HYDROMETEOROLOGICAL REPORT

2008

FLOOD FORCASTING DIVISION LAHORE

PAKISTAN METEOROLOGICAL DEPARTMENT

PREFACE

Floods are the one of the most destructive natural disasters, and its effects can only be reduced by proper management and developing of appropriate infrastructure. The quantum of flood depends upon the type of rainfall and its duration.

The flood forecasting division Lahore since its beginning is serving the nation by Issuing flood forecasts during each flood season. The compilation of flood report after each flood season, is an annual feature observed by Flood forecasting division (FFD) Lahore of Pakistan Meteorological Department (PMD).

Flood report for the year 2008 has been prepared under the able guidance of Chief Meteorologist and following the instructions of Director General, Meteorological services. It contains all the details relating to the aspect of flood forecasting like tracks i.e. the monsoon lows/depressions, rainfall during wet spells, hydrographs of flood peaks, monthly and seasonal Isohyetal maps, normal isopercental maps, damages and losses, flood limits, flood evaluation report and radar images.

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Chief Meteorologist
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1. HIGHLIGHTS

1.1 A total number of six Monsoon lows originated from the Bay of Bengal, however none of these was able to reach in the vicinity of Pakistan

1.2 The seasonal precipitation (July to September) Isopercental pattern indicates above normal rainfall over lower Sindh whereas slightly above normal rainfall is experienced over northeast Balochistan and Kashmir. Western Balochistan remained almost dry during the monsoon season 2008.

1.3 During August 2008, unprecedented torrential rainfall over the Suleman range & hill torrents of DG Khan Divisions caused heavy flooding in DG Khan Rajanpur districts

1.4 In all twelve rainfall wet spells occurred during this monsoon season 2008.

1.5 FFD, Lahore continued to maintain the liaison with the dam operating authorities at Mangla and Tarbela, in order to link the dam operations with the weather/flood forecasts.

1.6 The supply of the hydro-meteorological data from WAPDA alongwith Punjab and Sindh Irrigation & Drainage Authorities (PIDA & SIDA) remained satisfactory.

1.7 Generally, normal flow conditions prevailed in all the major rivers during flood season 2008 except one high flood peak in river Chenab and one in river Ravi and a medium flood wave in river Sutlej

1.8 The Lahore Municipal Corporation (LMC), Water and Sanitation Agency (WASA), Lahore Development Authority (LDA) , the Nazims & DCO's of the local Government were constantly kept abreast of the impending rain situations in the Metropolitan City of Lahore and other areas of Punjab, to help them to carry out their drainage & relief programmes in depending upon the weather forecasts.

1.9 The concerned Federal and Provincial Authorities were also daily informed the prevailing weather/flood conditions.

1.10 The routine daily weather/flood bulletins were regularly issued from 15th June 2008 to 30th September 2008. Moreover the significant flood forecasts were also issued whenever the weather situation demanded.

Tracks of Lows/Depression during Monsoon Season-2008

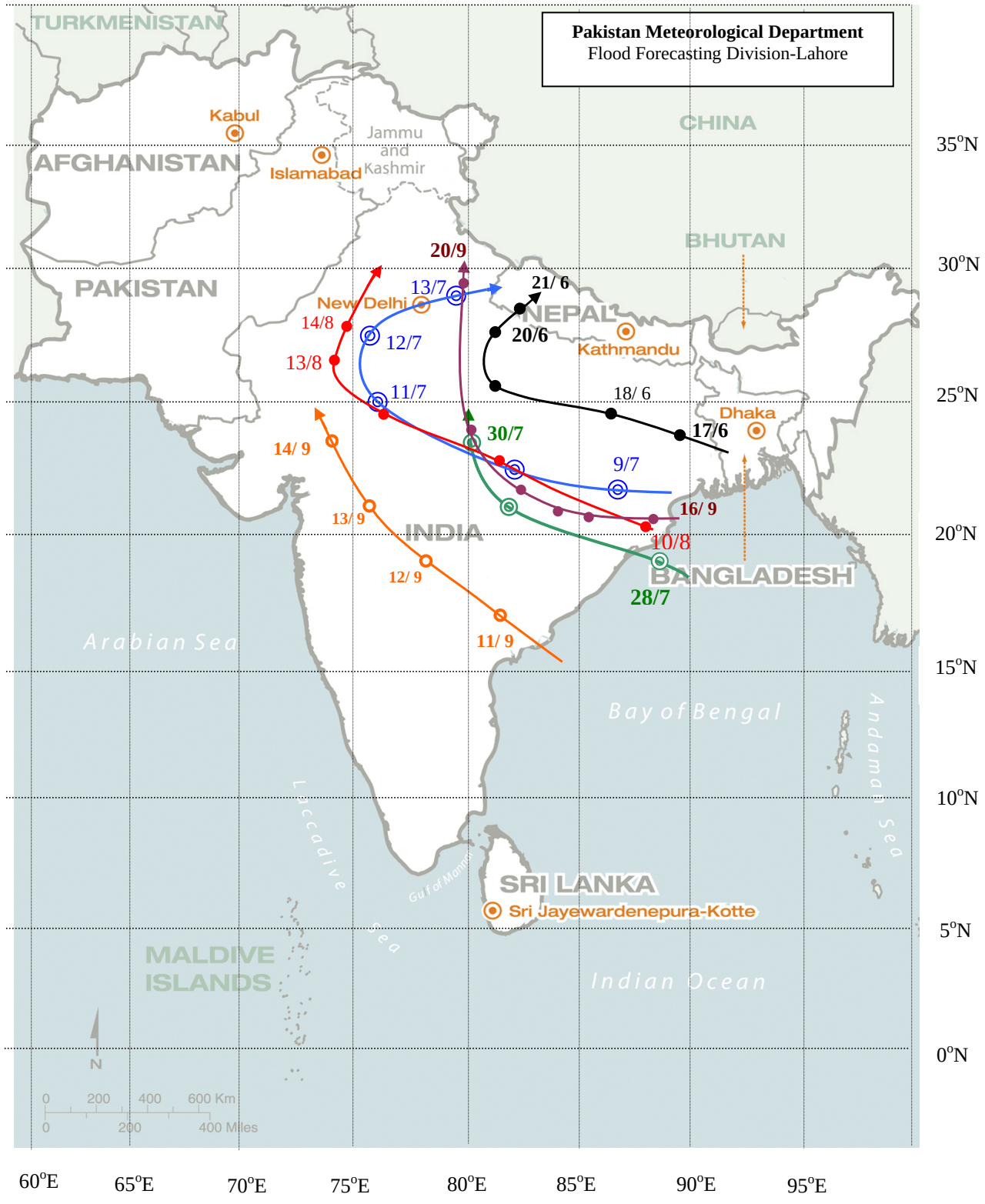

Fig -1: Tracks of monsoon lows/depression

2. SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF JUNE, 2008

2.1 METEOROLOGICAL EVENTS

Only one monsoon low was developed over north Bay of Bengal on 16th and after moving moved in northwesterly direction dissipated on 21st June 2008 over Uttar Pradesh. No significant rainfall in Pakistan was observed due to this weather system. The rainfall which occurred over Pakistan during the period was due to the accentuation of seasonal low, passage of westerly waves in the north of the country and influx of monsoon current from Arabian Sea. Three spells of rainfall occurred during the period.

2.1.1 FIRST WET SPELL OF JUNE 2008 FROM 15-06-2008 TO 16-06-2008

Scattered rainfall of light to moderate intensity with isolated heavy falls during this spell was reported from the upper catchments of river Indus and Jhelum along with northeastern Punjab. Significant accumulated rainfall during this spell is given is shown in Fig-2.

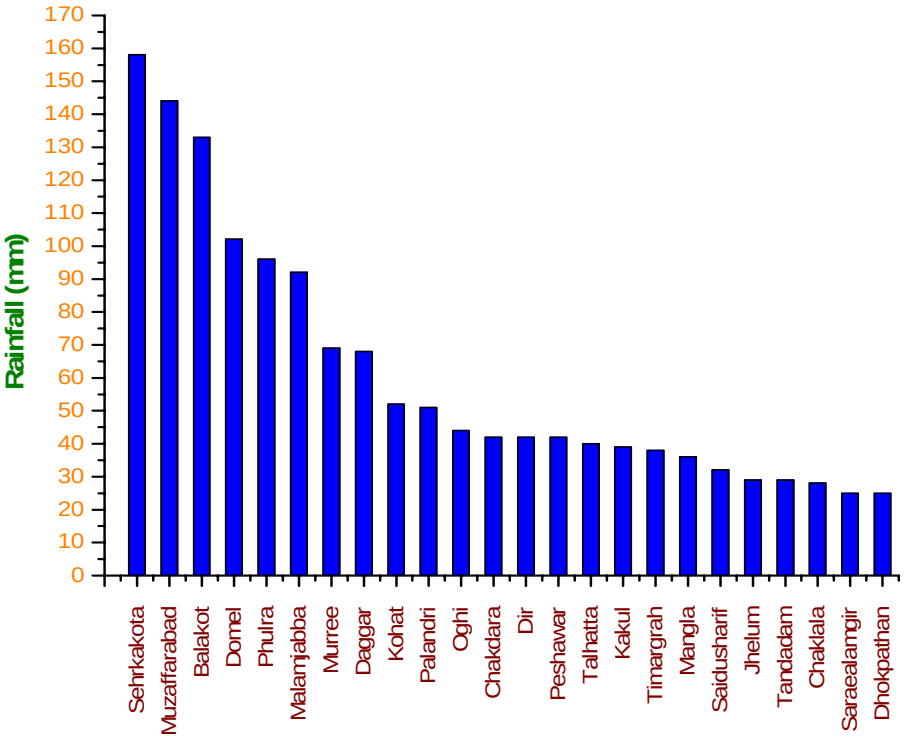

Fig -2: WET SPELL OF JUNE 2008 FROM 15-06-2008 TO 16-06-2008

2.1.2 RIVER POSITION DURING JUNE 2008

Due to this spell river Kabul at Nowshera registered a high flood peak, while low flood peaks were also observed in river Indus at Tarbela & Kalabagh and also in river Jhelum at Mangla.

