



Water Resource Status of Pakistan (I)



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1. Introduction

Islamic Republic of Pakistan is a sovereign country in South Asia. Earth's Northern and Eastern Hemisphere (latitude 24° to 37° north, longitude 61° to 75° East). With a population exceeding 196 million people, it is the sixth

most populous country and with an area covering 796,095km², it is the 36th largest country in the world in terms of area. Pakistan has a 1,046km coastline along the Arabian Sea. Pakistan is a federal parliamentary republic consisting of four provinces (Punjab, Sindh, Balochistan, Khyber Pakhtunkhwa) and four federal territories. Most of the people believe on Islam (Islam 95–98%, 2–5% Christian, Hinduism and other religions). Many languages been spoken different parts of the country but main national language is Urdu. Pakistan got independence on 14 August, 1947. The economy of Pakistan is the 26th largest in



Figure 1-1 Map of Pakistan

Source: Wikipedia, the free encyclopedia

the world in terms of purchasing power parity (PPP), and 44th largest in terms of nominal GDP (\$245 billion (nominal) (2014), \$855 billion (2014 est.)) even though the country is sixth most populous in the world. GDP per capita is \$3,149 ranking 140th in the world. Pakistan GDP growth rate is 3.7% (2012), 4.1% (2013–14). GDP per sector is 25.3% Agriculture, 21.6% industry, 53.1% services (2013).

Pakistan has the exports of \$25.05 billion (2013) while major industries here in Pakistan is Textiles and apparel, food processing, pharmaceuticals, materials, chemicals, cement, mining, machinery, steel, engineering, software and hardware, automobiles, motorcycle and auto parts, electronics, paper products, fertilizer, shrimp, defense products, shipbuilding.

Pakistan's principal natural resources are arable land and water. About 25% of Pakistan's accounts for about 21% of GDP and employs about 43% of the labor force. The Federal Bureau of Statistics provisionally valued major crop yields at Rs.504,868 million in 2005 thus registering over 55% growth since 2000 while minor crop yields were valued at Rs.184,707 million in 2005 thus registering over 41% growth since 2000. The exports related

to the agriculture sector in 2009–10 are Rs 288.18 billion including food grains, vegetables, fruits, tobacco, fisheries products, spices and livestock.

Pakistan exports rice, cotton, fish, fruits (especially Oranges and Mangoes), and vegetables and imports vegetable oil, wheat, pulses and consumer foods. The country is Asia's largest camel market, second-largest

apricot and ghee market and third-largest cotton, onion and milk market.

The economic importance of agriculture has declined since independence, when its share of GDP was around 53%. The value of processed retail food sales has grown 12 percent annually during the Nineties and was estimated at over \$1 billion in 2000, although supermarkets accounted for just over 10% of the outlets.

Pakistan lies in the temperate zone, immediately above the tropic of cancer. The climate varies from tropical to temperate. Arid conditions exist in the coastal south, characterized by a monsoon season with adequate rainfall and a dry season with lesser rainfall, while abundant rainfall is experienced by the province of Punjab, and wide variations between extremes of temperature at given locations. Rainfall varies from as little as less than 10 inches a year to over 150 inches a year, in various parts of the nation. These generalizations should not, however, obscure the distinct differences existing among particular locations. Pakistan has four seasons: a cool, dry winter marked by mild temperatures from December through February; a hot, dry spring from March through May; the summer rainy season, or southwest monsoon period, from June through September; and the retreating monsoon period of October and November. The onset and duration of these seasons vary somewhat according to location. The climate in the capital city of Islamabad varies from an average daily low of 5°C in January to an average daily high of 40°C in June.

