Pakistan Meteorological Department

2012

Snow at Margallas in Jan 2012

Climate of Pakistan (2012)

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Climate of Pakistan in 2012

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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. In general, 2012 has witnessed no hazardous events climatically. Highlights of the analysis for the climate of Pakistan in 2012 are listed below.

1. Temperature

Average Monthly Temperatures of Pakistan for the year 2012 are compared with Average Monthly Normal Temperatures (1981-2010) in figure 1.

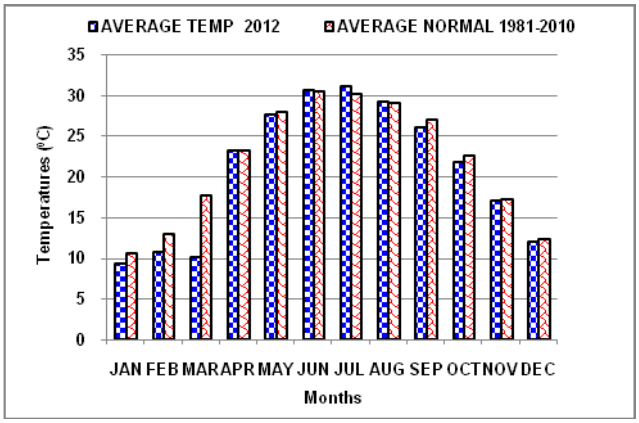


Figure 1: Comparison of 2012 mean monthly temperatures with Normal (1981-2010)

Pakistan's monthly mean temperatures of 2012 were above the 1981-2010's average in July only, while in January, February, March, September, October, November and December were below it. April, Jun, and August temperatures were equal to normal and of May were near normal (Fig. 1).

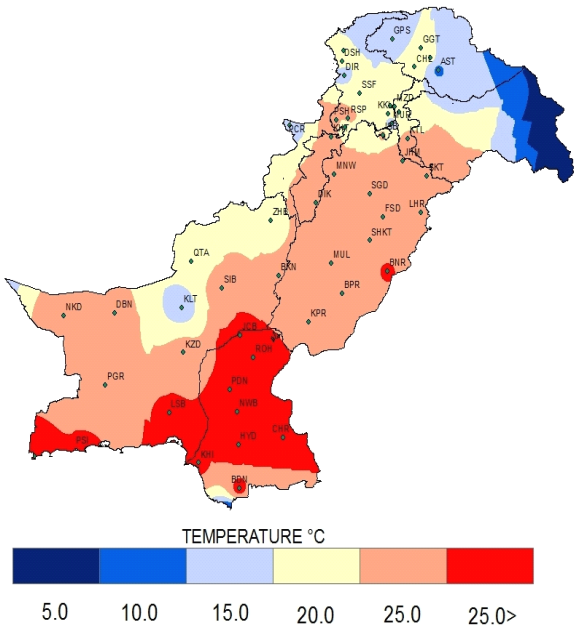


Figure 2: Spatial Distribution of Mean Annual Temperatures of Pakistan for 2012

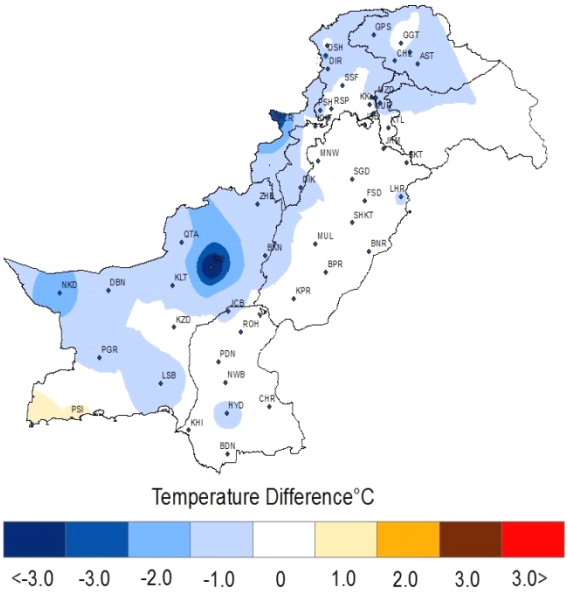


Figure 3: Mean Annual Temperatures (2012) Difference from Normal (1981-2010)

Annual Mean Temperatures (actual) for 2012 remained on higher side in most of the country (Fig. 2). Whole Sindh, Punjab and major Portion of Balochistan experienced temperatures ranging from 22^0C-27^0C or even higher. Only a narrow belt of Northern areas had temperatures ranging from 3^0C-10^0C. Figure 3 above shows mean annual temperature departures from Normal 19981-2010.