2.1.3 SECOND SPELL OF JUNE 2008 FROM 19-06-2008 TO 20-06-2008

Scattered rainfall of light to moderate intensity with isolated heavy fall was recorded during this spell over the upper catchments of river Indus and Jhelum. Scattered rainfall of light to moderate intensity was also reported from Punjab & Lower NWFP.
Significant accumulated rainfall is shown in Fig 3.

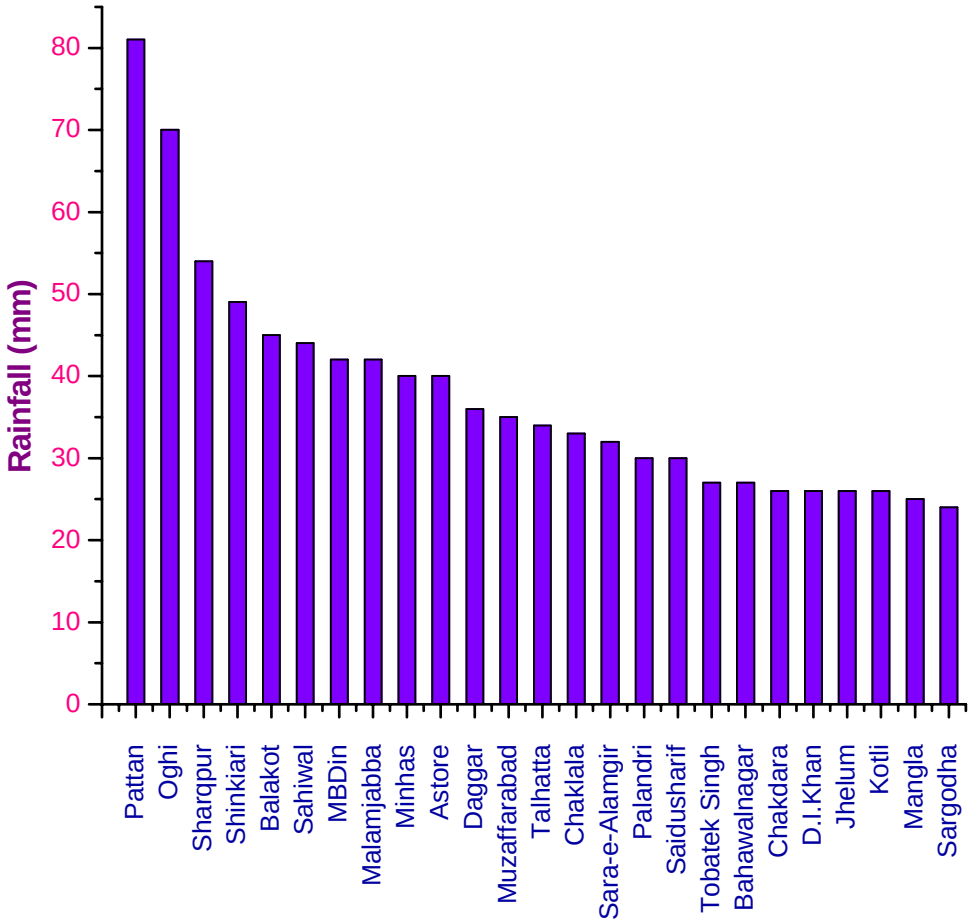

Fig -3: WET SPELL OF JUNE 2008 FROM 19-06-2008 TO 20-06-2008

2.1.4 RIVER POSITION DURING THE SPELL.

Result of this spell no significant flood situation was developed in any river however a low flood peak was recorded in river Indus at Tarbela.

2.1.5 THIRD SPELL OF JUNE 2008 FROM 27-06-2008 TO 30-06-2008

Fairly widespread rainfall of light to moderate intensity was recorded during this spell was reported from the upper catchments of river Indus and Jhelum along with Punjab. Significant rainfall during this spell is shown in Fig 4.

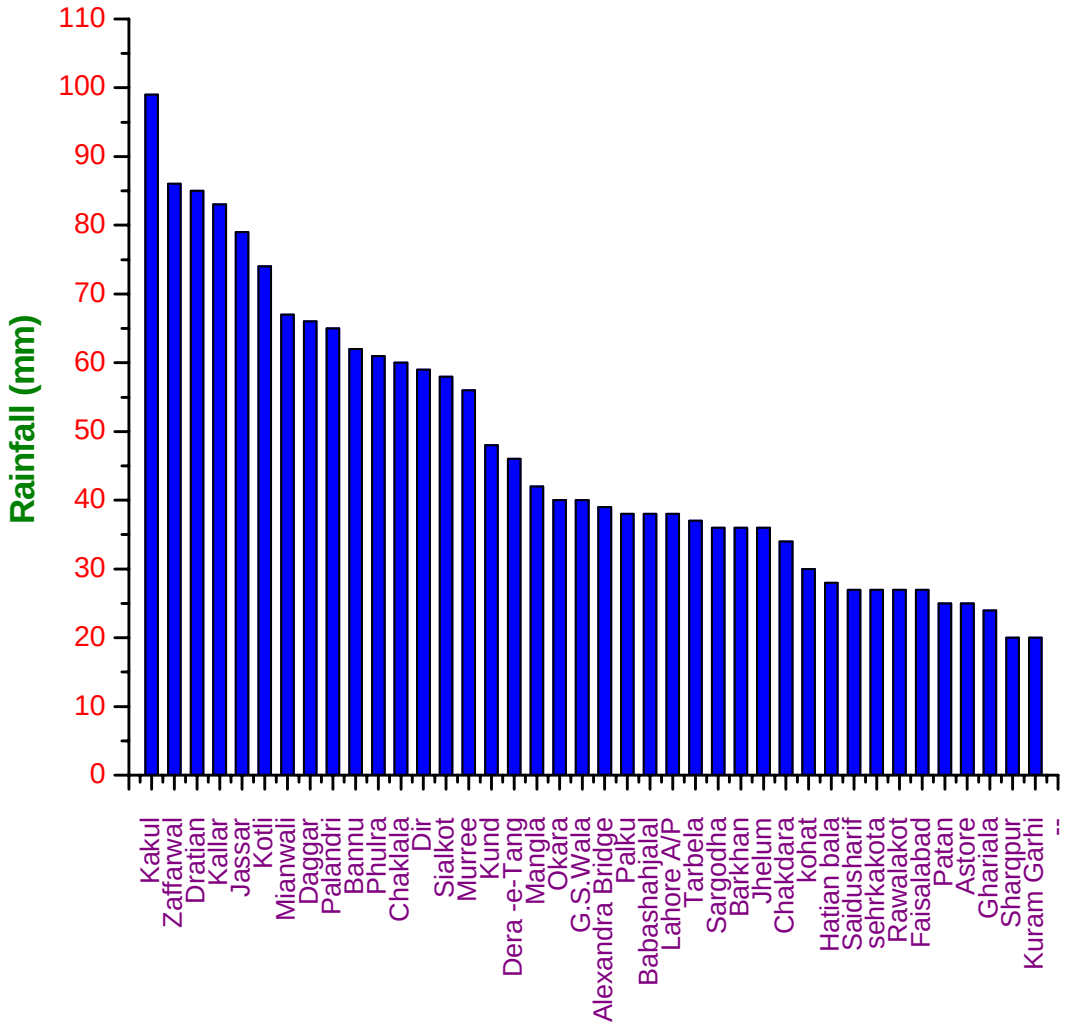

Fig 4: WET SPELL OF JUNE 2008 FROM 27-06-2008 TO 30-06-2008

2.1.6 RIVER POSITION DURING THE SPELL

Low flood peaks in river Indus at Kalabagh & Chashma were the result of this spell.

2.1.7 RIVER POSITION DURING JUNE 2008

Generally all the rivers, hill torrents and nullahs maintained their normal flows during the period however flood peaks of low intensity was recorded in river Indus at Tarbela, Kalabagh, & Chashma in river Jhelum at Mangla, and in river Ravi at Balloki. A peak of high flood magnitude was also registered in river Kabul at Nowshera. Hydrographs showing the magnitude are as under.

