WEATHER IN PAKISTAN: MONSOON SEASON (JULY-SEPTEMBER 2006)

Akhlaq Jameel*, Naeem Shah* & S. Anzar Ali Jafri*

Introduction:

Monsoon rain commenced over the country during first week of July. Rather heavy to very heavy rain occurred on a number of days in northern and central parts of the country and on a few days in southern parts of the country during the monsoon season. Western disturbances also affected northern parts of the country as well as monsoon currents and a number of monsoon lows particularly in the months of August and in the first quarter of September affected eastern parts of the country. Heavy rains in July and August caused floods in different areas of the NWFP and Punjab (resulting loss of lives and damages of properties are given in monthly features). A tropical cyclone 04-A was formed over eastcentral and adjoining northeast Arabian Sea lay centered at Lat. 19.9° N & Long. 66.2° E on 22nd September 2006. It moved in northeasterly direction and intensified into a severe cyclonic storm and lay centered at Lat. 21.0° N and Long. 67.0° E on 23rd September. On 24th September, Tropical Cyclone 04-A over Arabian Sea remained quasi-stationary and weakened gradually into a depression. On 25th, it further weakened into a well marked low over the same area. A number of duststorms hit the plain areas of the Punjab, Balochistan and Sindh during the quarter.

Seasonal rainfall (July-September):

Seasonal rainfall out of 56 meteorological observing stations in the whole country, was in large excess in 12, moderate excess in 7, slight excess in 7, normal in 6, slight deficit in 5, moderate deficit in 11 and in large deficit in 8.

Rainfall was in large excess in Bunji, Muzaffarabad, Parachinar, Balakot, Jhelum, Barkhan, Nawabshah, Hyderabad, Badin, Chhor, Karachi (A/P) and Karachi (Masroor), moderate excess in Gilgit, Chilas, Kotli, Chaklala, Quetta, Kalat and Padidan, slight excess in Skardu, Dir, Saidu Sharif, Peshawar, Faisalabad, Lahore (A/P) and Khanpur, normal in Garhi Dupatta, Kakul, Kohat, Murree, Lahore (PBO) and Sibbi, slight deficit in Sialkot, Sargodha, Bahawalpur, Dalbandin and Moenjodaro, moderate deficit in Gupis, Astor, Drosh, Risalpur, Cherat, Mianwali, Zhob, Khuzdar, Panjgur, Jacobabad and Rohri and was in large deficit in Chitral, D.I.Khan, Shorekot, Multan, Bahawalnagar, Nokkundi, Pasni and Jiwani. The principal amounts of rainfall (mm) during the month of July, August and September 2006 are given in Table-1. Seasonal station- wise percentage rainfall departures are given in Fig. 1 and percentage departures in Table 2 whereas province-wise graphic representation of rainfall is given in Fig. 2.

* Pakistan Meteorological Department

Monthly Features:

July

Weather and associated synoptic features:

Details of weather systems formed during the month are given in Table 3.

Rain/thundershowers with a few heavy to very heavy falls and few duststorms in plains occurred almost at all the places or at a number of places on 15 – 20 days in Hazara and Gujranwala regions, on 8 – 11 days in Malakand, Rawalpindi, Lahore and Zhob regions, on 5 – 7 days in FATA, Kohat, Peshawar, Sargodha and Mirpurkhas regions, on 1 – 4 days in Bannu, D.I.Khan, Faisalabad, D.G.Khan, Bahawalpur, Sibbi, Kalat, Sukkur, Hyderabad and Karachi regions. Rain/thunderstorms with a few duststorms in plains also occurred either at a few places or at isolated places on 9 – 13 days in Malakand and Rawalpindi regions, on 4 – 6 days in Hazara, Peshawar, Faisalabad and Kalat regions, on 1 –3 days in FATA, Kohat, Sargodha, Lahore, Sukkur, Hyderabad, Mirpurkhas and Karachi regions.

Rainfall distribution:

The rainfall was in large excess in 9 meteorological observing stations (Muzaffarabad, Kotli, Balakot, Peshawar, Chaklala, Jhelum, Lahore (A/P), Barkhan and Hyderabad); moderate excess in 2 meteorological observing stations (Dir and Badin); slight excess in 5 meteorological observing stations (Chilas, Parachinar, Saidu Sharif, Kakul and Nawabshah); normal in 5 meteorological observing stations (Garhi Dupatta, Murree, Sialkot, Zhob and Karachi (A/P); slight deficit in 5 meteorological observing stations (Bunji, Kohat, Lahore (PBO), Moenjodaro and Padidan); moderate deficit in 11 meteorological observing stations (Gupis, Gilgit, Skardu, Drosh, Risalpur, Cherat, Mianwali, Kalat, Khuzdar, Chhor and Karachi (Masroor) and in large deficit in 19 meteorological observing stations (Astor, Chitral, D.I.Khan, Sargodha, Faisalabad, Shorekot, Multan, Bahawalpur, Bahawalnagar, Khanpur, Quetta, Dalbandin, Nokkundi, Sibbi, Panjgur, Pasni, Jiwani, Jacobabad and Rohri).