2. Rainfall

2012 received near to normal rainfall throughout the year with little variability. In winter months of January and February precipitation remained near Normal (1981-2010). March was below Normal whereas April experienced well above Normal rainfall. This moisture was carried to next month, but June and July were very dry switching to drought like situation especially in Sindh. August had above Normal rains which started ameliorating drought conditions in whole Pakistan. The last spells of Monsoon in early September made this month's rainfall 300% above Normal which eliminated Meteorological drought situation. Especially Thar received such good enough downpours that it became so green that the migrated dwellers turned back to their houses in Thar. October and November were slightly below Normal but December high above Normal rainfall. Yet at the end of the year parts of western Baluchistan show slight to moderate drought.

Overall province of Baluchistan, Sindh and GB/AJK received comparatively more rainfall than Punjab and KPK with respect to percentage departure of 2012 rainfalls from Normal (1981-2012). Although percentage departure of rainfall of 2012 from the Normal (1981-2010) show more than 75% higher precipitation in south-eastern belt, including Sibbi, Jacobabad, Rohri and Khanpur with adjoining areas (Fig. 4), yet in a few monsoon spells of September the junction area of Northern Punjab. GB/AJK and North-eastern KPK received heaviest precipitation as compared to rest of the country (Fig. 5).

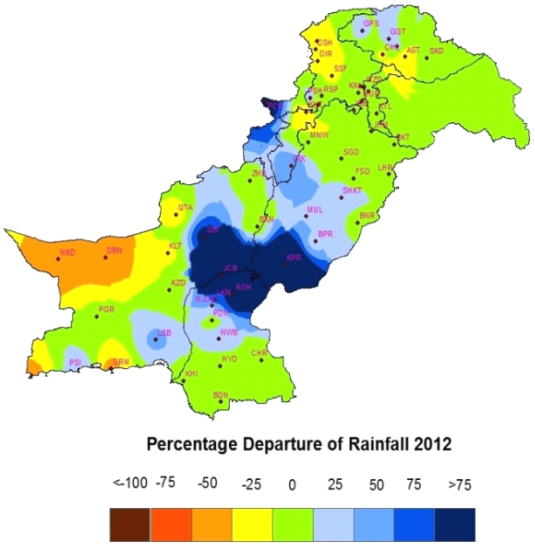


Figure 4: Percentage departure of 2012 Rainfall from Normal 1981-2010

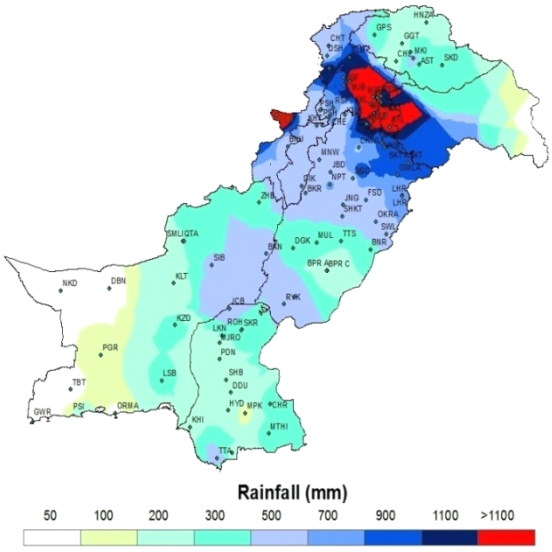


Figure 5: Spatial Distribution of Rainfall 2012 over Pakistan

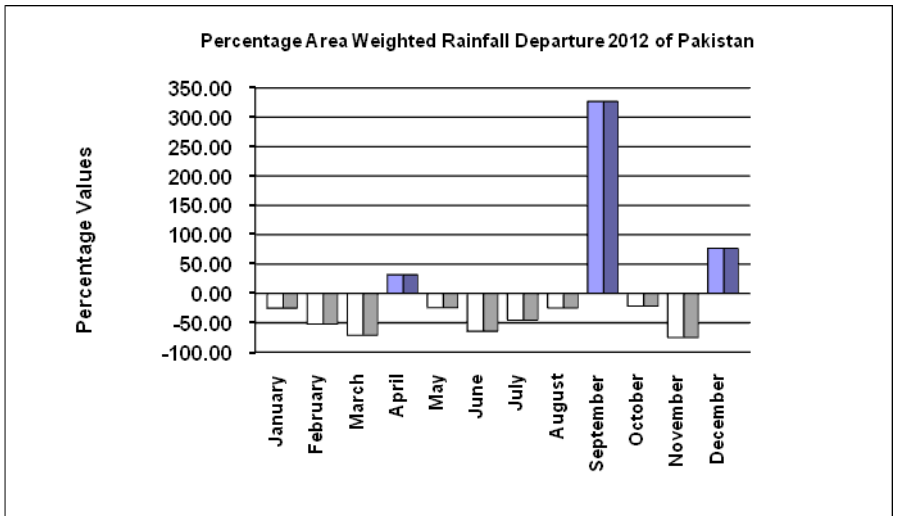