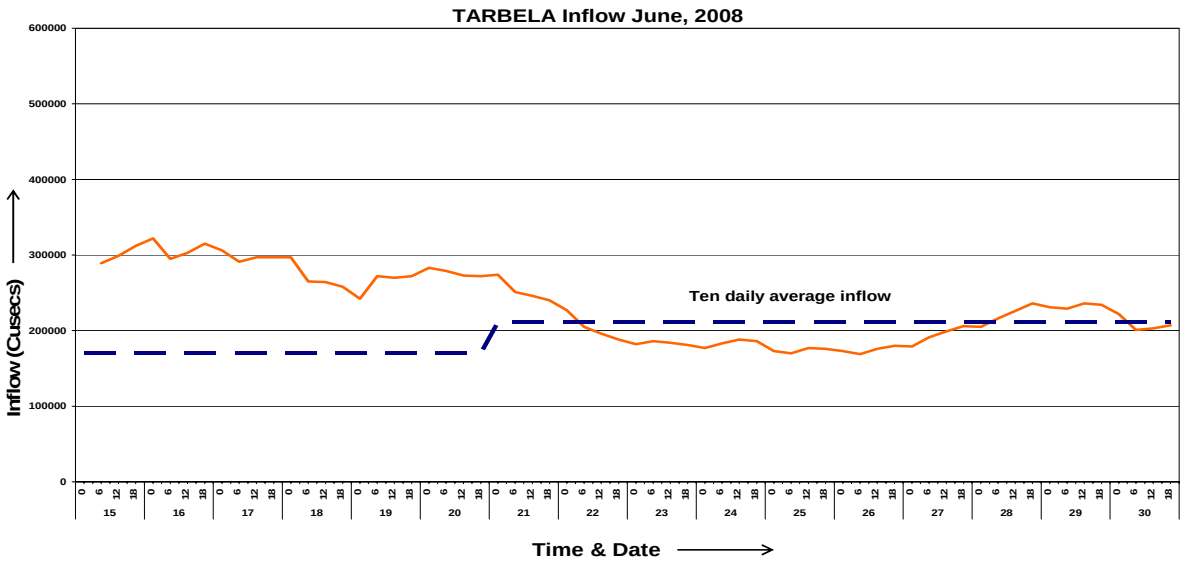

Fig -5: Hydrograph of Tarbela inflow of June, 2008

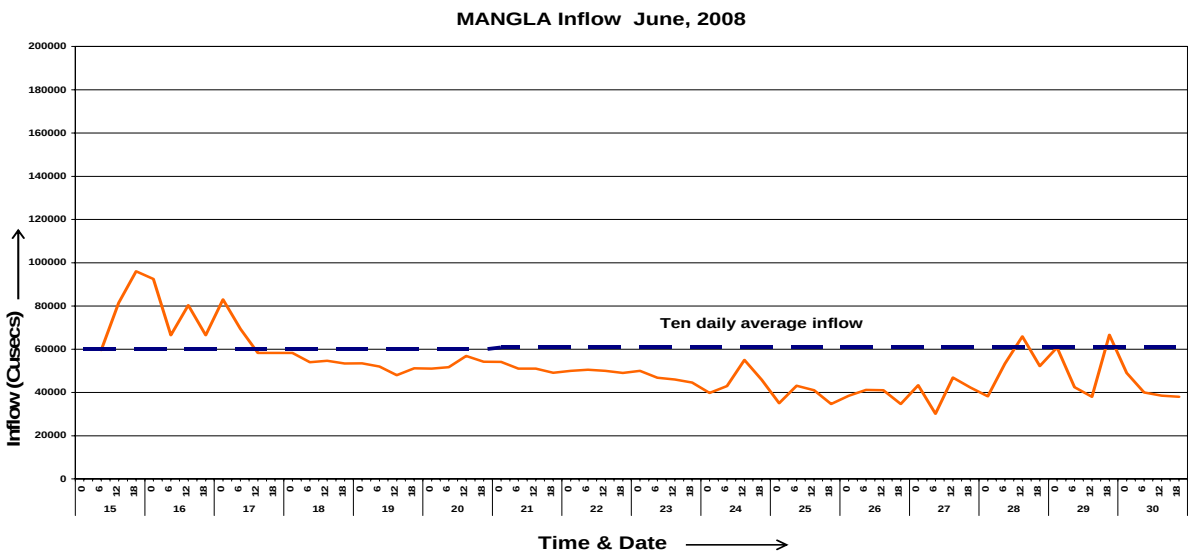

Fig -6: Mangla Hydrograph inflow of June, 2008

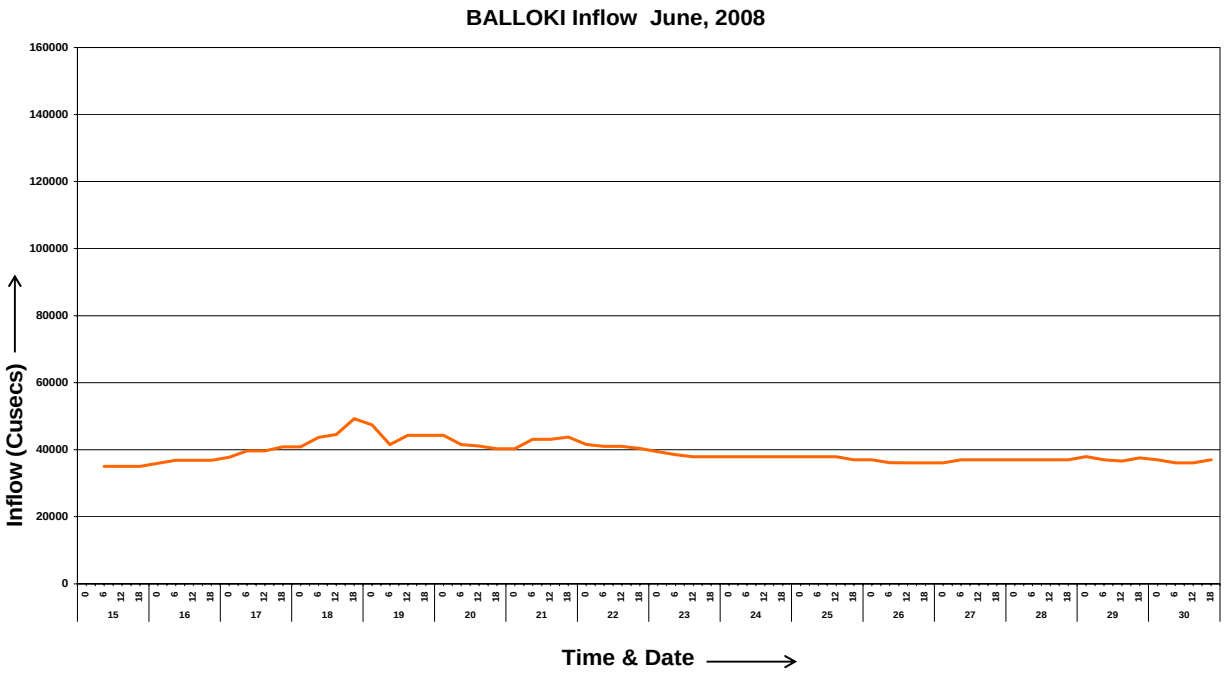

Fig -7: Balloki Hydrograph inflow of June, 2008

3. SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF JULY 2008.

3.1 METEOROLOGICAL EVENTS

One monsoon low developed in the Bay of Bengal, in the second week of July on 09th July .Initially it took a west-northwest course and after crossing Madhya Pradesh (India) it finally reached over Southeastern parts of Rajasthan on 11-07-2008 and from here it recurved to northeastwards and dissipated over northern parts of Madhya Pradesh on 13-07-2008 .No significant rainfall was reported in Pakistan due to this weather system. All the rainfall recorded during July was due to the passage of westerly waves & accentuation of seasonal low .Four rainfall spells were observed during the month.

3.1.1 FIRST WET SPELL OF JULY 2008 FROM 06-07-2008 TO 10-07-2008

This spell lasted for five days. It was due to the combined effect of westerly waves, accentuation of seasonal low, resulting in the incursion of monsoon current from Arabian Sea & Bay of Bengal in the Punjab and Kashmir. The intensity of rainfall during this spell ranged between light to moderate with isolated heavy falls.
Significant spell wise accumulated rainfall is shown in Fig 8.

