Pakistan Meteorological Department

2011

Climate of Pakistan (2011)

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Climate of Pakistan in 2011

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1. Introduction

Temperature and precipitation are two major elements which determine the climate of any region. Any persistent change in both or one with respect to the long term mean or normal values leads to the climate change of that region. Highlights of the analysis for the climate of Pakistan in 2011 are listed below.

2. Temperature

Average Monthly Temperatures of Pakistan for the year 2011 are compared with Average Monthly Normal Temperatures (1981-2010) in figure 1.

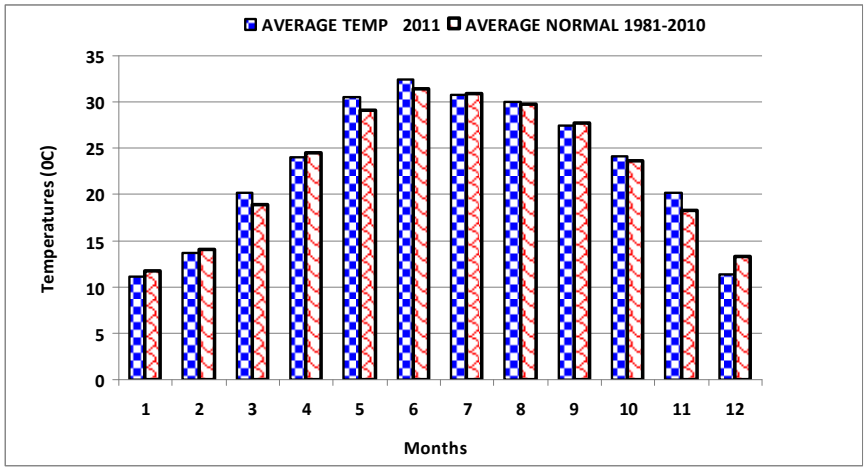

Figure 1: Departures of 2011 mean monthly temperatures from Normal (1981-2010)

Monthly mean temperatures of 2011 were above the 1981-2010's average in March, May, Jun, October and November; while in January, February, April, September and December were below it. July temperatures were equal to normal and of August were near normal (Fig. 1).

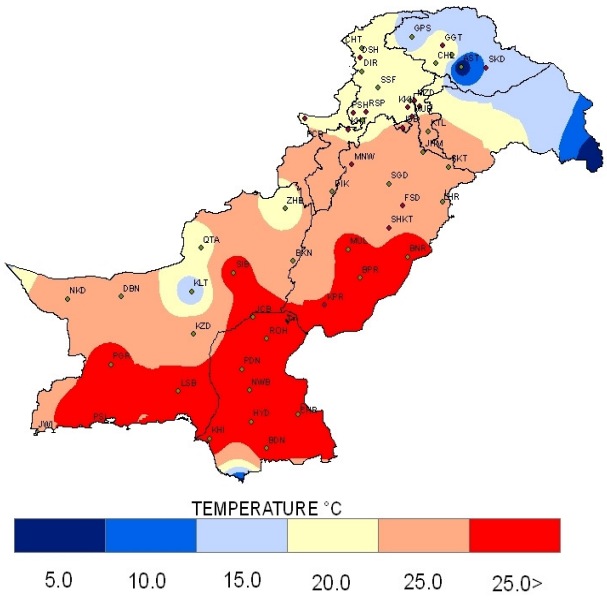

Figure 2: Spatial Distribution of Mean Annual Temperatures of Pakistan for 2011

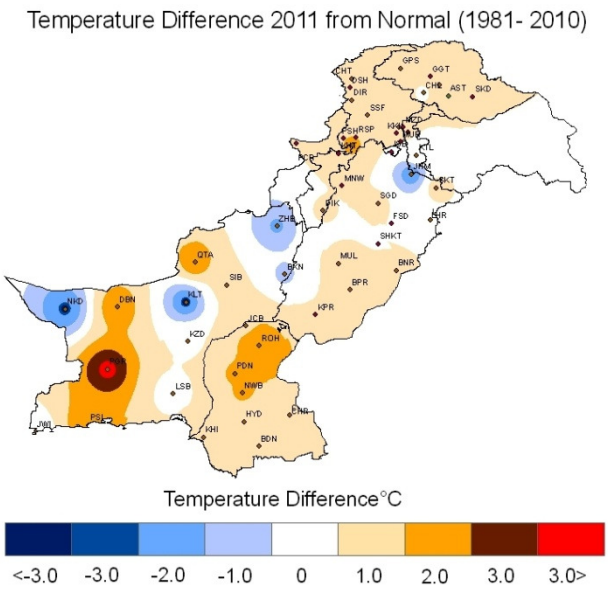

Figure 3: Mean Annual Temperatures (2011) Difference from Normal

Annual Mean Temperatures (actual) for 2011 remained on higher side in most of the country (Fig. 2). Whole Sindh, Punjab and major Portion of Balochistan experienced temperatures ranging from 24^0C-27^0C or even higher. Only a narrow belt of Northern areas had temperatures ranging from 3^0C-12^0C. Figure 3 above shows mean annual temperature departures from Normal 19981-2010.

