35^{0}C maximum (43.6^{0}C ever recorded, June) and 5-10^{0}C minimum temperature (-3^{0}C in January). The area is rugged by means of deep vales, and diverse temperature. Infertile loams at slopes, rich fertile soil in vales with terraces horticulture as well as deciduous and coniferous forests.

D.4.3. Unvarying Rainfall, Winters Concentration, 65 To 70% Relative Humidity (Uwv`)

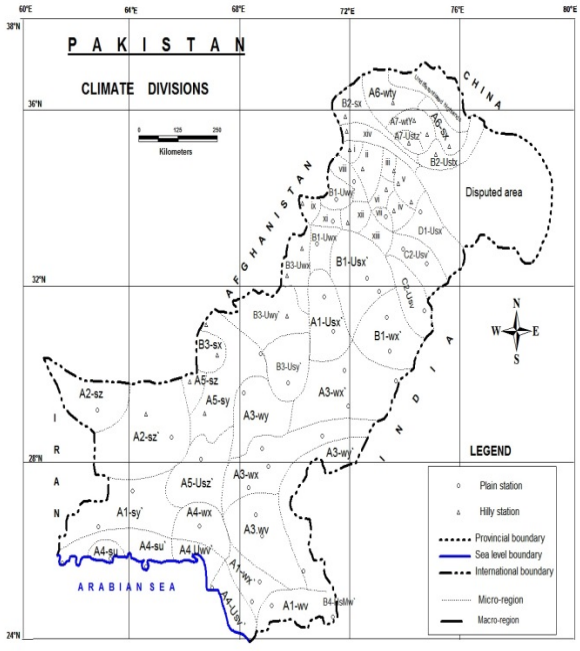
The region covers Upper Dir district having sum of precipitation 55-60inches (1379-1524mm), warm short summers and cool long moist winters. The average weather condition comprises of 5mm or 0.2inch evapotranspiration, 7hours/day sunshine, 82 rainy days, 1.6knots wind speed, 15-20^{0}C average temperature, 25-30^{0}C maximum, and 0-5^{0}C minimum temperature. The extreme maximum daily temperature reaches to 41.5^{0}C, during June, and-13.9^{0}C in January having poor loam at slopes, fertile soil in vales, coniferous, deciduous and plantation forests.

E. Undifferentiated Highland

The climate type described by interminable ice and snow having average temperature less than solidification consistently and is situated 2500 meters over the ocean level. It is situated at the outrageous north of Pakistan having grand Himalayas as well as deep vales. The snow and ice spread all over the zone yet few landmasses are portrayed by ice activity especially close to Chilas. The popular areas are Khunjarab, Hunza, Astore, Skardu, Ashkomen and Shigar valley with significant icy masses of Batora, Siachin, Passu, Rakaposhi and Balturo. The climate type consists of rough geology with glacial moraines, frost action, evergreen coniferous and deciduous forests.

Conclusion

Pakistan is the country of different climates varies from maritime in the south, continental at mid latitudes and undifferentiated highlands at the mountains. Furthermore, the variation also exists in summer as well as winter seasons at different physiographical areas. Thus, based on the temperature condition the entire country has classified into hot, warm, mild, cool, and cold season having five precipitation zones consisting of arid, semi-arid, sub-humid, humid and undifferentiated highlands. Pakistan encounters four precipitation seasons namely winter, pre-monsoon, monsoon and post monsoon. Because of sub-tropical vicinity the country has experienced two fundamental seasons explicitly winter and summer, which are sub-divided into four sub-spells to be precise hot, warm, monsoon and cold season. Based on appropriation and fluctuation of climate variables, Pakistan has classified been into five macro areas that auxiliary sub-curved up into 18 meso and 46 micro scale climate regions. All the regions have been defined with unique coding system having specific meaning and highlighted on map 1 and Table 1.



Map 1 Climate classification of Pakistan.

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