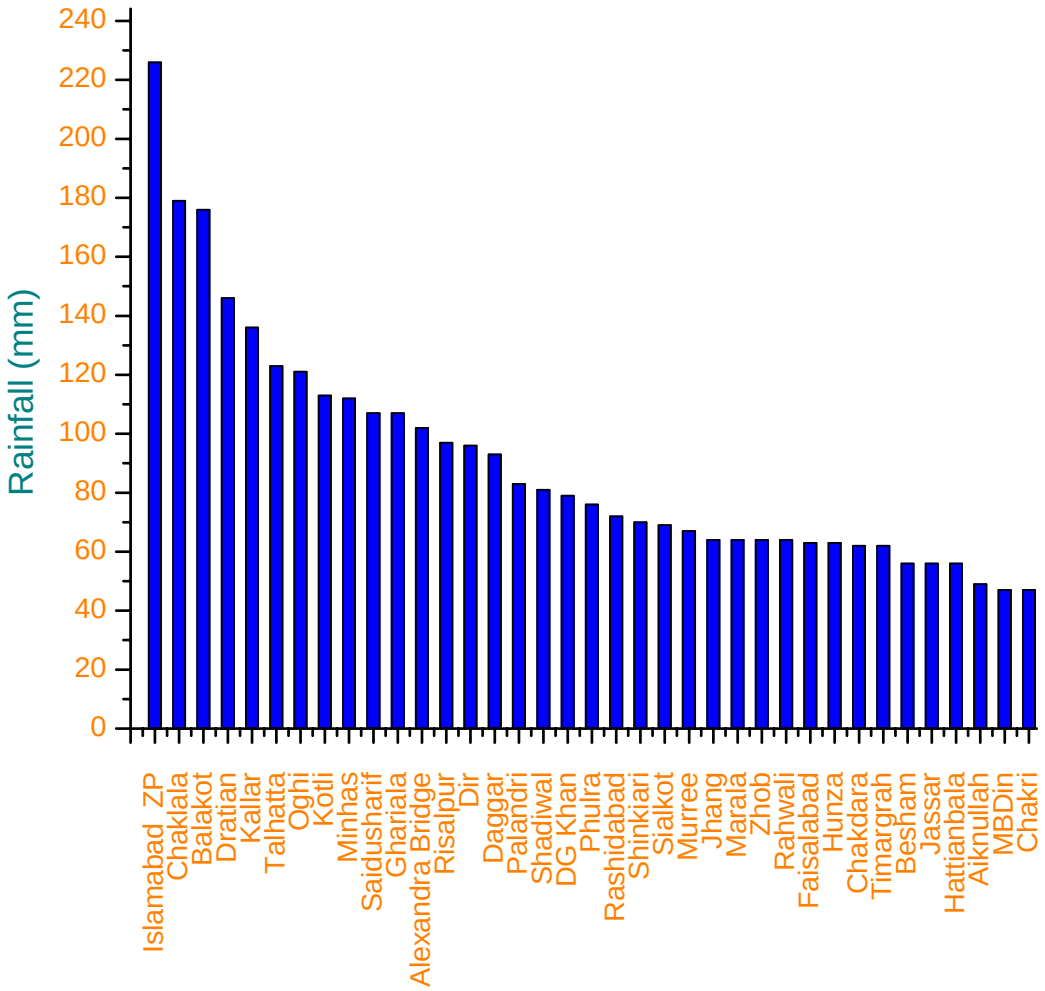

Fig -8: WET SPELL OF JULY 2008 FROM 06-07-2008 TO 10-07-2008

3.1.2 RIVER POSITION DURING THE SPELL:

A high flood peak was observed in river Kabul at Nowshera. A medium level flood was recorded in river Chenab at Marala. Water also raised to a low level flood in river Indus at Tarbela, Kalabagh & Chashma, in river Chenab at Khanki & Qadirabad and also in river Ravi at Balloki.

3.1.3 SECOND WET SPELL OF JULY 2008 FROM 12-07-2008 TO 14-07-2008

The second rainfall spell of July 2008 and fifth of the season was mainly caused due to the passage of westerly wave accentuation of seasonal low and penetration of moist current from Arabian sea. During this spell moderately heavy fall was recorded over northern & northeast Punjab while rain of light to moderate intensity occurred over Kashmir and upper NWFP and also over northeast Balochistan.
Significant rainfall in this spell is shown below in fig 9.

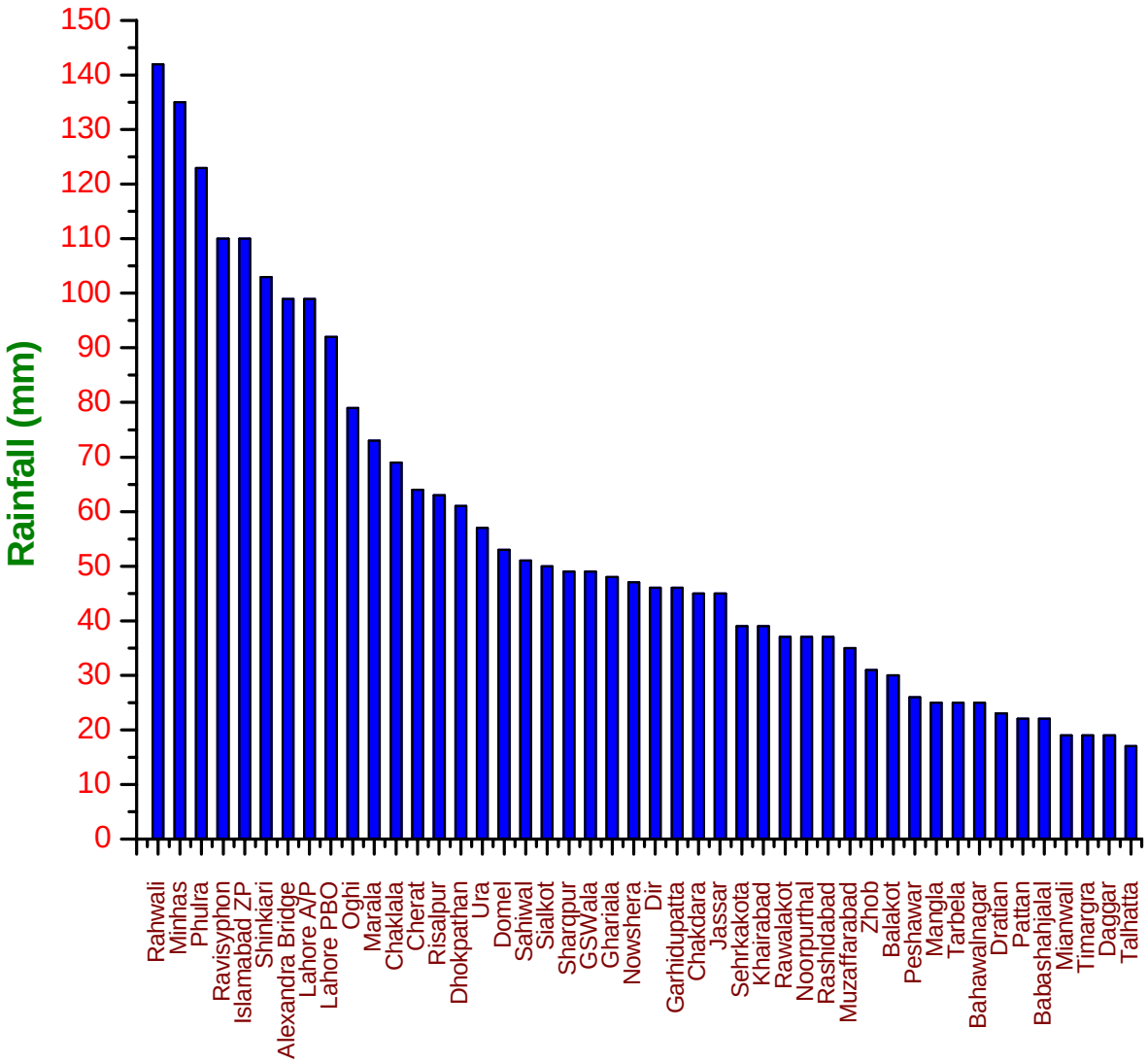

Fig -9: WET SPELL OF JULY 2008 FROM 12-07-2008 TO 14-07-2008

3.1.4 RIVER POSITION DURING THE SPELL:

A low flood peak was recorded in river Indus at Kalabagh.

3.1.5 THIRD WET SPELL OF JULY 2008 FROM 17-07-2008 TO 21-07-2008

The third rainfall spell of July 2008 and sixth of the season was mainly caused due to the passage of westerly wave accentuation of seasonal low and penetration of southwest monsoon current. Rain of light to moderate intensity with isolated heavy fall occurred over north Punjab Kashmir and upper NWFP.
Significant rainfall during the spell is shown below.