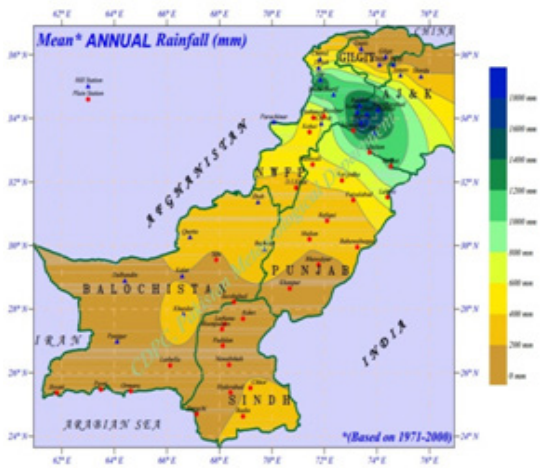


Figure (1-2) Mean daily Rainfall

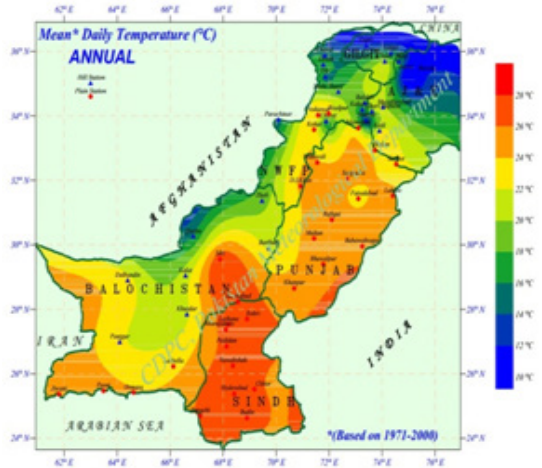


Figure (1-3) Mean daily Temperature

Source: Pakistan Meteorological Department

Half of the annual rainfall occurs in July and August, averaging about 300 mm in each of those two months. The remainder of the year has significantly less rain, amounting to about 100 mm per month. Hailstorms are common in early spring. The temperature is also more uniform in Karachi than in Islamabad, ranging from an average daily low of 13°C during winter evenings to an average daily high of 34°C on summer days. Although the summer temperatures do not get as high as those in Punjab, the high humidity causes the residents a great deal of discomfort.

Pakistan's largest city, Karachi, which is also the country's industrial center, is more humid than Islamabad but gets significantly lesser rainfall. Only July and August average more than 50mm of rainfall in the Karachi area; the remaining months are exceedingly dry with little rainfall.

2. Water Resources status for each Province

2.1 Punjab

2.1.1 Introduction

Punjab is Pakistan's second largest province in terms of Land area after Balochistan and is located at the north western edge of the geologic Indian plate in South Asia. The capital and largest city is Lahore which was the historical capital of the wider Punjab region. Other important include Faisalabad, Rawalpindi, Gujranwala cities, Multan, Sialkot, Bahawalpur, Sargodha, Gujrat, Sheikhupura and Jhelum. Undivided Punjab is home to six rivers, of which five flows through Pakistani Punjab. From west to east, these are the Indus, Jhelum, Beas, Chenab, Ravi and Sutlej. Nearly 60% of Pakistan's population lives in the Punjab. It is the nation's only province that touches every other province it is also

surrounds the federal enclave of the national capital city at Islamabad.

2.1.2 Climate

Most areas in Punjab experience extreme weather with foggy winters, often accompanied by rain. Recently the province experienced one of the coldest winters in the last 70 years. Experts are suggesting that this is because of global warming. Punjab's region temperature ranges from -2°C to 45°C , but can reach 47°C in summer and can touch down to -5°C in winter. Climatically, Punjab has three major seasons

- Hot weather (April to June) when temperature rises as high as 110°F .
- Rainy season (July to September). Average rainfall annual ranges between 96cm sub-mountain region and 46cm in the plains.
- Cooler / Mild weather (October to March). Temperature goes down as low as 40°F

2.1.3 Rainfall

The amount of rainfall in the Punjab ranges between 250 mm and 1000 mm. The maximum rain is falling near the Shivalik Hills and the minimum towards the desert in the west.