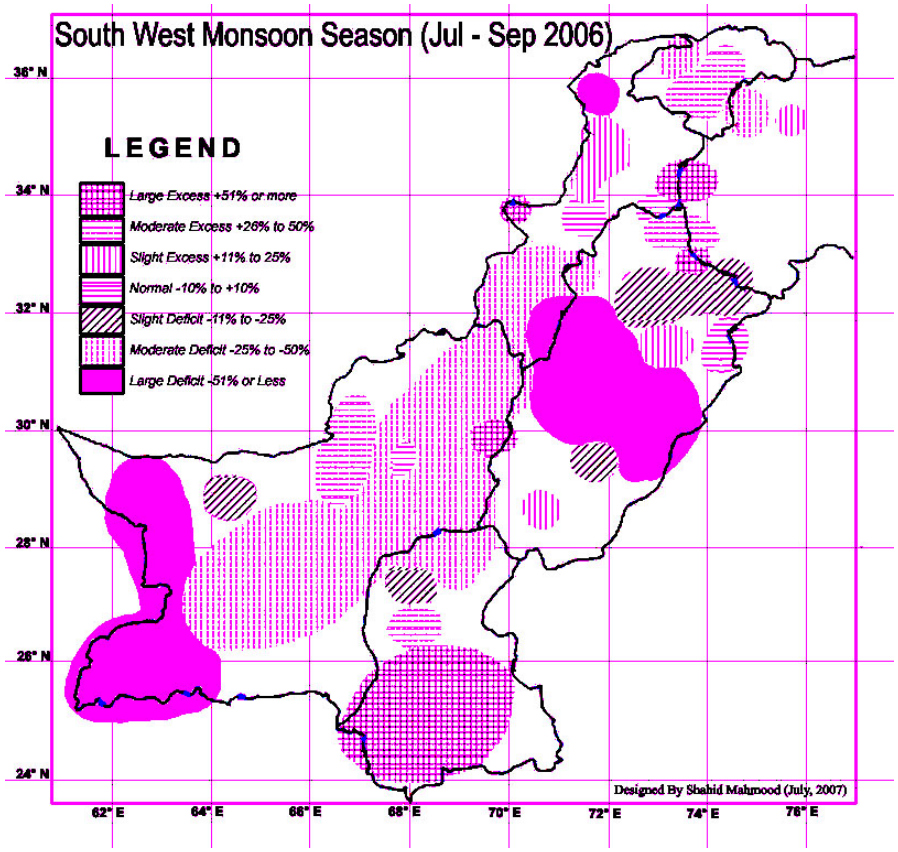

Figure 1

Table 1: Principal amounts of rainfall (30 mm and above)

Date	July	August	September
(1)	(2)	(3)	(4)
1	Nil	Karachi (Masroor) 33.	G. Dupatta 45, Murree 42.
2	Nil	Balakot 68, Mithi 65 & Muzaffarabad 30.	Faisalabad 69, Sialkot 67, Rawalakot 41, Lahore(A/P) 36 & Lahore (PBO) 32.
3	Rawalpindi 60, Murree 52, Mangla 49, M.abad 43 & Dir 38.	Balakot 171, Jhelum 89, M. Bahauddin 70, Dir 47, R/pindi 40, Kohat 32 & Mangla 31.	Lahore(PBO) 115, Sialkot 105, Lahore(A/P) 95 & S.Sharif 45.
4	Barkhan 65, Kakul 31.	R/pindi 92, Jhelum 83, R.kot 78, M.abad 75, Islamabad 70, Kamra 68, M. Bahauddin 48 & Risalpur 44	Barkhan 45.
5	Nil	Islamabad 154, R.pindi 123, Bannu 90, B.kot 88, M. Jabba 88, R.kot 80, Dir 80, Jhelum 70, Mianwali 63, Murree 61,	Nil