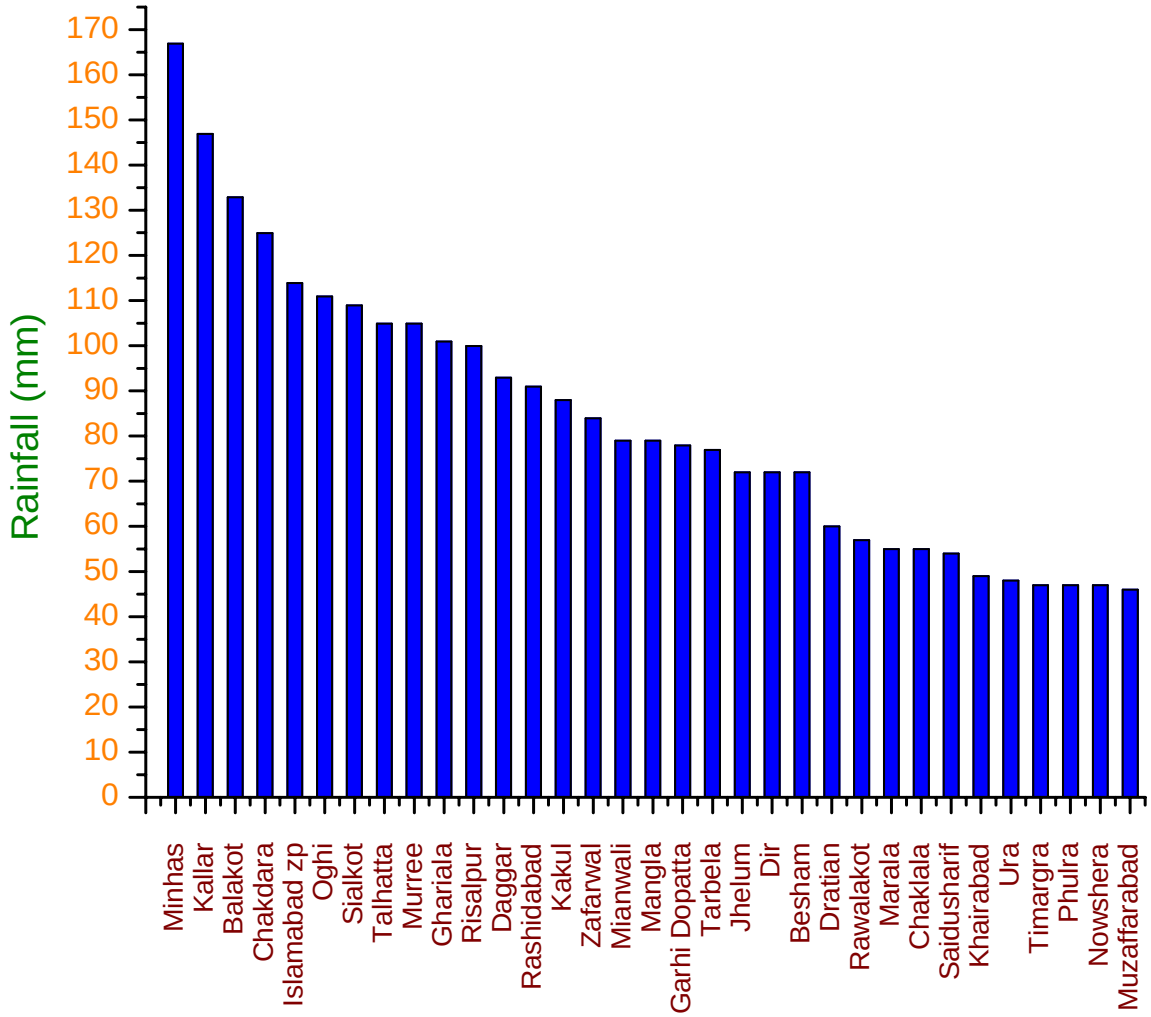

Fig -10: WET SPELL OF JULY 2008 FROM 17-07-2008 TO 21-07-2008

3.1.6 RIVER POSITION DURING THE SPELL

During this spell low level flood was recorded in river Indus at Kalabagh & Chashma and in river Ravi at Balloki.

3.1.7 FOURTH WET SPELL OF JULY 2008 (7^{th} OF THE SEASON)

FROM 29-07-2008 TO 31-07-2008

The fourth rainfall spell of July 2008 and seventh of the season was mainly caused due to accentuation of seasonal low and penetration of moist current from southwest & southeast. Rain of moderate intensity with isolated heavy fall occurred over northeast Punjab. Moderate rain was also reported from Kashmir, upper NWFP & Sindh. Significant spell wise accumulated rainfall is given below.

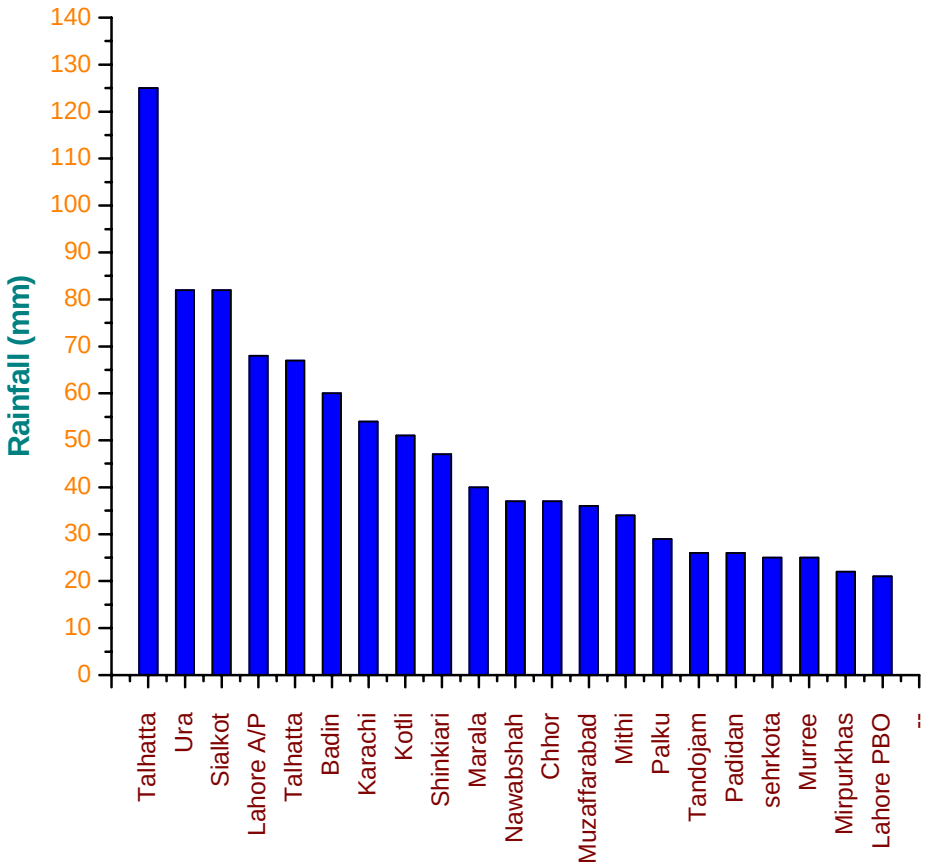

Fig -11: WET SPELL OF JULY 2008 FROM 29-07-2008 TO 31-07-2008

3.1.8 RIVER POSITION DURING THE SPELL

Result of this wet spell a flood peak of high intensity was observed in river Chenab at Marala and then at Khanki & Qadirabad. Low flood peaks were also registered in river Jhelum at Mangla, in river Indus at Kalabagh, and in river Ravi at Balloki.

3.1.9 RIVER POSITION DURING JULY 2008

River Chenab at Marala & Khanki recorded one high flood peak during the month of July. Low flood peaks were also observed in River Chenab at Marala, Khanki, Qadirabad & in River Indus at Tarbela, Kalabagh, Chashma, Taunsa, Guddu river, Indus at Chashma, Taunsa and Guddu. River Jhelum at Mangla, river Ravi at Balloki also registered low flood peaks during the month. Hydrographs showing the magnitude are as under.