Figure 6: Percentage Departures from Normal of Rainfall 2012

In figure 6, percentage departure of monthly rainfall of 2012 from normal monthly rainfall of 1981-2010 has been shown. January, February, March, May, Jun, July, August, October and November seen below normal precipitation whereas in the months of April and December rainfall was above normal. It was abnormally high above normal in September, making it the wettest month of the year.

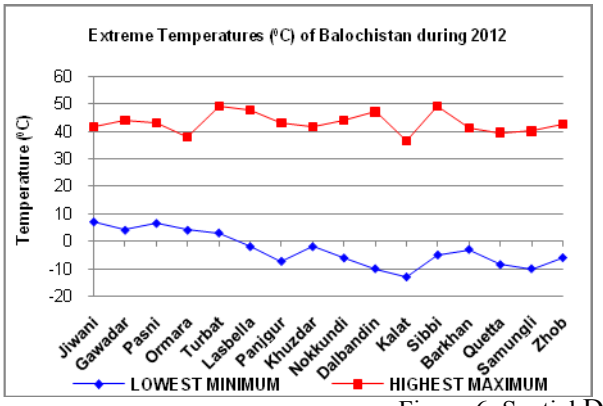
The northern half of the country received heavy rains during end of monsoon (August – September), the southern half of Pakistan (Sindh and Balochistan) also received heavy downpours in the spells of September. This not only fulfilled the water requirement of kharif season but also provide the better 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.

Unlike 2010 and 2011 flooding the monsoon season of 2012 started with highly below normal rains. All July and two decades of August went very dry with one or two little rainfall at a few places. It was the last decade of June and first decade of September that whole country received good enough downpours. Receiving 481 mm rainfall, Jacobabad and adjoining districts were unfortunate to have flood like situation and consequential damages owing to the run-off and/or overflows from the high altitude districts of Jafferabad and Nasirabad in Balochistan.

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. The desert of Thar became a lot of green with enough water in the troughs for future dry spells. 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.

3. Extreme Events

Highest Maximum and lowest Minimum Temperatures of Province-wise cities of Pakistan during 2012 are shown in Figure 7(a-e). Stations are arranged in ascending order with respect to their latitudes.