Date	July	August	September
(1)	(2)	(3)	(4)
		G.Dupatta 59, Kotli 57, Mangla 57, M.abad 48, M. Bahauddin 45, Sialkot 43, S.Sharif 31 & Kakul 30.	
6	Nil	B.pur 66, R. Kot 60, M.Bahudin 53, R.Pindi 49, Islamabad 48, Kotli 46, Khanpur 43.	Nil
7	Hyderabad 37	M.jabba.50, Karachi Masroor 41, Sialkot 34, Kohat 30, Padidan 30 & Hyderabad 30.	Nil
8	Nil	Nawabshah 72, Parachinar 49, Malamjaba 44	Mitthi 174, Hyderabad 137, Chhor 75, Mirpurkhas 63, Badin 60
9	Nil	Lasbella 32	Thatta 72, Chhor 42, Hyderabad 31
10	Balakot 52, Kotli 51, Rawalakot and M. Jabba 49(each), G. Dupatta & Kakul 32 each, Islamabad 31 & Jhelum 30.	Nil	Nil
11	Balakot 42 & Kakul 33	Muzaffarabad 57.	Balakot 37.
12	Islamabad 90, Rawalpindi 80, M. Bahauddin 51, M.abad and S.Sharif 48 (each), G. Dupatta 36 & Parahinar32.	Badin 38.	Murree 30.
13	Rawalpindi 138, Mandi Bahauddin 130, Jhelum 85, Mangla 80, M.abad & Balakot 77(each), Kotli 66, Murree 57, M. Jabba 56, Peshawar 51, S. Sharif 47, Rawalakot 46, G. Dupatta 45, Dir 35 & Kamra 32.	Chhor 34, Dadu 33 & Bannu 31.	Mangla 30.
14	Lahore A/P 75, Lahore PBO 66, M.Bahudin 54,Jhelum 37, Balakot 36, Sargodha and Shorekot 35(each) &	Hyderabad 43.	Barkhan 35.

Date	July	August	September
(1)	(2)	(3)	(4)
	Faisalabad 32.		
15	Nil	Faislabad 79, Sargodha 56, Kamra 42 & Parachinar 33.	Kamra 39 & Parachinar 30.
16	Nil	Malam Jabba & Islamabad 30(each).	Nil
17	Nil	Mithi 64 & Badin 58.	Nil
18	Kakul 51	Karachi Masroor 63 & Karachi A/P 56.	Nil
19	M.abad 40 & M. Jabba 34	Nil	Nil
20	M. abad 54, Murree 47, G. Dupatta 32 & Islamabad 31.	Balakot 84, Kotli 70, Rawalpindi 37 & Mithi 35.	Rawlakot 31.
21	Nil	M.abad 60, Kakul 51, Balakot 50, Mirpurkhas 48, Kotli 40, Chhor 33 & Islamabad 32	Nil
22	Kakul 46 & Barkhan 30.	Mirpurkhas 42, M. Jabba 40, G. Dupatta 36 & Murree 33.	Risalpur 31.
23	Kotli 127.	Chhor 141, Mithi 82, Jhelum 34 & Kotli 30.	Nil
24	Mangla 134, Murree 104, M.abad 93 & Lahore A/P 76.	Nil	Nil
25	Islamabad 145, Jhelum 85, Kakul 76, Sialkot 57 & Rawalpindi 52.	Nil	Nil
26	Lahore A/P 106, Jhelum 50 & Lahore P.B.O 39.	Nil	Nil
27	M.abad 96, Islamabad 87, Kotli 86, Jhelum 75, Sialkot 71, Rawalpindi 36 & Kamra 33.	Nil	Nil
28	Balakot 194.	M. Bahauddin 79, Lahore P.B.O 56, Sargodha 45, Kotli 37, Jhelum 35 & Balakot 34.	Nil
29	M.abad 51, Barkhan	M. Jabba 59 & Barkhan 45.	Nil

Date (1)	July (2)	August (3)	September (4)
	44		
30	Dadu 58, Rawalpindi 44,Thatta 36 & Sialkot 31.	Murree 44.	Nil
31	Thatta 76, Karachi (Faisal) 72, Karachi (A/P) 66, Karachi (Masroor) 50, Nawabshah 46, Moenjodaro & Badin 35 (each) & Mitthi 33.	Nil	-----

Table 2: Station wise rainfall(mm) for each month and season as a whole (July - September 2006)

		July			August			September			Season		
		Actual (mm)	Normal (mm)	Dep % (mm)	Actual (mm)	Normal (mm)	Dep% (mm)	Actual (mm)	Normal (mm)	Dep% (mm)	Actual (mm)	Normal (mm)	Dep% (mm)
1	Gupis	8	14	-43	16	24	-33	5	12	-58	29	50	-42
2	Gilgit	8	16	-50	39	17	129	12	8	50	59	41	44
3	Skardu	8	11	-27	15	14	7	18	9	100	41	34	21
4	Bunji	16	19	-16	69	21	229	5	11	-55	90	51	76
5	Chilas	16	14	14	29	17	71	6	8	-25	51	39	31
6	Astor	10	25	-60	21	29	-27	14	22	-36	45	76	-41
7	Muzaffar-abad	614	359	71	375	227	65	71	108	-34	1060	694	53
8	Garhi Dupatta	276	266	4	273	236	16	85	104	-18	634	606	5
9	Kotli	466	286	63	350	298	17	84	92	-9	900	676	33
10	Parachinar	120	99	21	198	97	104	101	55	84	419	251	67
11	Chitral	0	5	-100	1	7	-86	11	13	-15	12	25	-52
12	Dir	197	154	28	250	156	60	21	91	-77	468	401	17
13	Drosh	14	22	-36	33	20	65	0	22	-22	47	64	-27
14	Saidu Sharif	187	153	22	133	126	5	87	68	19	407	347	17