3. Rainfall

There had been anomalous precipitation throughout the year 2011 as shown in figure 4 below. In winter there was quite below normal in the months of December and January, Whole country experienced moderate to severe drought like situation. February remained very wet with respect to Normal (1981-2010), thus turning over the drought like situation to moderate wet conditions. This moisture carried on to March and April; whereas mostly Normal state prevailed in pre-monsoon period with little wetter Northern part of Balochistan and KPK, and drier Lower half of Sindh. The drought condition become severe in June in almost entire Sindh and lowers half of Balochistan experiencing no rain except at Barkhan. Upper Punjab and adjoining KPK region received well above normal rainfall in Jun and July. August and September witnessed quite well above Normal precipitation especially the month of September remained wettest all over Pakistan which also led to flooding in Sindh and Balochistan. The post monsoon also shown abnormal patterns, KPK and Balochistan remained wettest whereas South-eastern Sindh started showing drought like conditions again.

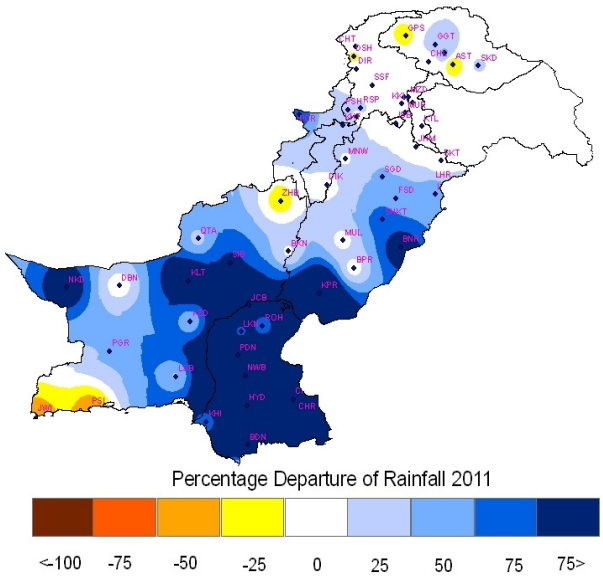

Figure 4: Percentage departure of 2011 Rainfall from Normal 1981-2010

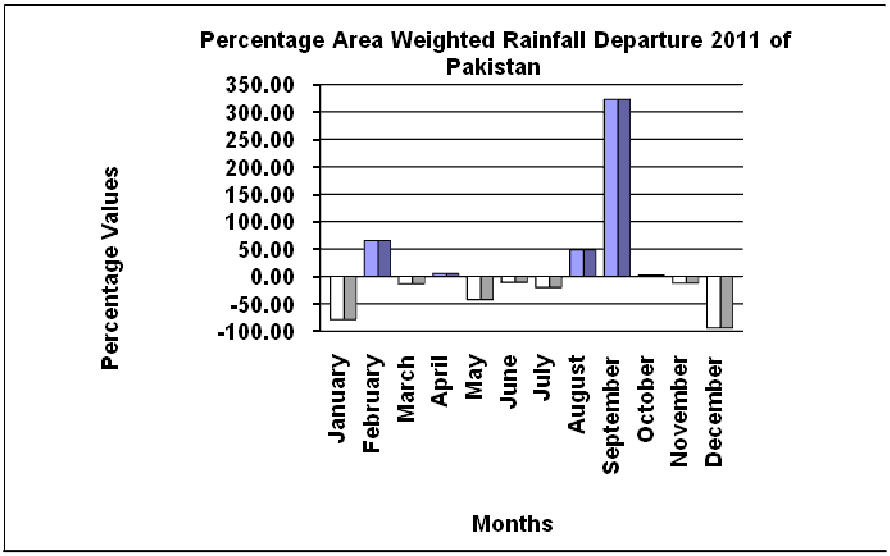

Figure 5: Percentage Departures from Normal of Rainfall 2011

In figure 5, percentage departure of monthly rainfall of 2011 from normal monthly rainfall of 1981-2010 has been shown. January, March, May, Jun, July, November and December seen below normal precipitation whereas in the months of February, and August rainfall was above normal. It was near normal in April and abnormally high above normal in September.