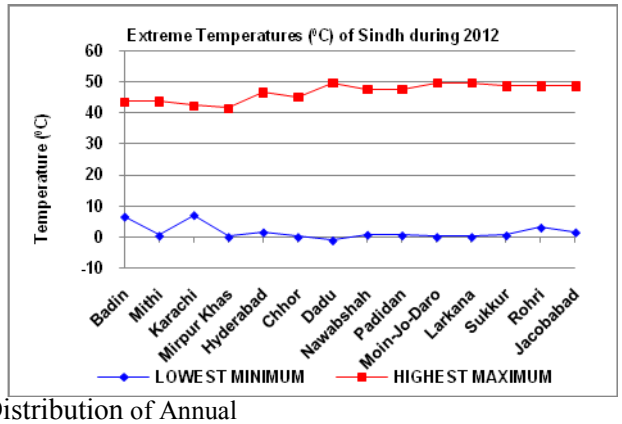
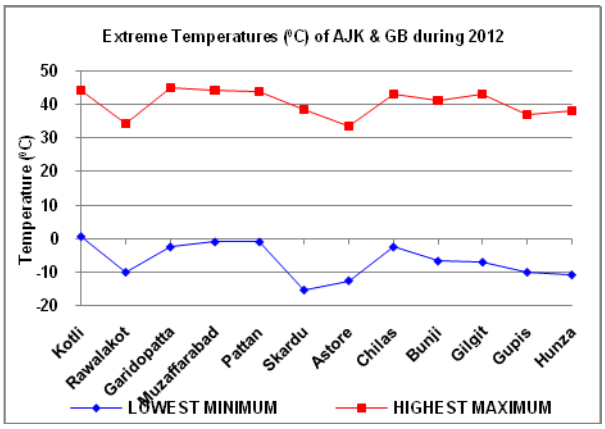


Figure 6: Spatial Distribution of Annual total Rainfall over Pakistan for 2012

Figure 7 (a): Extreme Temperatures of Sindh

Figure 7 (b): Extreme Temperatures of Balochistan



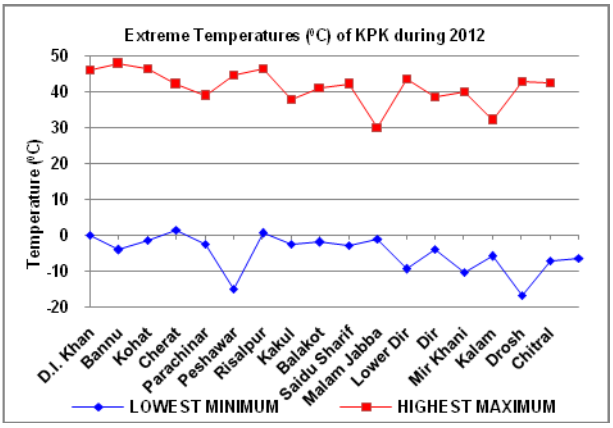


Figure 7 (c): Extreme Temperatures of AK & GB

Figure 7 (d): Extreme Temperatures of KPK

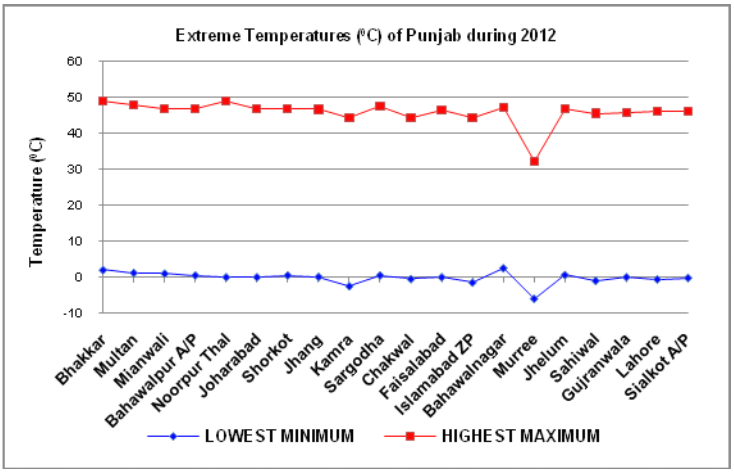


Figure 7 (e): Extreme Temperatures of Punjab

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Highest daily Rainfall in 2012 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.