		July			August			September			Season		
		Actual (mm)	Normal (mm)	Dep % (mm)	Actual (mm)	Normal (mm)	Dep% (mm)	Actual (mm)	Normal (mm)	Dep% (mm)	Actual (mm)	Normal (mm)	Dep% (mm)
15	Kakul	330	264	25	191	267	-28	62	104	-42	583	635	-8
16	Balakot	597	372	60	626	271	131	106	113	-6	1329	756	76
17	Kohat	62	75	-17	143	116	23	33	42	-21	238	233	2
18	Peshawar	95	46	107	49	73	-33	15	22	-32	159	141	13
19	Risalpur	67	132	-49	71	143	-50	33	47	-30	171	322	-47
20	Cherat	55	93	-41	105	96	9	5	35	-86	165	224	-26
21	D.I.Khan	4	61	-93	19	62	-69	2	21	-90	25	144	-83
22	Chaklala	504	305	65	418	348	20	52	113	-54	974	766	27
23	Murree	376	364	3	311	335	-7	144	143	1	831	842	-1
24	Jhelum	485	263	84	371	252	47	39	75	-48	895	590	52
25	Sialkot	314	304	3	84	323	-74	194	91	113	592	718	-17
26	Mianwali	84	135	-38	122	130	-6	3	50	-94	209	315	-34
27	Sargodha	47	114	-59	146	132	11	33	28	18	226	274	-17
28	Faisalabad	57	117	-51	123	85	45	86	38	126	266	240	11
29	Shorekot	40	97	-59	32	55	-42	0	29	-100	72	181	-60
30	Lahore (P.B.O)	185	212	-13	146	195	-25	158	65	143	489	472	4
31	Lahore (A/P)	343	218	57	107	198	-46	156	75	108	606	491	23
32	Multan	2	60	-97	33	36	-8	0	25	-100	35	121	-71
33	Bahawal-pur	5	54	-91	73	43	70	4	12	-67	82	109	-25
34	Bahawal-Nagar	37	84	-55	2	43	-95	3	13	-77	42	140	-70
35	Khanpur	0	26	-100	67	17	294	0	15	-100	67	58	15
36	Quetta	2	16	-87	38	13	192	0	2	-100	40	31	29
37	Dalbandin	0	3	-100	2	1	100	1	0	100	3	4	-25
38	Nokkundi	0	2	-100	0	0	0	0	0	0	0	2	-100
39	Zhob	59	61	-3	8	50	-84	19	11	73	86	122	-29
40	Barkhan	191	109	75	96	88	9	110	45	144	397	242	64

		July			August			September			Season		
		Actual (mm)	Normal (mm)	Dep % (mm)	Actual (mm)	Normal (mm)	Dep% (mm)	Actual (mm)	Normal (mm)	Dep% (mm)	Actual (mm)	Normal (mm)	Dep% (mm)
41	Sibbi	10	37	-73	81	37	119	0	9	-100	91	83	10
42	Kalat	10	20	-50	32	9	255	0	2	-100	42	31	35
43	Khuzdar	31	60	-48	40	57	-30	8	8	0	79	125	-37
44	Panjgur	3	21	-86	16	7	129	2	3	-33	21	31	-32
45	Pasni	0	5	-100	4	11	-64	0	1	-100	4	17	-76
46	Jiwani	0	9	-100	0	2	-100	0	0	0	0	11	-100
47	Moenjo-daro	35	45	-22	38	31	23	0	7	-100	73	83	-12
48	Jacobabad	2	43	-95	19	35	-46	24	11	118	45	89	-49
49	Rohri	0	45	-100	41	25	64	0	12	-100	41	82	-50
50	Nawab-shah	60	51	18	174	46	278	20	16	25	254	113	125
51	Padidan	33	41	-19	101	41	146	4	13	-69	138	95	45
52	Hyderabad	80	45	78	205	63	225	170	13	1208	455	121	276
53	Badin	88	68	29	203	93	118	60	27	122	351	188	87
54	Chhor	47	79	-41	348	69	404	117	37	216	512	185	177
55	Karachi (A/P)	66	66	0	149	60	148	22	10	120	237	136	74
56	Karachi (Masroor)	52	72	-28	200	51	292	11	12	-8	263	135	95

Table 3: Detail of weather systems during July 2006.

S.No	System	Period	Place of the first location	Direction of Movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A) Low Pressure area						
1)	Low pressure area extended upto mid-tropospheric level	5 - 6	Sindh and adj. areas.	Stationary	Sindh and adjoining areas	Became less-marked on 7.
2)	Trough of Low	22-24	Lower Sindh and adjoining areas.	Do	Lower Sindh and adjoining areas.	Became less marked on 25.
3)	Well-marked Low extended upto mid-tropospheric level	30-31	Rajasthan (India) & adjoining areas.	Westwards	Sindh & adjoining areas.	Became less-marked on 4 of next month.
B) Western disturbance/eastward moving systems						
1)	Low pressure area.	1- 6	Upper NWFP & adjoining areas	Eastwards	Kashmir and adjoining areas	Moved away Northeastwards on 7.
2)	Do	9- 14	Do	Do	Do	Moved away Northeastwards on 15.
3)	Do	19-22	Do	Do	Do	Moved away Northeastwards on 23.
4)	Do	24-26	Do	Do	Do	Moved away Northeastwards on 27.
5)	Do	27-30	Do	Do	Do	Moved away Northeastwards on 31.