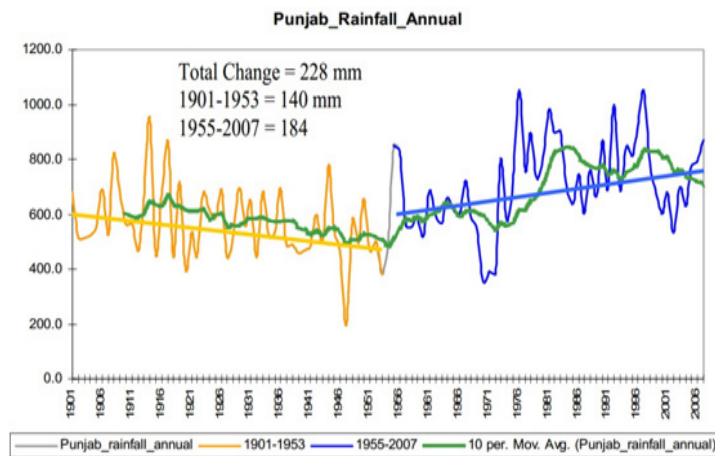


Figure (2-1) Punjab Annual Rainfall

Source: Pakistan Meteorological Department

70 to 80 percent of the total rainfall is concentrated during the three months of south-west monsoon winds and the rest comes during the winter months. There is wide difference in the amount of rainfall experienced in east and west Punjab. Near the hills rainfall is over 1,000mm. Gurdaspur,

Hoshiarpur, Ropar district and eastern parts of Patiala receive an annual rainfall of more than 750mm. The 500mm rainfall line runs in a north-west to south-east direction and cuts the Punjab into almost two equal zones. The Fazilka tehsil in the extreme west receive a rainfall of less than 250mm.

2.1.4 Agriculture

The Punjab province has about 29% of the total reported, 57% of the total cultivated and 69% of the total cropped area of Pakistan. It contributes a major share in the agricultural economy of the country by providing about 83% of cotton, 80% of wheat, 97% fine aromatic rice, 63% of sugarcane and 51% of maize to the national food production. Among fruits, mango accounts for 66%, citrus more than 95%, guava 82% and dates 34% of total national production of these fruits.

2.2 Sindh

2.2.1 Introduction

Sindh is bounded to the west by Balochistan, to the north by Punjab, to the east by the Indian states of Gujarat and Rajasthan and to the south by the Arabian Sea. The capital and largest city of the province is Karachi, which is also Pakistan's largest city and the country's only financial hub. Most of the population in the province is Muslim, with sizable Hindu, Christian, Parsi and Sikh minorities.

Geographically it is the third largest province of Pakistan, stretching about 579km from north to south and 442km (extreme) or 281 km (average) from east to west, with an area of 140,915km² of Pakistani territory.

2.2.2 Climate

Sindh lies in a tropical to subtropical region; it is hot in the summer and mild to warm in winter. Temperatures frequently rise above 46 °C between May and August, and the minimum average temperature of 2°C occurs

during December and January in the northern and higher elevated regions. Central Sindh's maximum temperature typically reaches 43–44°C. Lower Sindh has a damper and humid maritime climate affected by the southwestern winds in summer and northeastern winds in winter, with lower rainfall than Central Sindh. Lower Sindh's maximum temperature reaches about 35–38°C.

2.2.3 Rainfall

Sindh lies between the two monsoons—the southwest monsoon from the Indian Ocean and the northeast or retreating monsoon deflected towards it by the Himalayan Mountains and escapes the influence of both. The average rainfall in Sindh is only 15–18cm per year. The region's scarcity of rainfall is compensated by the inundation of the Indus twice a year, caused by the spring and summer melting of Himalayan snow and by rainfall in the monsoon season. These natural patterns have recently changed somewhat with the construction of dams and barrages on the Indus River. Parts of southeastern Sindh receive rainfall of up to 91 cm and some cities have received very heavy rainfall on occasion.

2.3 Balochistan

2.3.1 Introduction

Balochistan is a province of southwestern Pakistan. It spreads primarily along the eastern part of the geographic region of Balochistan. It is the largest of Pakistan's four administrative provinces in terms of area, constituting approximately 44% of the