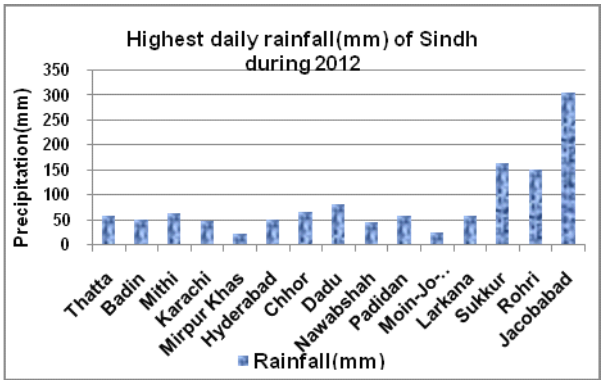


Figure 8 (a): Highest daily Rainfall of Sindh

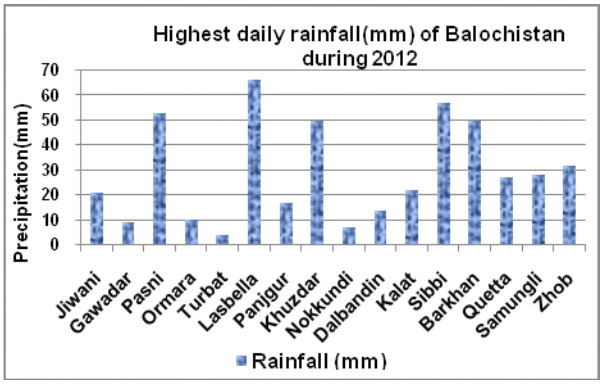


Figure 8 (b): Highest daily Rainfall of Balochistan

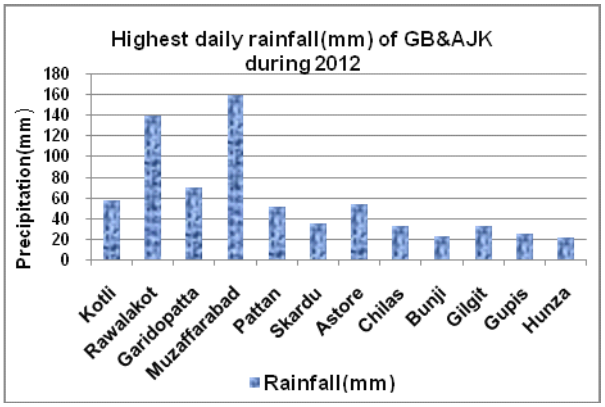


Figure 8 (c): Highest daily Rainfall of AK & GB

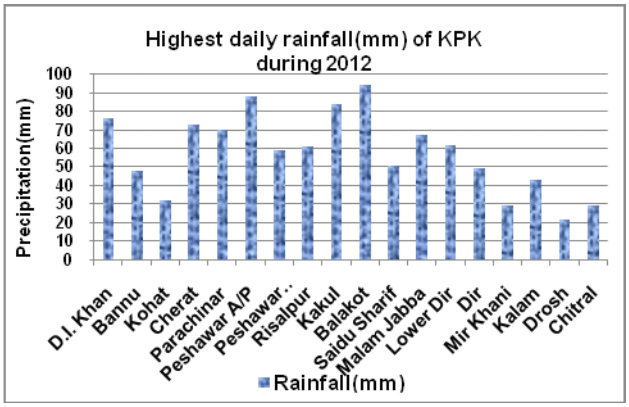


Figure 8 (d): Highest daily Rainfall of KPK

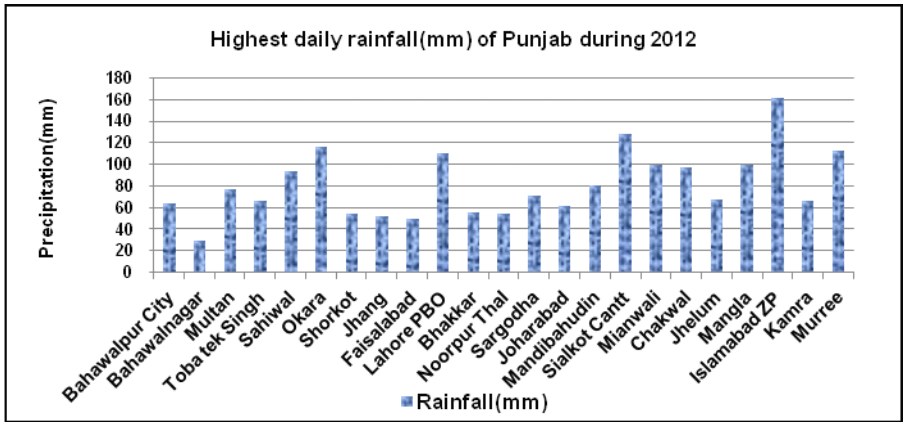


Figure 8 (e): Highest daily Rainfall of Punjab

4. Other extreme Events of 2012

There were no large scale record breaking events in 2012 like those in 2010 & 2011 but on small scale.