Temperature distribution:

Appreciable to moderate heat wave conditions prevailed on 12 days each in Quetta and Sukkur regions, on 4 – 6 days in Bahawalpur, Sibbi and Mekran regions, on 1 – 3 days in Zhob and Larkana regions. Hot day conditions prevailed on 5 days each in Quetta and Sargodha regions, on 1 – 2 days in Rawalpindi, Larkana, Kalat and Sibbi regions. They were considerably above normal on 4 days in Malakand region. They were appreciably to markedly

above normal on 3-5 days in Hyderabad, Mirpurkhas, Karachi, Peshawar and Malakand regions, on 1 – 3 days in Faisalabad, Kohat and Kalat regions. They were appreciably to markedly below normal on 6 - 10 days in Peshawar, Gujranwala, Rawalpindi and Lahore regions, on 1 – 4 days in Hazara, D.I.Khan, Sargodha, Faisalabad, Multan, Bahawalpur, Quetta, Kalat, Larkana, Hyderabad, Mirpurkhas, Sukkur and Karachi regions. They were considerably below normal on 1 - 2 days in Malakand, Peshawar, D.I.Khan, Lahore, Rawalpindi, Gujranwala and Sargodha regions. During the month, the highest maximum temperature in plains of the country was 49.0° C recorded at Turbat (Mekran region) on 16 July 2006.

Disastrous weather events and associated damages:

Sixteen people killed over the past two days in Sukkur/Khairpur areas of Sindh due to excruciating heat wave as reported on July 5.

Four people killed and more than 20 fainted owing to scorching heat and humidity, which gripped D.I.Khan on July 8.

Seventeen people killed in rain-related incidents during heavy monsoon showers that wrecked different parts of upper and central Punjab on July 12.

Over twenty people dead as monsoon rains triggered floods and land slides in many parts of the country and Azad Kashmir on July 23.

At least seven people were killed and one went missing in Rawalpindi after torrential rains flooded low-lying areas of the city on July 23.

Seven people including an infant and a special person and over a dozen others were injured when heavy rain lashed Lahore on July 24 & 25.

The death toll from torrential rains and flood in Mansehra has risen to 14 while some people were reported to be missing in different areas as reported on July 28.

These people were killed in rain-related incidents in Sialkot district while flash floods in seasonal Nullah Dek inundated hundreds of acres of standing crops in 58 villages in Pasrur Tehsil and Shakargarh as reported on July 28.

Four people were killed in rain-related incidents as the first monsoon downpour hit Karachi on July 29.

August

Weather and associated synoptic features:

Details of weather systems formed during the month are given in Table 4.

Rain/thundershowers with a few moderate to heavy and isolated very heavy falls and few duststorms in plains occurred almost at all the places or at a number of places on 12 – 16 days in FATA, Hazara and Mirpurkhas regions, on 8 – 10 day in Malakand, Rawalpindi, Gujranwala, Sargodha, Lahore, Hyderabad and Karachi regions, on 4 – 7 days in Bannu, Kohat, Peshawar, D.G.Khan, Zhob, Sibbi, Kalat and Sukkur regions, on 1 – 3 days in D.I.Khan, Faisalabad,

Multan, Bahawalpur, Quetta, Mekran and Larkana regions. Rain/thunderstorms with a few duststorms in plains also occurred either at a few places or at isolated places on 12 – 17 days in Malakand, Peshawar, Rawalpindi, Sukkur and Hyderabad regions, on 6 – 10 days in Hazara, Gujranwala, Faisalabad, Bahawalpur, Quetta, Kalat, Larkana and Mirpurkhas regions, on 1 – 3 days in FATA, D.I.Khan, Sargodha, Lahore, Multan, D.G.Khan, Zhob, Sibbi, Mekran and Karachi regions.

Rainfall distribution

The rainfall was in large excess in 23 meteorological observing stations (Gilgit, Bunji, Chilas, Muzaffarabad, Parachinar, Dir, Drosh, Balakot, Bahawalpur, Khanpur, Quetta, Dalbandin, Sibbi, Kalat, Panjgur, Rohri, Nawabshah, Padidan, Hyderabad, Badin, Chhor, Karachi(A/P) and Karachi(Masroor); moderate excess in 2 meteorological observing stations (Jhelum and Faisalabad); slight excess in 6 meteorological observing stations (Garhi Dupatta, Kotli, Kohat, Chaklala, Sargodha and Moenjodaro); normal in 8 meteorological observing stations (Skardu, Saidu Sharif, Cherat, Murree, Mianwali, Multan, Nokkundi and Barkhan); slight deficit in 1 meteorological observing station (Lahore(PBO); moderate deficit in 9 meteorological observing stations (Gupis, Astor, Kakul, Peshawar, Risalpur, Shorekot, Lahore(A/P), Khuzdar and Jacobabad and in large deficit in 7 meteorological observing stations (Chitral, D.I.Khan, Sialkot, Bahawalnagar, Zhob, Pasni and Jiwani).