The northern half of the country received heavy rains during monsoon (July– September), which not only fulfill the water requirement of kharif season but also provide the better conditions of soil moisture for sowing of Rabi crops. Therefore, the initial demand (November) of water was met through post monsoon conserved soil moisture. Afterwards rains also satisfy the crop water requirement to some extent upto wax maturity (reproductive stage of Rabi crops). After this stage hot and dry weather conditions are the pre-requisite for attaining rapid maturity.

In 2011, the heavy rainfall causes a lot of damage to standing crops in southern parts of Pakistan especially the Sindh region during monsoon. But this rainfall brought a positive change in the dry areas of Sindh and proved too beneficial for holding the soil moisture for the cultivation of for Rabi season. This rainfall proved to be helpful to eliminate the moisture stress conditions in the country. The winter rainfall also proved to be very helpful for the Rabi crops when it was on flowering stage in most of the rainfed areas. The long spell of rainfall not only fulfilled the water requirement of the crops but also play a role to reduce the drought intensity in the country.

Spatial distribution of total annual rain fall over Pakistan for 2011 depicts extreme rainfall over northwestern Punjab and Eastern KPK which exceeded 1000mm (Fig.6). It is obvious from fig. 5 that it happened in the month of September which led to flood 2011 in Sindh and parts of Balochistan. Lower half of Balochistan received very little rainfall ranging from 25 to 200 mm which is leading most of the areas there towards meteorological drought conditions.

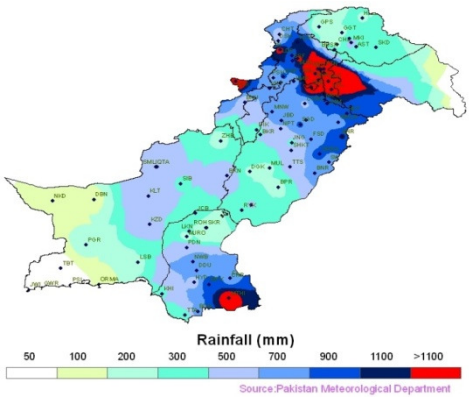

Figure 6: Spatial Distribution of Annual total Rainfall over Pakistan for 2011

4. Extreme Events

Highest Maximum and lowest Minimum Temperatures of Province-wise cities of Pakistan during 2011 are shown in Figure 7(a-e). Stations are arranged in ascending order with respect to their latitudes.