(a) Snow on Margallas, Islamabad: January 6 -7, 2012

On the evening of 6th January and morning of 7th February there was light snowfall over Margalla hills, Islamabad. Its been unique due to its longer prevailing period than previous records. Pictures of the event are given below:

Figure 9: Snow on Margallas on 6th & 7th January, 2012

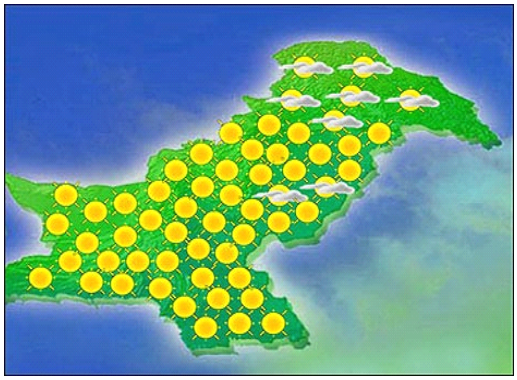
(b) Heat Wave in Pakistan during March, 2011

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 March, 2012 a few stations of Punjab, GB/AJK and KPK had temperatures 5°C or more higher than the respective normal in the last 3-4 days, but it does not satisfy the definition of heat wave. These stations include Bahawalnagar, Bahawalpur, Faisalabad, Islamabad, Jehlum, Lahore, Multan, Murree and Sialkot from Punjab, Astore, Bunji, Chilas, Garhi Dopatta, Gilgit, Gupis, Kotli and Muzaffarabad from GB/AJK and Balakot, Chitral, D.I. Khan, Dir, Drosh, Kakul and Parachinar from KPK. Some of the stations from Balochistan which suffered heat wave in the month of March 2012 are:

i. Dalbandin with maximum normal for the month of March 53.8°C undergone heat wave from 14 to 18 March. Temperatures remained 6°C -9°C above normal.
ii. Kalat with maximum normal for the month of March 15.4°C undergone heat wave from 14 to 18 March. Temperatures remained 5°C -8°C above normal.
iii. Khuzdar with maximum normal for the month of March 23.5°C undergone heat wave twice, from 14 to 18 March and then from 26 to 31 March. Temperatures remained 5°C -9°C above normal.
iv. Nokundi with maximum normal for the month of March 26.9°C undergone heat from 14 to 18 March. Temperatures remained 6°C -10°C above normal.
v. Panjgur with maximum normal for the month of March 25°C undergone heat wave from 24 to 31 March. Temperatures remained 6°C -10°C above normal.



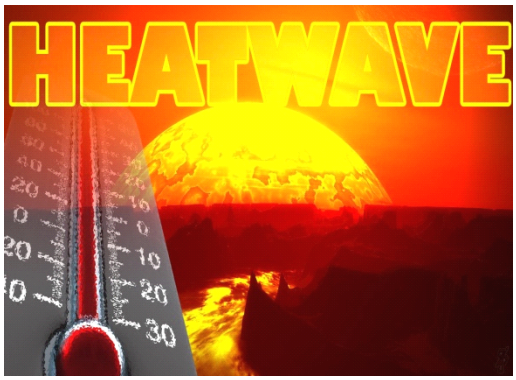


Figure 10: Scenes of heat wave in Pakistan during March 2012

(c) Dust storm June 2012

On 5th June the cities of Lahore, Faisalabad, Quetta and Peshawar were hit by severe dust storm causing a death toll of about 8 and around 30 injuries. Peshawar alone suffered from the event with 5 killed and 20 injured. There was widespread damage to crops and trees too.