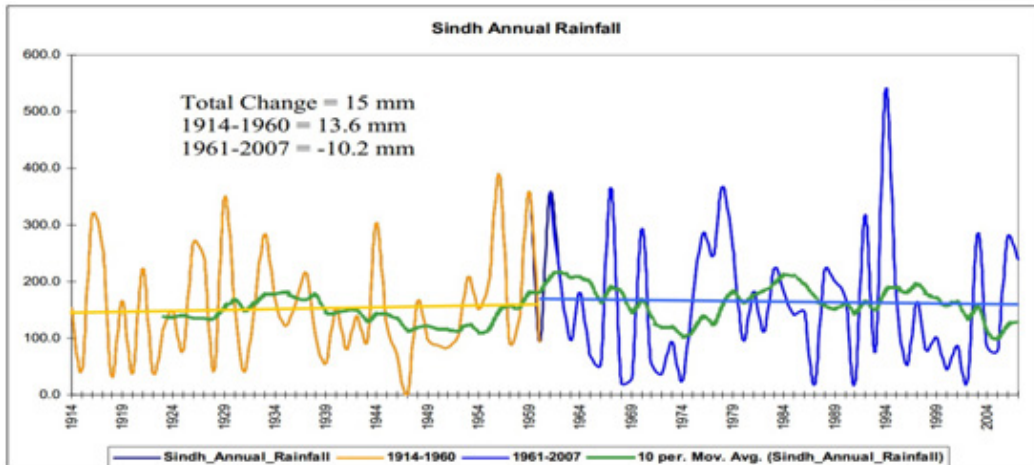


Figure (2–2) Annual Rainfall of Sindh

Source: Pakistan Meteorological Department

country's total land mass, and the smallest in terms of population, being home to less than 5% of the country's population. Balochistan is rich in exhaustible and renewable resources; it is the second major supplier of natural gas in Pakistan. The province's renewable and human resource potential has not been systematically measured nor exploited due to pressures from within and without Pakistan. Local inhabitants have chosen to live in towns and have relied on sustainable water sources for thousands of years.

2.3.2 Climate

The climate of the upper highlands is characterized by very cold winters and hot summers. In the lower highlands, winters vary from extremely cold in northern districts Ziarat, Quetta, Kalat, Muslim Baagh and Khanozai to milder conditions closer to the Makran coast. Winters are mild on the plains, where temperature never falling below

freezing point. Summers are hot and dry, especially in the arid zones of Chaghai and Kharan districts. The plains are also very hot in summer, with temperatures reaching 50° C. The record highest temperature, 53°C, was recorded in Sibi on 26 May 2010, exceeding the previous record, 52°C.

2.3.3 Rainfall

Average annual precipitation in Balochistan varies from 50 to 500 mm. Maximum precipitation falls in the northeastern areas with annual average rain fall ranging from 200 to 500 mm. It decreases in the south and the eastern parts and is minimum in Naukundi, Kharan and Dalbandin area, rainfall ranges between 25 to 50mm. Evaporation rates are higher than the precipitation and generally vary from 1,830 –1,930 mm per annum.

2.3.4 Agriculture

The major proportion of the area is under

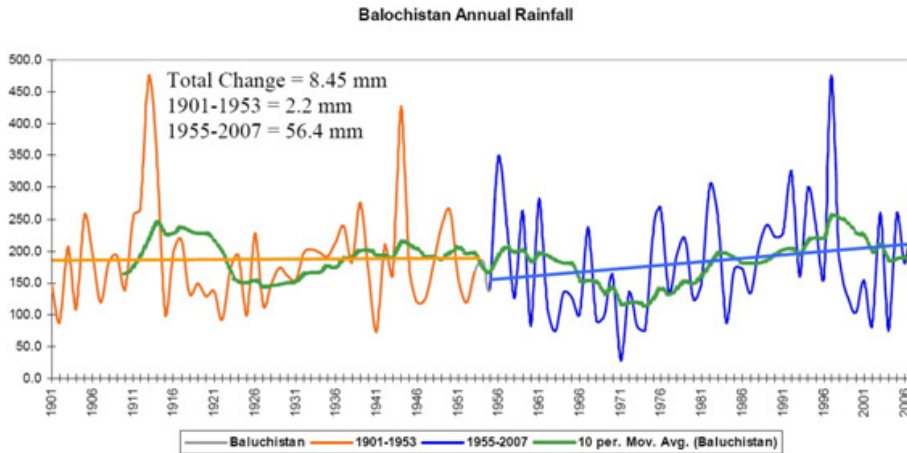


Figure (2-3) Annual Rainfall of Balochistan

fruit production followed by wheat production. During Rabi season, wheat is both a food crop as well as a cash crop. In 1992-1993 the area under fruit production was just 4,977 ha. During 1993-1994 it went up to 5,605, during 1994/95 there was an increase to 5,696 ha. Thus during 1992-1993 - 1994-1995 the area under fruit production grew with 14.44%. Similarly the area increase in wheat during the same period was 19.49 %.