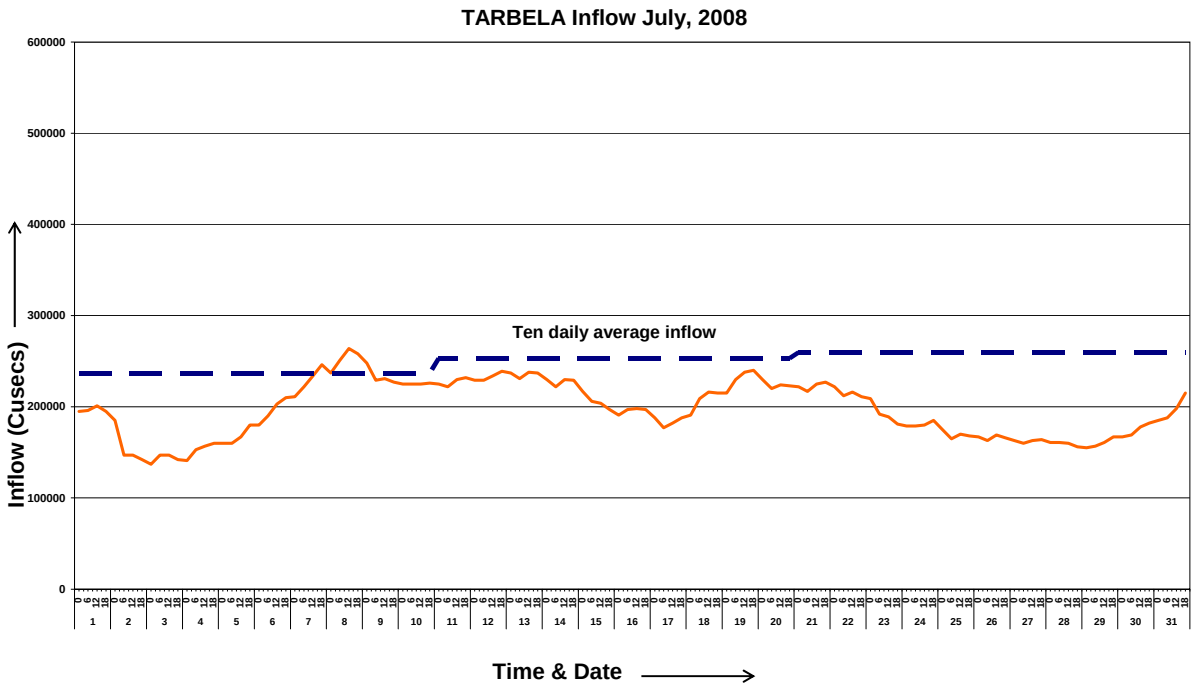

Fig -12: Hydrograph 0f Tarbela inflow of July, 2008

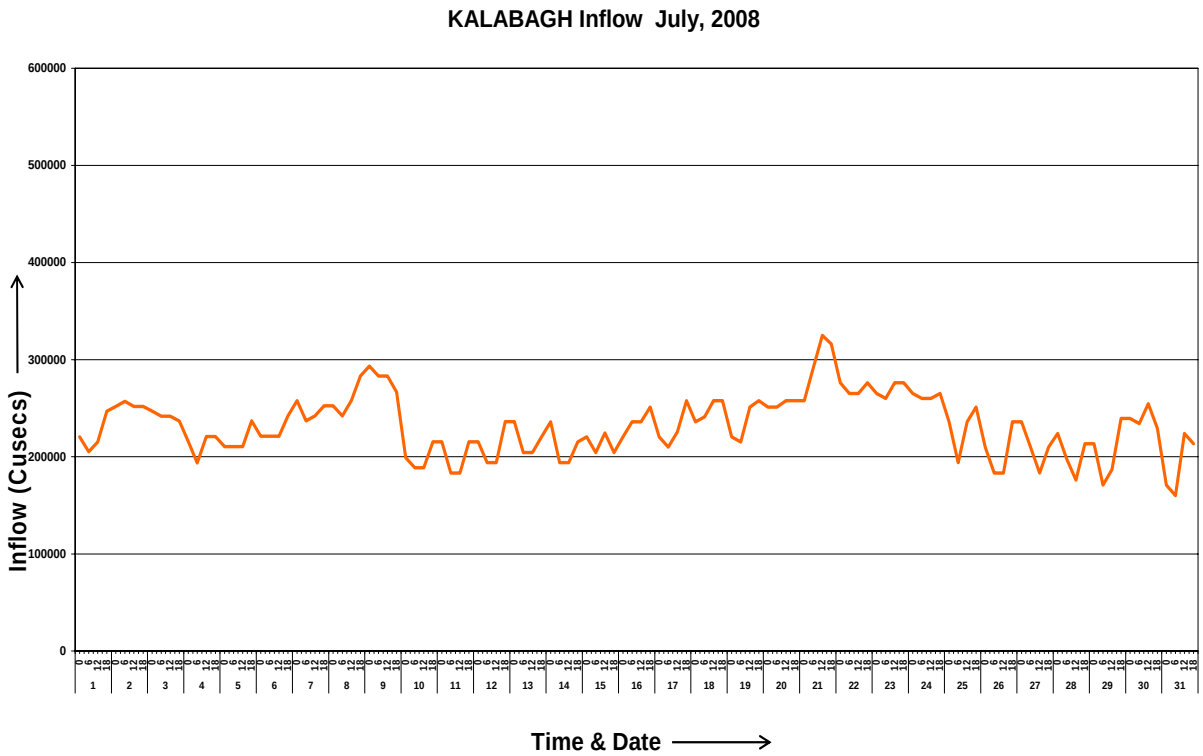

Fig -13: Hydrograph of Kalabagh inflow of July, 2008

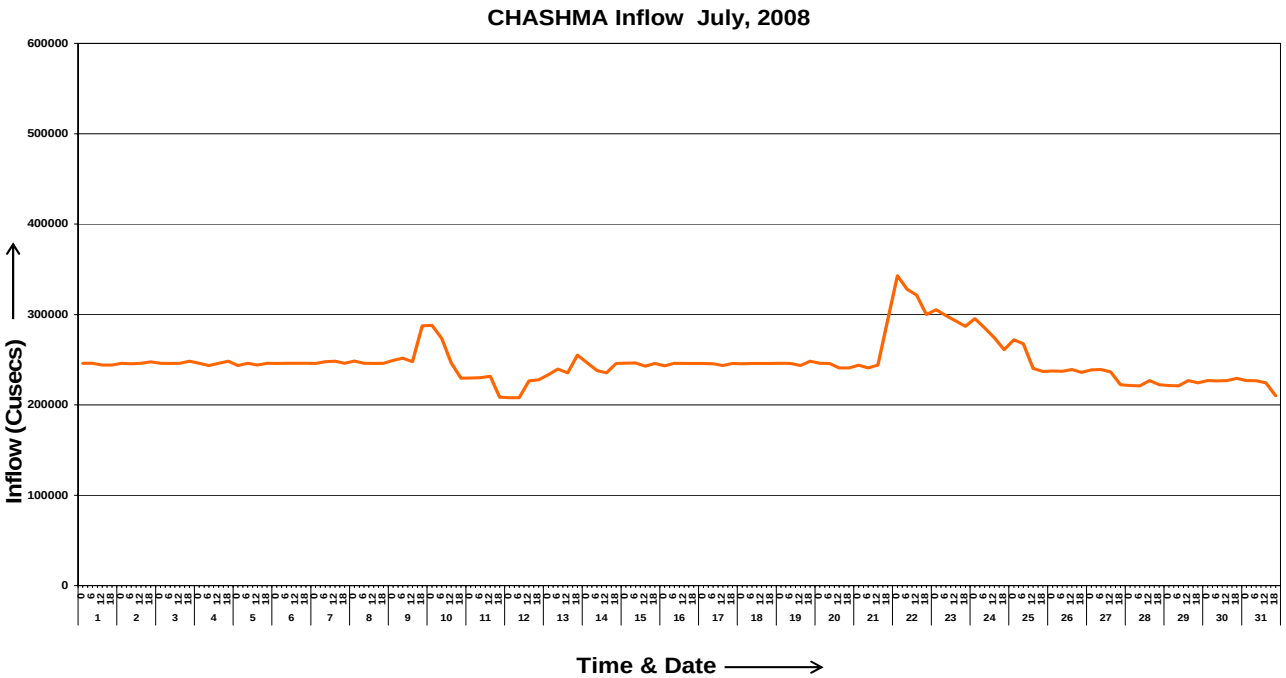

Figure -14 Hydrograph of Chashma inflow of July, 2008

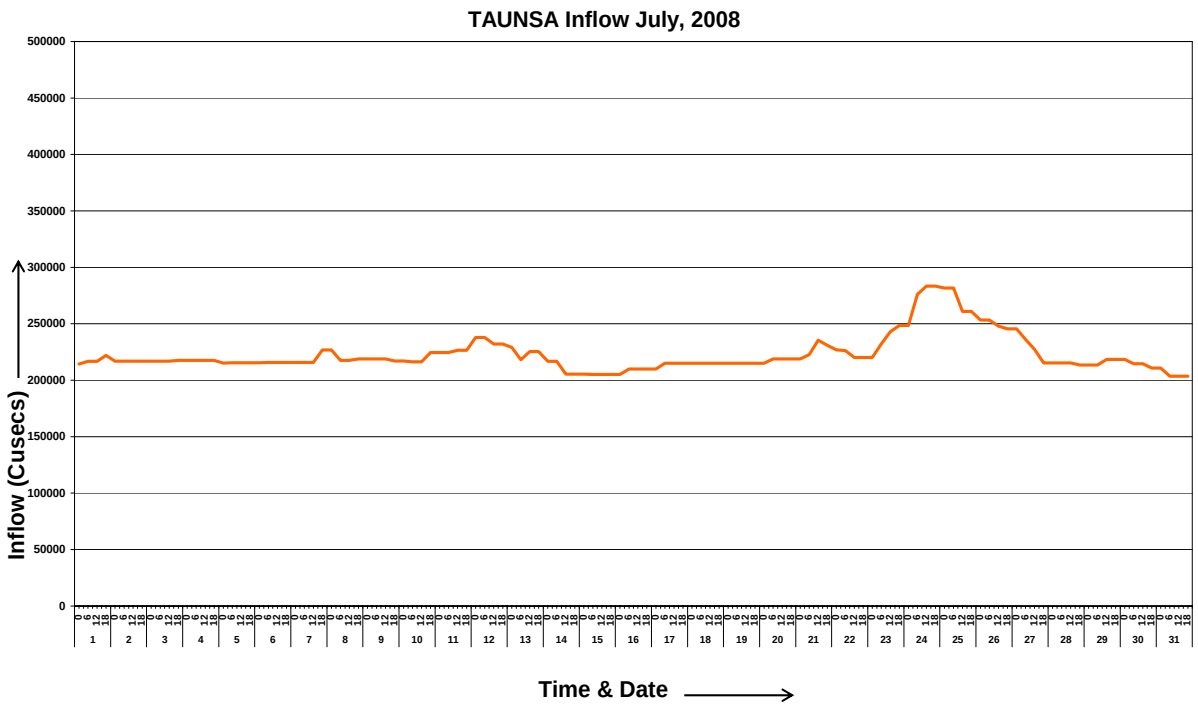

Fig -15: Hydrograph of Taunsa inflow of July, 2008

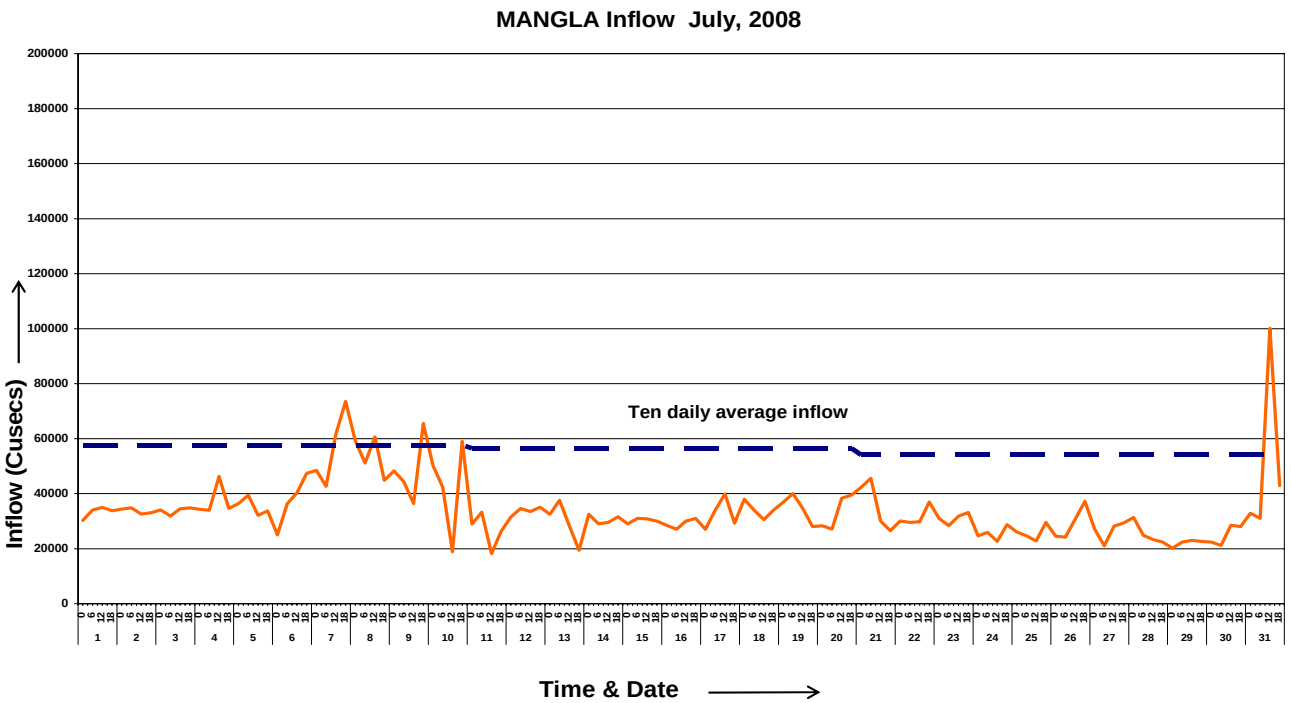

Fig -16: Hydrograph of Mangla inflow of July, 2008

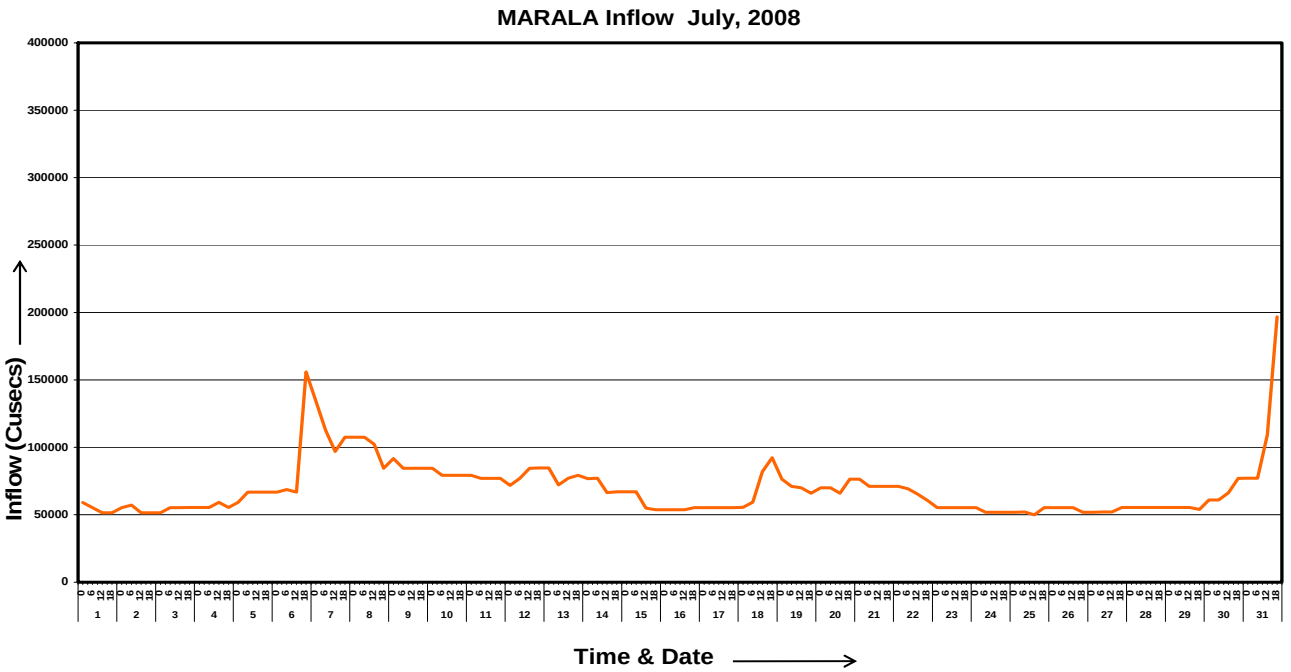