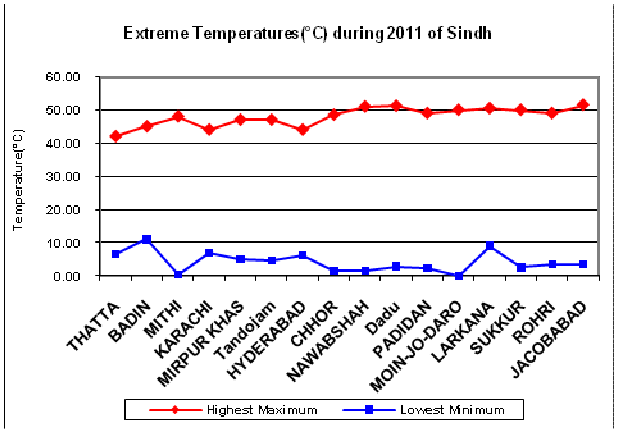

Figure 7 (a): Extreme Temperatures of Sindh

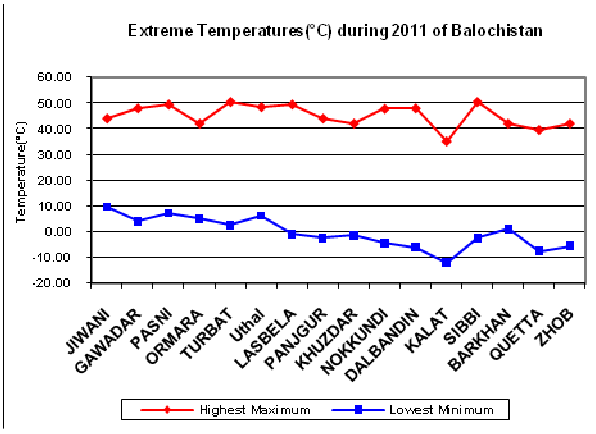

Figure 7(b): Extreme Temperatures of Balochistan

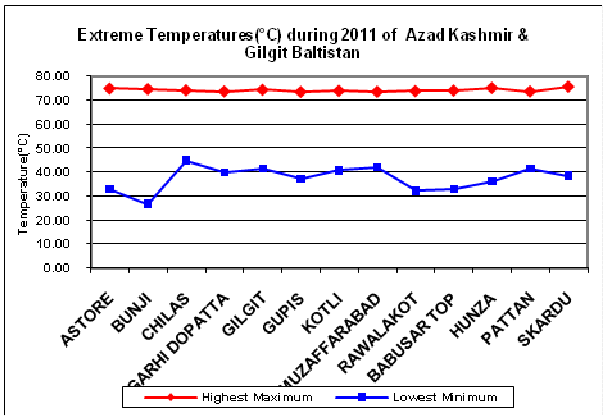

Figure 7 (c): Extreme Temperatures of AK & GB

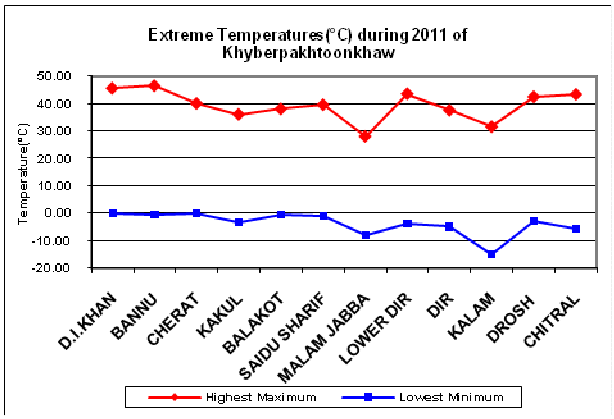

Figure 7 (d): Extreme Temperatures of KPK

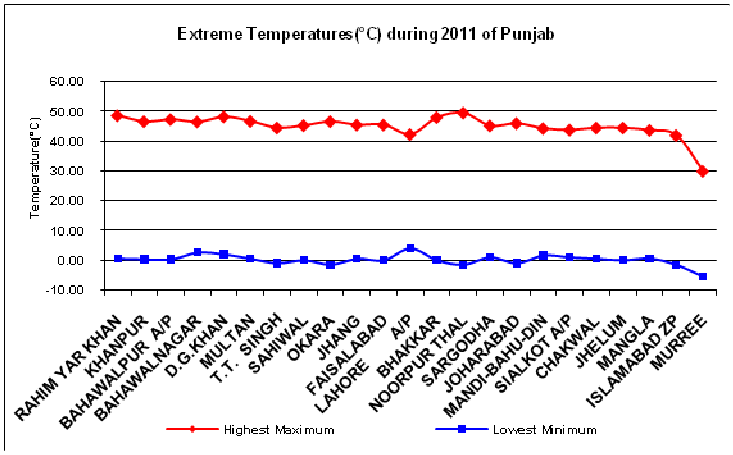

Figure 7 (e): Extreme Temperatures of Punjab

Highest daily Rainfall in 2011 for different cities of Pakistan Province-wise is given in Figure 8(a-e). Stations are arranged in ascending order with respect to their latitudes.