Temperature distribution:

Appreciable to moderate heat wave conditions prevailed on 2 days in Mekran region. Hot day conditions prevailed on 1 – 3 days in Rawalpindi, Quetta, Zhob and Larkana regions. They were appreciably to markedly above normal on 1 - 3 days in Malakand, Rawalpindi, Gujranwala and Karachi regions. They were appreciably to markedly below normal on 6 - 10 days in Hyderabad and Mirpurkhas regions, on 3 – 5 days in Peshawar, Rawalpindi, Gujranwala, Zhob, Kalat, D.I.Khan, Bahawalpur and Sibbi regions, on 2 days each in Hazara, Lahore, Faisalabad and Mekran regions. They were considerably below normal on 1 – 2 days in D.I.Khan, Rawalpindi, Lahore, Sargodha, Faisalabad, Larkana, Sukkur and Mirpurkhas regions. During the month, the highest maximum temperature in plains of the country was 44.5° C recorded at Turbat (Mekran region) on 13 August 2006.

S. No	System	Period	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	A) Low Pressure Area					
1)	Well marked low pressure area extended upto mid-tropospheric	1-4	Rajasthan (India) and adjoining	Westwards	Sindh & adjoining areas	Became less-marked on 5

S. No	System	Period	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	level		areas.			
2)	Do	6-9	Southwest Madhya Paradesh (India) with its trough extended to Eastern Sindh.	Northwest-wards and then northeastwards	East Rajasthan & adj. areas	Moved away northeast-wards on 10
3)	Do	11-13	West Rajasthan (India) and adj. areas.	Westwards	Eastern Sindh	Became less-marked on 15
4)	Do	16-19	Do	Southwest-wards	Northeast Arabian Sea	Became less-marked on 20
5)	Do	19- 23	East Rajasthan & adj. Areas.	Northwest-wards and then westwards	Upper Sindh & adj. areas	Became less-marked on 24
B) Western disturbances/eastward moving systems						
1)	Low pressure area	2-4	Upper NWFP and adjoining areas	Eastwards	Kashmir and adjoining areas	Moved away Northeast-wards on 5
2)	Low pressure area extending upto mid-tropospheric level	5-11	Do	Do	Do	Moved away Northeast-wards on 12
3)	Low pressure area	13-18	Do	Do	Do	Moved away Northeast-wards on 19
4)	Low pressure area extending upto mid-tropospheric level	20-29	Do	Do	Do	Moved away Northeast-wards on 30

Disastrous weather events and associated damages:

At least 19 people were killed and 10 others wounded in landslides and flash floods caused by torrential rains in various areas of Mansehra and Butgram district on 3 August.

At least 25 people were killed as monsoon rains and flash floods hit Rawalpindi and adjoining areas on 3 August.

Cascading hill torrents and heavy rains swept away four people, while 10 people reportedly died after their houses collapsed in Malakand division in the NWFP and Skardu in northern areas on 3 August.

At least 70 people were killed, 50 of them in one incident as rains and flash floods continued to cause devastation in various parts of the NWFP and tribal areas on 4 August.

Flash floods caused by continuous heavy rain that lashed various parts of the northern areas for the third day, killing at least 2 people reported on 7 August.

The recent rains and floods affected 767 villages, damaging crops spreading over 106,700 acres and partially damaging 3,732 houses, besides wiping out 390 in 10 districts of the Punjab reported on 12 August.

6 people of a family were killed when lightning hit a house in Kot Madakhel (northern areas) on 21 August.

September

Weather and associated synoptic features:

Details of weather systems formed during the month are given in Table 5.

Rain/thundershowers with a few moderate to heavy and isolated very heavy falls and few duststorms in plains occurred almost at all the places or at a number of places on 7 – 10 days in FATA, Hazara and Rawalpindi regions, on 3 – 5 days in Malakand, Kohat, Gujranwala, Sargodha, Lahore and Zhob regions, on 1 – 2 days in Peshawar, Bannu, D.G.Khan, Hyderabad, Mirpurkhas and Karachi regions. Rain/thunderstorms with duststorms in plains also occurred either at a few places or at isolated places on 4 – 8 days in FATA, Malakand, Faisalabad, Kalat and Sukkur regions, on 1 – 3 days in Hazara, Bannu, Peshawar, D.I.Khan, Rawalpindi, Gujranwala, Sargodha, Lahore, D.G.Khan, Bahawalpur, Quetta, Mekran, Larkana, Hyderabad, Mirpurkhas and Karachi regions.