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Figure 11: Scenes of dust storm during June 2012

(d) Cloud Burst at Sialkot July, 2012

On 26th July Sialkot suffered a cloud burst, the rainfall reported for Sialkot Cantt is 128mm and that for Sialkot Air Port is 76mm. It has been a good rain since the beginning of Monsoon season. Scenes for the day are shown in the pictures below:

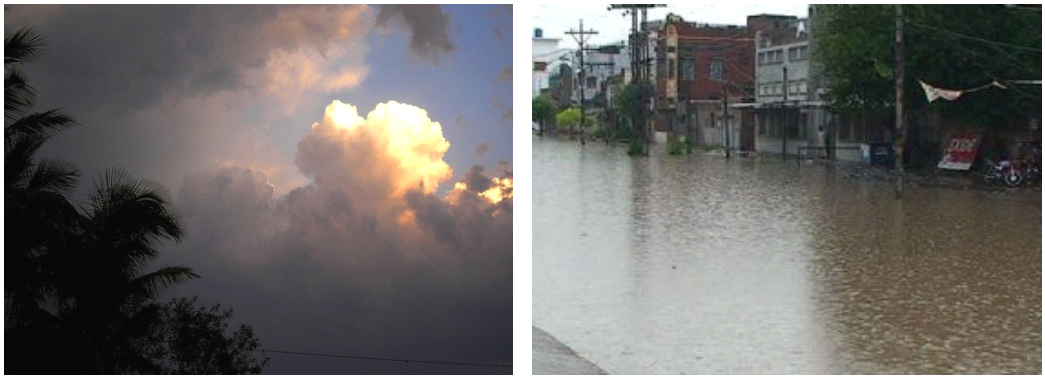

Figure 12: Cloud Burst at Sialkot July 26, 2012

(e) Flood/Flash Flood in Jacobabad, Sindh and Balochistan in September, 2012

Although whole country experienced good monsoon spell in first decade of September in 2012, yet in Sindh there were abnormally high rainfalls affecting a vast area with flashflood inundation. Low lying areas were flooded with accumulation of water in streets and residential houses.
The chief amounts of recorded rainfall in 5 days (from 6th -10th September) are:

Station name	Rainfall in 5 days (mm)	Total Rainfall in September (mm)	Normal Rainfall of September(mm)
Jacobabad	481	481.1	11
Khanpur	291	294.1	14.6
Rahim Yar Khan	236	245.1	-
Larkana	215	216.2	5.5
Sukkur	206	207.1	-
Shorkot	152	190.4	24.6
Chhor	137	170	37.3
Multan	136	158.2	24.9
Toba Tak Singh	130	163.2	-
Mithi	121	164	-
Dera Ghazi Khan	120	132.3	-
Badin	108	114	27.1
Sahiwal	107	225	-
Okara	103	224	-
Hyderabad	90	110.2	12.6
Dadu	90	90	-

Jacobabad alone received 305mm of rainfall on 10th September which broke 100 years record. All stations of Sindh received extremely high above normal rainfall in this month.

This unusual spell of heavy downpour was due to the strong Monsoon low pressure system which developed in the Bay of Bengal and swiftly travelled toward west and North West. This highly intensified Low pressure system entered in Pakistan on 7th September in Sindh, and on 8th September a westerly wave also joined this system from western Balochistan. On 9th September the intensified "Well Marked low" over Sindh and Balochistan and strong Westerly currents over Northern Parts of Pakistan caused very heavy downpours all over Pakistan. There was Reverine/Flash Flooding in eastern rivers and the vulnerable low lying areas were inundated.

Figure 12: Scenes of heavy rain/flash flooding during September2012

(f) Chilled Winter in Punjab in December, 2012

In the last week of December (from 24th-31st) a few plain stations of Punjab experienced chilled winter. These stations include Faisalabad, Islamabad, Lahore and Sialkot. Here maximum day time temperatures fall well below their respective maximum normal values. The normal day temperature in the plain areas of Punjab is 20-22°C and it has dropped upto 10°C. And Lahore's minimum temperature also has fallen well below minimum normal; therefore, Lahore remained chilliest among the plain stations in last week of December. The reason for this much drop of mercury is dense and prolonged fog. Such lowest temperatures have been observed in the plain areas of Punjab after 50 years.