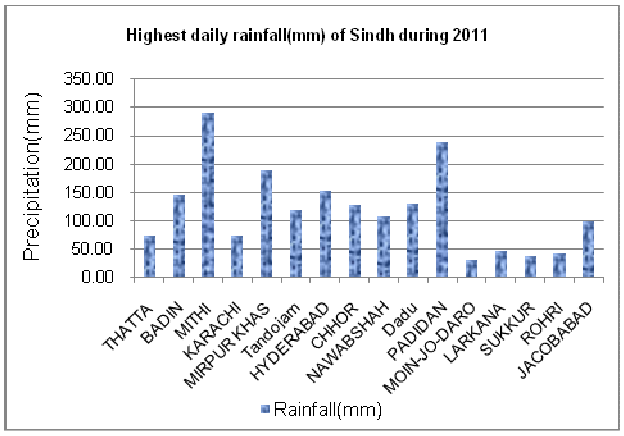

Figure 8 (a): Highest daily Rainfall of Sindh

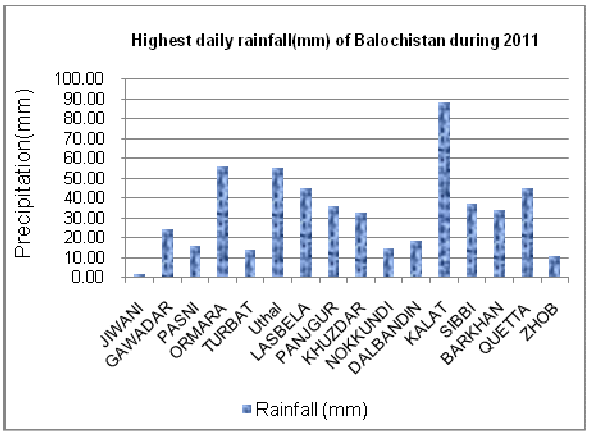

Figure 8 (b): Highest daily Rainfall of Balochistan

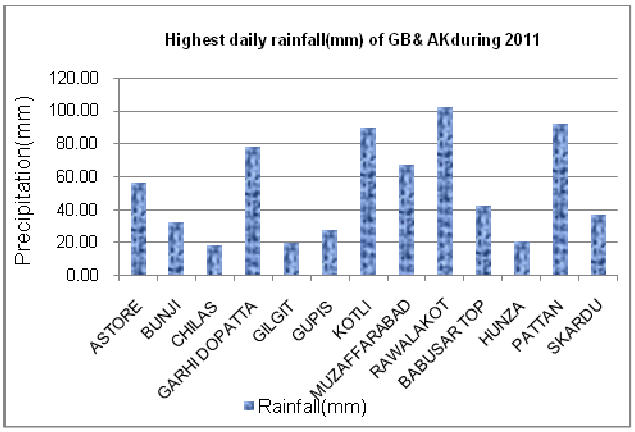

Figure 8 (c): Highest daily Rainfall of AK & GB

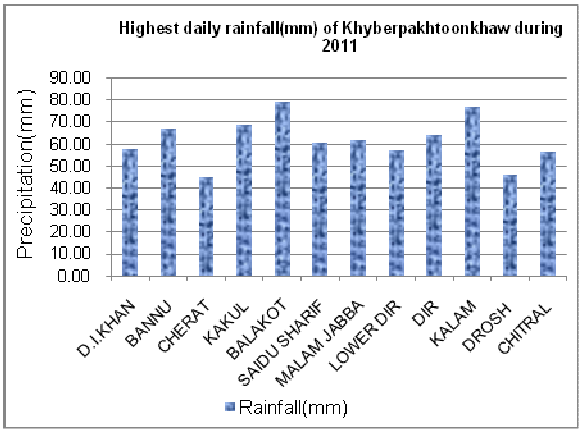

Figure 8 (d): Highest daily Rainfall of KPK

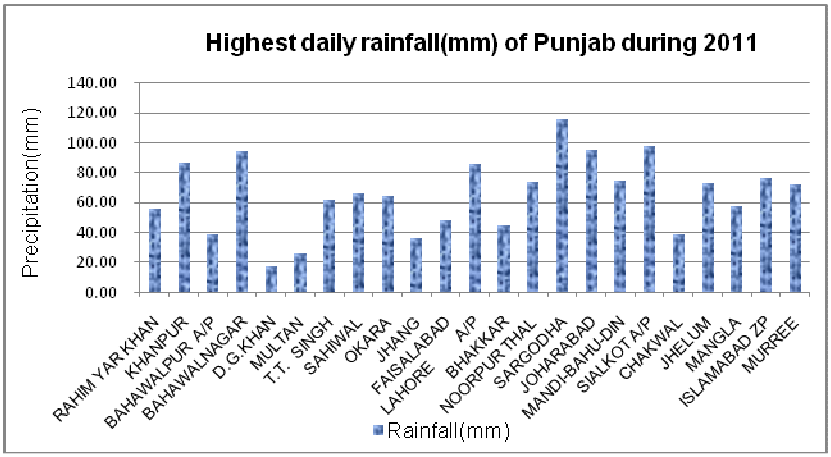

Figure 8 (e): Highest daily Rainfall of Punjab

5. Other extreme Events of 2011

(a) Hail storm at Lahore: February 26, 2011

There was severe hailstorm at Lahore on 26th February which presented a scene like snowfall there. Pictures of the event are given below:

Figure 9: Hailstorm at Lahore on 26th February, 2011

(b) Tornado at Head Marala Sialkot March 19, 2011

On 19th March a small town (Head Marala) near Sialkot was hit by a tornado/twister which caused damage to the properties of people there as shown in the pictures below:

Figure 10: Tornado and its destruction near Sialkot on March 19, 2011

(c) Heat Wave in Pakistan during March, 2011

The definition of heat wave recommended by the World Meteorological Organization is when the daily temperature of more than five consecutive days exceeds the average maximum temperature by 5°C (9 F), the normal period being 1971-2000.