Rainfall distribution:

The rainfall was in large excess in 14 meteorological observing stations (Skardu, Parachinar, Sialkot, Faisalabad, Lahore (PBO), Lahore (A/P), Dalbandin, Zhob, Barkhan, Jacobabad, Hyderabad, Badin, Chhor and Karachi (A/P); moderate excess in 1 meteorological observing station (Gilgit); slight excess in 3 meteorological observing stations (Saidu Sharif, Sargodha and Nawabshah); normal in 7 meteorological observing stations (Kotli, Balakot, Murree, Nokkundi, Khuzdar, Jiwani and Karachi (Masroor); slight deficit in 5

meteorological observing stations (Chilas, Garhi Dupatta, Chitral, Drosh and Kohat); moderate deficit in 7 meteorological observing stations (Astor, Muzaffarabad, Kakul, Peshawar, Risalpur, Jhelum and Panjgur and in large deficit in 19 meteorological observing stations (Gupis, Bunji, Dir, Cherat, D.I.Khan, Chaklala, Mianwali, Shorekot, Multan, Bahawalpur, Bahawalnagar, Khanpur, Quetta, Sibbi, Kalat, Pasni, Moenjodaro, Rohri and Padidan.

Table 5: Details of the Weather System during September, 2006.

S. No	System	Period	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A) Tropical Cyclone						
1)	Tropical Cyclone	22-25	Eastcentral & adj. Northeast Arabian Sea	Northeastwards	Northeast Arabian Sea.	A tropical cyclone 04-A was formed over eastcentral and adjoining northeast Arabian Sea lay centered at Lat. 19.9° N & Long. 66.2° E on 22nd September 2006. It moved in northeasterly direction and intensified into a severe cyclonic storm and lay centered at Lat. 21.0° N and Long. 67.0° E on 23rd September. On 24th September, Tropical Cyclone 04-A over Arabian Sea remained quasi-stationary and weakened gradually into a depression. On 25th, it further weakened into a well marked low over the same area.
B) Low pressure area						
1)	Well marked low pressure area extended upto mid-tropospheric level	1-3	Northwest Madhya Paradesh (India) and adj. areas.	Northwest-wards and then northwards	Indian Punjab & adjoining areas	Became less-marked on 4.

S. No (1)	System (2)	Period (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
2)	Do	5-8	Chattisgarh (India) & adj. Areas.	Northwest-wards.	Sindh & adj. areas	Merged with seasonal low on 9.
C) Western disturbances/eastward moving systems						
1	Low pressure area	1-3	Upper NWFP & adj. areas	Eastwards	Kashmir & adj. aeas	Moved away NE-wards on 4.
2	Low pressure area extending upto mid-tropospheric level	12-16	Do	Do	Do	Moved away NE-wards on 17.
3	Do	20-22	Do	Do	Do	Moved away NE-wards on 23.
4)	Trough of Low	25-27	Do	Do	Do	Moved away NE-wards on 28.

Temperature distribution:

Appreciable to moderate heat wave conditions prevailed on 9 days in Quetta region, on 1 – 3 days in Mekran and Sibbi regions. Hot day conditions prevailed on 1 - 3 days in Peshawar, Rawalpindi, Sargodha, Quetta, Mekran, Kalat and Mirpurkhas regions. They were considerably above normal on 1 day in Karachi region and appreciably to markedly above normal on 6 days each in Malakand and Sukkur regions, on 1 – 3 days in Rawalpindi, Sargodha, Kalat, Hyderabad and Karachi regions. They were appreciably to markedly below normal on

4 - 6 days in Rawalpindi, Sargodha, Sukkur, Hyderabad and Mirpurkhas regions, on 1 – 3 days in Malakand, Peshawar, Faisalabad, Bahawalpur, Multan, Lahore, Kalat, Zhob, Quetta, Mekran, Larkana and Karachi regions. They were considerably below normal on 1-3 days in Lahore, Gujranwala, Sargodha, Faisalabad, Rawalpindi and Hyderabad regions. During the month, the highest maximum temperature in plains of the country was 44.0° C recorded at Turbat (Mekran region) on 8 & 12 September 2006.

Disastrous weather events and associated damages:

Ten people were killed in Lahore and Sialkot in incidents of roof collapsing and drowning as torrential rain continued to lash parts of central Punjab on 2 September.

As many as 108 people were killed in recent flash floods which swept through 21 districts of Punjab province completely destroying 3070 houses besides damaging standing crops, over 175,000 acres of land. According to official sources in total around 900,000 acres of land in 1,152 villages were affected areas of Punjab province, reported on 6 September.

According to revenues officials, crops over 230,000 acres have been destroyed in district Sanghar due to recent heavy rains, reported on 17 September.