Figure 13: Scenes of chilly December, 2012

(g) Fog in different cities duing Janury-February, 2012 and November-Deceber. 2012

With the advent of climate change many cities of Pakistan are facing more and more Foggy mornings. Moreover many higly populated metropolitan cities are witnessing very long hours of Fog. This is possibly increasing quantity of hygroscopic particles (the main cause of Fog formation) in the busy industrial cities with ever growing population. Some ststistics of Foggy days all over Pakistan are given in the table below:

S.No.	Station	No. of foggy Days				
	SIND	Jan	Feb	NOV	DEC	Total
1	Hyderabad	-	-	02	01	03
2	Badin		-	-	02	02
3	Rohri	03	-	-	-	03
4	Padidan	02	-	-	-	02
5	Nawabshah	-	-	01	04	05
6	Sukkur	12	02	02	06	22
7	Moen jo Daro	02	-	-	05	07
8	Larkana	04	-	-	01	05
9	Thatta	-	-	-	02	02
10	Mithi	01	-	-	02	03
11	Dadu	03	-	-	02	05
	BALOCHISTAN					
1	Jiwani	-	-	-	04	04
2	Lasbella	01	-	-	-	01
3	Ormara	-	-	03	-	03
4	Panjgur	-	02	-	-	02
5	Quetta	04	-	-	-	04
6	Gawadar	-	-	02	-	02
	KPK&GB					
1	Peshawar	03	-	-	-	03
2	Balakot	01	-	-	01	02
	PUNJAB					
1	Dea Ismail khan	-	-	04	04	08
2	Dera Ghazi Khan	-	-	04	-	04
3	Rahim Yar Khan	01	-	07	05	13
4	Khanpur	05	02	10	11	28
5	Bahawalpur A/P	03	01	09	08	20
6	Bahawalpur City	03	01	06	07	17
7	Multan	09	02	04	06	21
8	Bhakkar	-	-	-	03	03
9	Toba Tek Singh	06	01	02	10	19
10	Jhang	06	01	03	07	17
11	Faisalabad A/P	06	01	05	09	21
12	Okara	04	01	-	08	13
13	Sahiwal	08	01	07	07	23
14	Lahore A/P	09	-	06	09	24
15	Gujranwala	10	-	03	19	32
16	Mandi Bahaudin	01	-	-	08	09
17	Sargodha	01	01	-	07	09
18	Noorpur Thal	-	-	-	01	01
19	Joharabad	-	02	-	05	07
20	Sialkot A/P	10	-	03	19	22
21	Sialkot City	09	-	-	11	20
22	Jehlum	01	-	02	04	07
23	Chakwal	03	-	-	-	03
24	Islamabad	-	-	-	01	01

Figure 14: Images of Fog in Pakistan in the year 2012

5. **Drought Monitor**

National Drought Monitoring Centre of PMD monitors drought events on fortnightly basis; according to which 2012 has seen mostly normal to wet conditions in most parts of Pakistan except some western parts of Balochistan which had Mild to Moderate Drought. South and Western parts of KPK received very good rainfall in second half of Monsoon season. Southern Punjab, eastern Balochistan and central and northern Sindh experienced Moderate to Extreme wet conditions due to heavy rain/flash flood in September and rersultant water accumulation there. Figure 14 below shows the drought conditions of whole Pakistan for 2012.

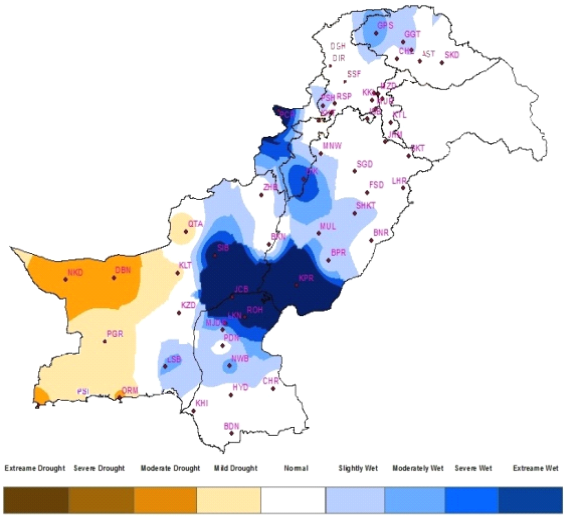

Figure 15: Drought analysis for Pakistan by for the year 2012