Fig -17: Hydrograph of Marala inflow of July, 2008

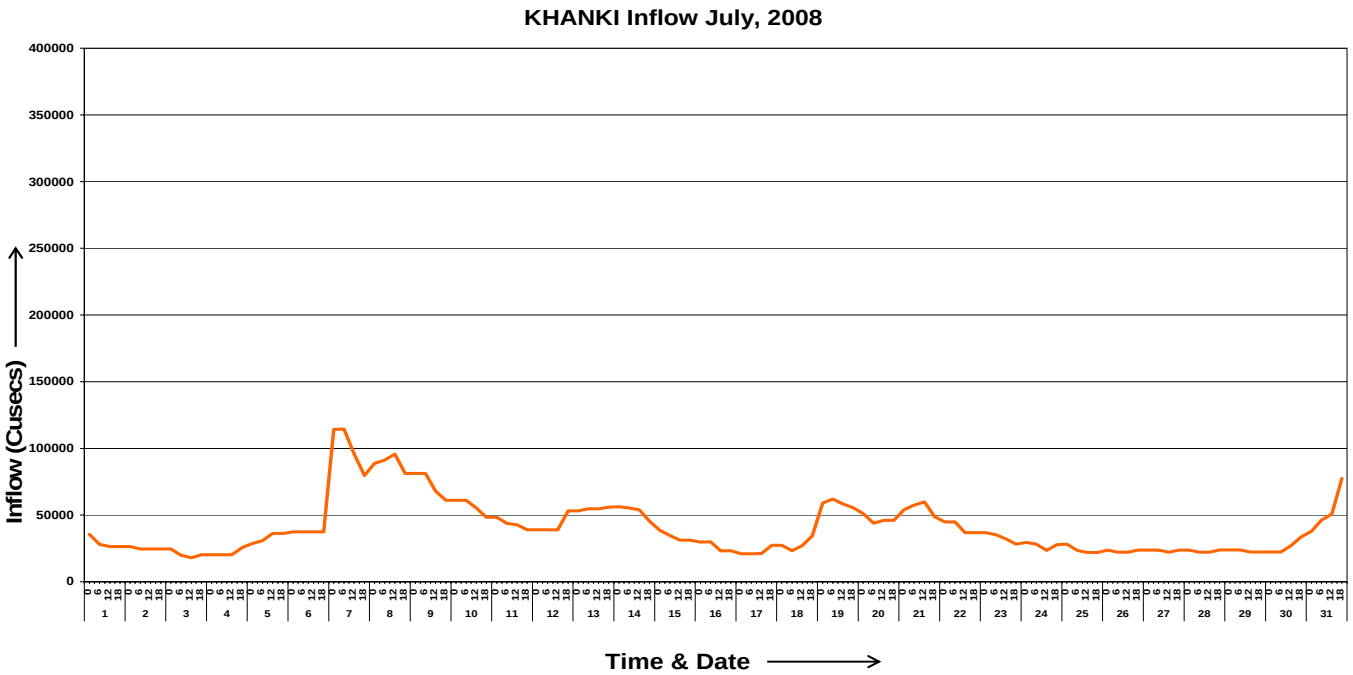

Fig -18: Hydrograph of Khanki inflow of July, 2008

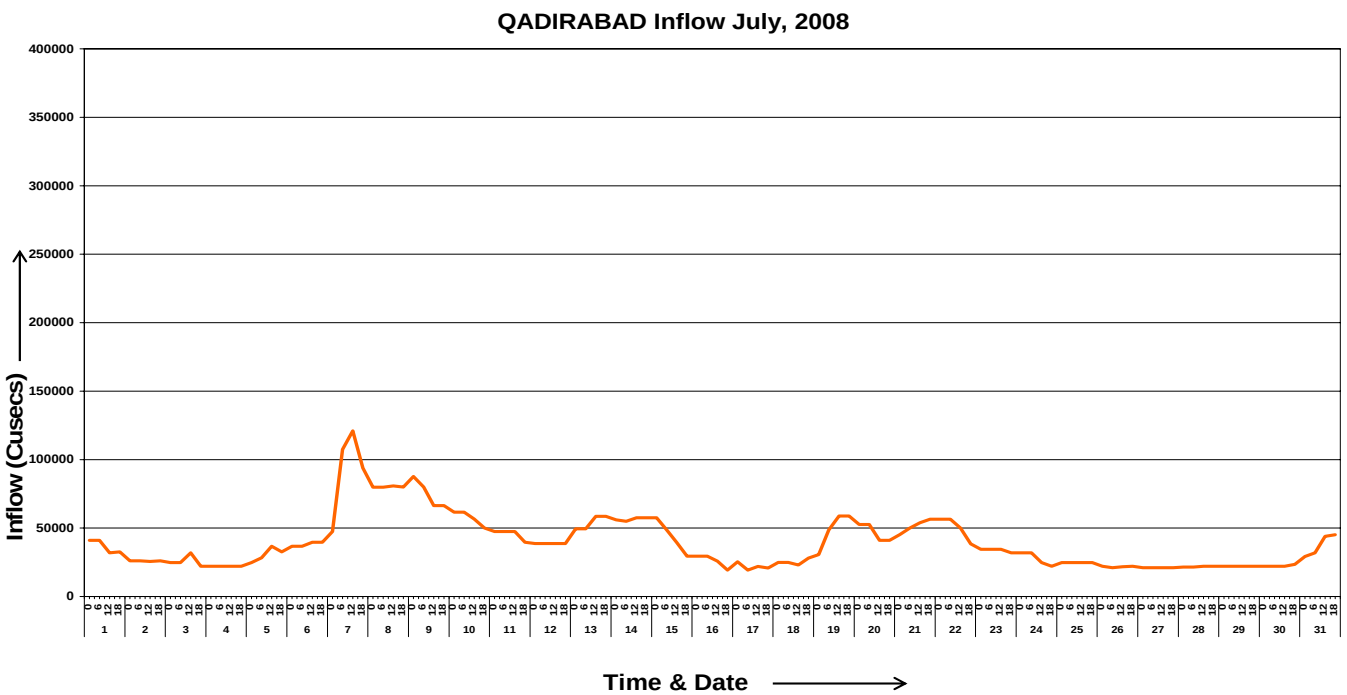

Fig -19: Hydrograph of Qadirabad inflow of July, 2008

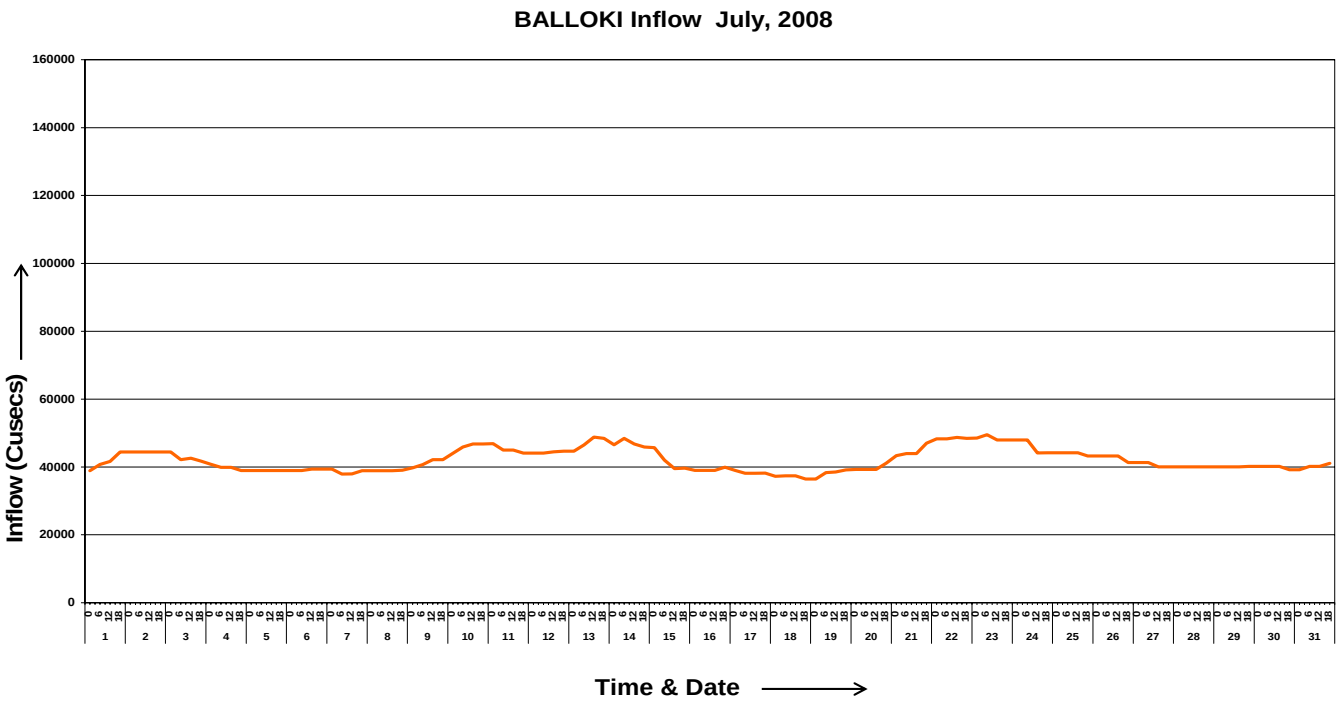

Fig -20: Hydrograph of Balloki inflow of July, 2008

3.1.10 RAINFALL PATTERN FOR THE MONTH OF JULY 2008

Isohyetal map of July 2008 indicates that the maximum precipitation occurred in submontain districts of Punjab and southern