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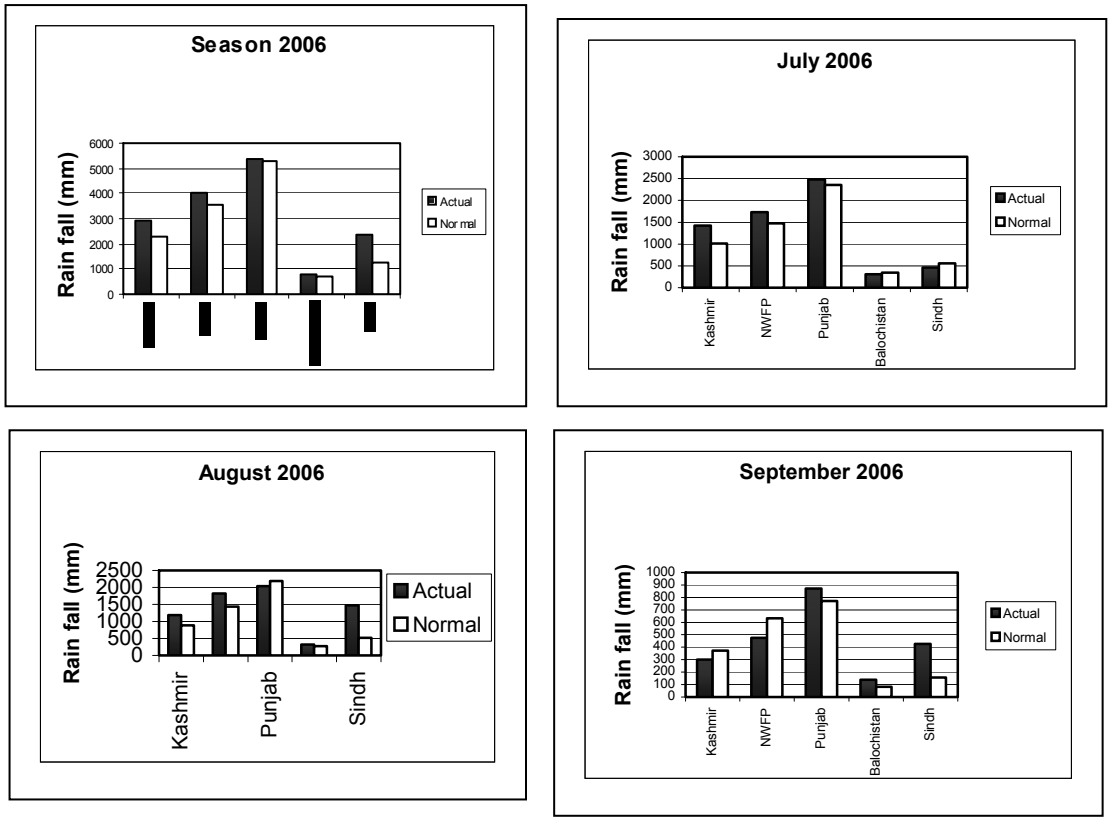

Figure 2

Appendix

Definition of the terms used.

Large Excess	Percentage departure from normal rainfall is + 51% or more.	***Heavy Rain***	rainfall amount is from 44.5 mm to 88.9 mm in 24 hour
Moderate Excess	Percentage departure from normal rainfall is + 26% to + 50%.	***Very Heavy Rainfall***	rainfall amount is 89.0 mm or more in 24 hours.
Slight Excess	percentage departure from normal rainfall is + 11% to + 25%.	***Severe Heat Wave***	Departure of maximum temperature from normal is + 8° C or more for the regions where normal max. temp. is more than 40° C. Declared only when the max. temp. of a station reaches at least 40° C for plains and at least 35° C for Hilly regions.
Normal	percentage departure from normal rainfall is - 10% to + 10%.	***Heat Wave Conditions***	Departure of max. temp. from normal is between + 4° C to + 7° C
Slight Deficit	percentage departure from normal rainfall is - 11% to - 25%.	***(Appreciable + Moderate)***	where the normal max. temp. is more than 40° C.
Moderate Deficit	percentage departure from normal rainfall is - 26% to - 50%.	***Hot day conditions***	Whenever the max. temp remains 40° C or more and minimum remains 5° C or more above normal, provided, it is not satisfying the heat wave criteria.
Large Deficit	percentage departure from normal rainfall is - 51% or less.	***Markedly above Normal***	Departure of max. temperature from normal is between + 6° C to + 7° C
Almost at all places	66 % or more stations of a meteorological division reporting at least 2.5 mm rainfall.	***Appreciably above Normal***	Departure of max. temperature from normal is between + 4° C to + 5° C
Almost a number of places	33 % to 66 % stations of a meteorological division reporting at least 2.5 mm rainfall.	***Appreciably below Normal***	Departure of max. temperature from normal is between - 4° C to - 5° C.
At a few place	33 % or less stations of a meteorological division reporting at least 2.5 mm rainfall.	***Markedly below Normal***	Departure of max. temperature from normal is between - 6° C to -7° C.
Isolated places	One or two stations of a meteorological division.	***Considerably below Normal***	Departure of max. temperature from normal is - 8° C or less.