2.4 Khyber Pakhtunkhwa (KPK)

2.4.1 Introduction

Khyber Pakhtunkhwa sits primarily on the Iranian plateau and comprises the junction where the slopes of the Hindu Kush mountains on the Eurasian plate give way to the Indus-watered hills approaching South Asia. The major rivers that cross the province are the Kabul, Swat, Chitral, Kunar, Siran, Panjkora, Bara, Kurram, Dor, Haroo, Gomal and Zhob.

Its snow-capped peaks and lush green valleys of unusual beauty have enormous potential for tourism.

2.4.2 Climate

The northern zone is cold and snowy in winters with heavy rainfall and pleasant summers with the exception of Peshawar basin, which is hot in summer and cold in winter. It has moderate rainfall. Temperatures in southern Pakhtunkhwa are extremely hot: Dera Ismail Khan in the southernmost district of the province is known as one of the hottest places in the world with temperatures known to have reached 50°C. In the cooler months, nights can be cold and frosts remain frequent; snow is very rare, and daytime temperatures remain comfortably warm with abundant sunshine.

2.4.3 Rainfall

Rainfall is much heavier than further north because moist winds from the Arabian Sea

able to penetrate the region. Southern slopes of Khyber Pakhtunkhwa are the wettest part of Pakistan. Annual rainfall ranges from around 500 mm in the most sheltered areas to as much as 1,750 mm in parts of Abbottabad and Mansehra Districts. As in central Pakhtunkhwa, the seasonality of precipitate on shows a very sharp gradient from west to east, but the whole region very rarely receives significant monsoon rainfall. Even at high elevations annual rainfall is less than 400mm and in some places as little as 200mm.

2.2.4 Agriculture

Agriculture remains important and the main cash crops include wheat, maize, tobacco (in Swabi), rice, sugar beets, as well as fruits are grown in the province. Fruits mostly dry fruits are grown here. A variety of apples is grown here. Besides apples, apricots and dry fruits like almonds, walnuts and pine nuts are also grown here in abundance. Potato breeding also takes place in the NWFP (KPK). A lot of fruits consumed in Pakistan and exported to other countries are grown in KPK.

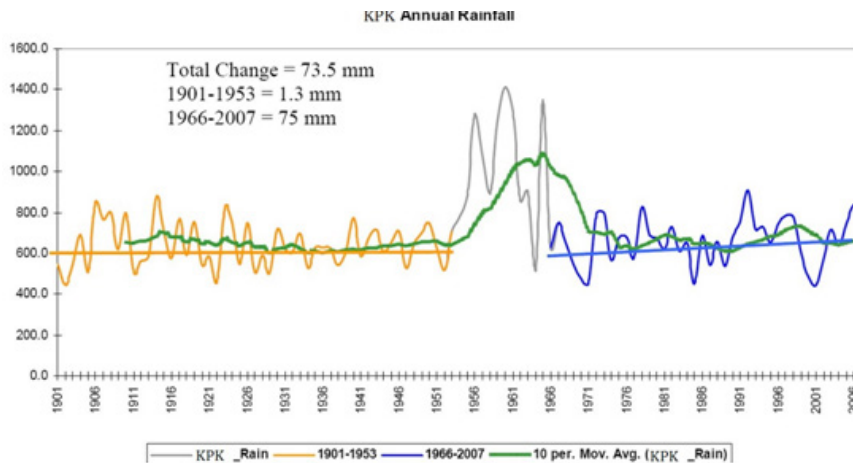


Figure (2-4) Annual Rainfall of KPK

3. Conclusion

Pakistan lies in the temperate zone where climate varies from tropical to temperate. Each province of Pakistan has different hydrologic characteristics and different rainfall patterns. During the monsoon season adequate amount of rainfall was experienced by the province of Punjab which is the largest province of

Pakistan. The amount of rainfall in the Punjab ranges between 250 mm and 1000 mm. Sindh province lies in a tropical to subtropical region and is hot in the summer and mild to warm in winter. The average rainfall in Sindh is only 15–18cm per year but scarcity of water compensated by spring and summer melting of Himalayan snow and construction of new dams and barrages at Indus River. Balochistan is a

province of southwestern Pakistan. The climate of the upper highlands is characterized by very cold winters and hot summers and average annual precipitation in Balochistan varies from 50 to 500mm. The northern zone of Khyber Pakhtunkhwa is cold and snowy in winters with heavy rainfall and pleasant summers. Even at high elevations annual rainfall is less than 400mm and in some places as little as 200mm.

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