An analysis of extreme temperatures during 1965-2009 shows that major parts of the country have been experiencing a warming trend. The frequency of extreme maximum temperature events are increasing significantly in Northern Areas, Southern Punjab, Sindh and Balochistan.

In 2011 certain parts of Pakistan had undergone a heat wave during 10-18 and then 22-28 March where daily maximum temperatures crossed maximum normal temperatures of 1970-2000 for more than five consecutive days. Some of the stations which suffered heat wave in the month of March 2011 are:

i. Islamabad with maximum normal for the month of March 23.6°C undergone heat wave twice, from 13 to 18 March and then from 22 to 27 March. Temperatures remained 5°C - 9°C above normal.

ii. Peshawar with maximum normal for the month of March 23.7°C undergone heat wave twice, from 12 to 18 March and then from 21 to 27 March. Temperatures remained 11°C -15°C above normal.

iii. Muzaffarabad with maximum normal for the month of March 21.9°C undergone heat wave twice, from 9 to 18 March and then 22 to 27 March. Temperatures remained 5°C -11°C above normal.

iv. Multan with maximum normal for the month of March 28.2°C undergone heat wave twice, from 14 to 19 March and then 23 to 28 March. Temperatures remained 5°C - 9°C above normal.

v. Quetta with maximum normal for the month of March 18.1°C undergone heat wave from 22 to 27 March. Temperatures remained 6°C -8°C above normal.

vi. Dalbandin with maximum normal for the month of March 25.8°C undergone heat wave from 23 to 28 March. Temperatures remained 6°C -9°C above normal.

Figure 11: Scenes of heat wave in Pakistan during March 2011

(d) <u>Flash Flood/Flood in Sindh in September, 2011</u>

The monsoon this year gave abnormally high rainfalls in Sindh affecting a vast area with prolonged flood activity.

Sindh received its first major rainfall spell, starting from 11th to 15th August 2011 owing to a monsoon weather system initially present over Indian Rajasthan. Badin received 148 and 147

mm of rainfall on 11th and 12th August respectively. Chhor, Hyderabad and Mithi received 129, 104 and 291 millimeter of rainfall respectively on 11th August 2011.
Sind again had a major rainy period which started from 29th August and continued till 15th September. This all resulted in the historic rainfalls which were 247% above normal rainfalls in the province. Figure 12 is the pictorial show of the event.

Figure 12: Scenes of flash flood/flooding in Sindh, Pakistan during 2011

6. Drought Monitor

National Drought Monitoring Centre of PMD monitors drought events on fortnightly basis; according to which 2011 has seen mostly normal to wet conditions in most parts of Pakistan except Baluchistan and parts of Northern Punjab which had Mild to Moderate Drought. Western parts of KPK received very good rainfall throughout 2011 and South of Sindh experienced Moderate to Extreme wet conditions due to flood water accumulation there. Figure 13 below shows the drought conditions of whole Pakistan for 2011.

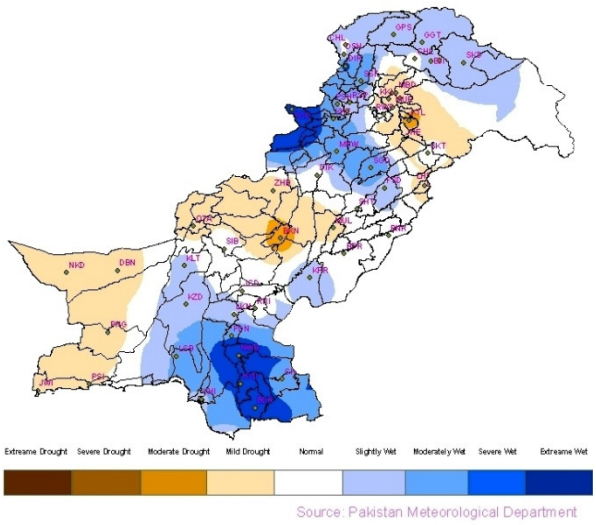

Figure 13: Drought analysis for Pakistan by for the year 2011