slopes of Pir Panjal range of lesser Himalaya in Kashmir. One rainfall maxima exceeding 400 mm. occurred in north Punjab (Kamra). Another lesser rainfall maxima exceeding 300mm.was observed in Northeast Punjab around Sialkot. Rainfall exceeding 50mm was observed at southern Sindh around Thatta & Badin northeast. Areas of Balochistan, western Balochistan remained almost dry during this month.

As shown in

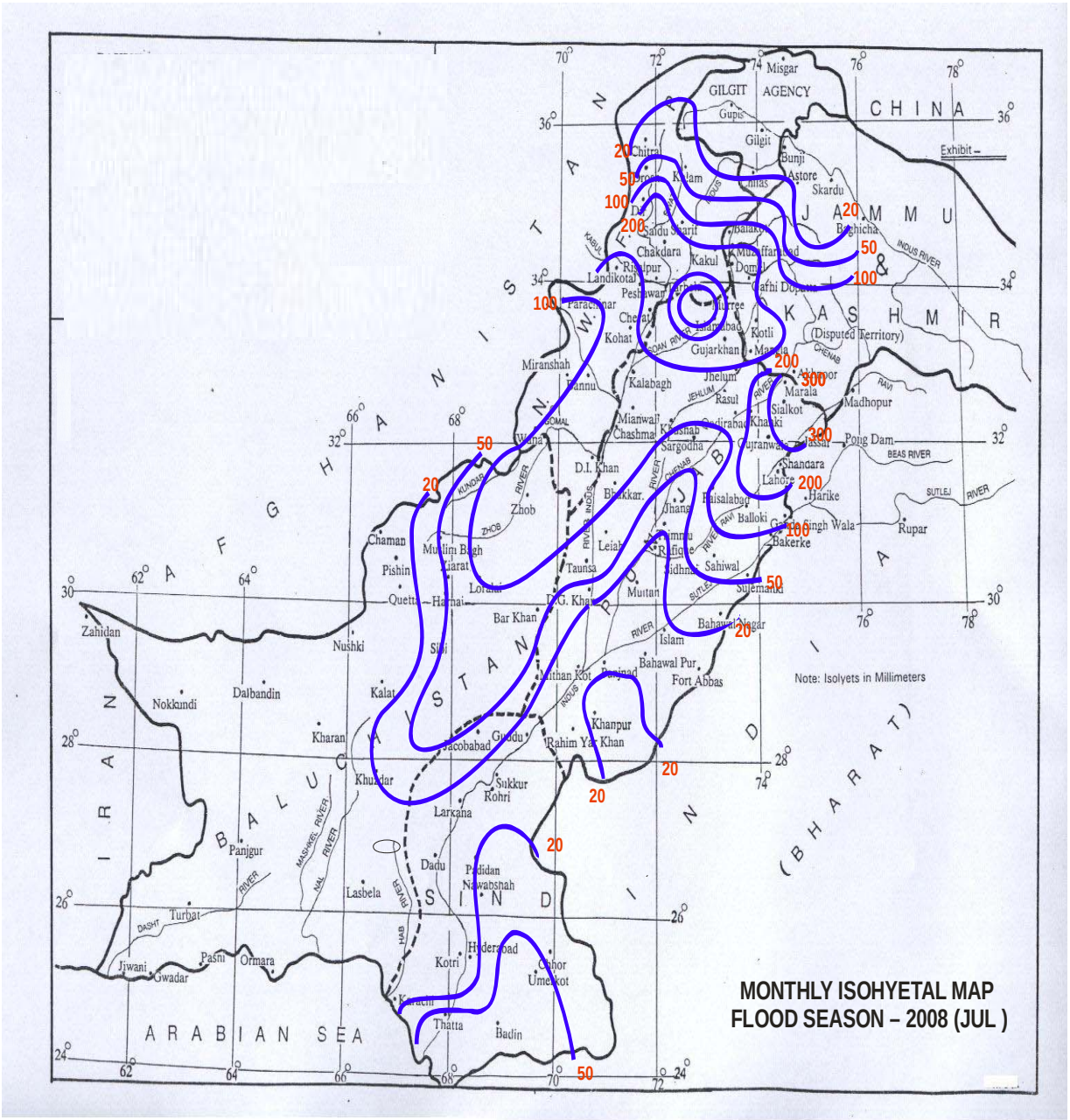

Figure -21 Isohyetal map of July, 2008.

RADAR IMAGE JULY, 2008

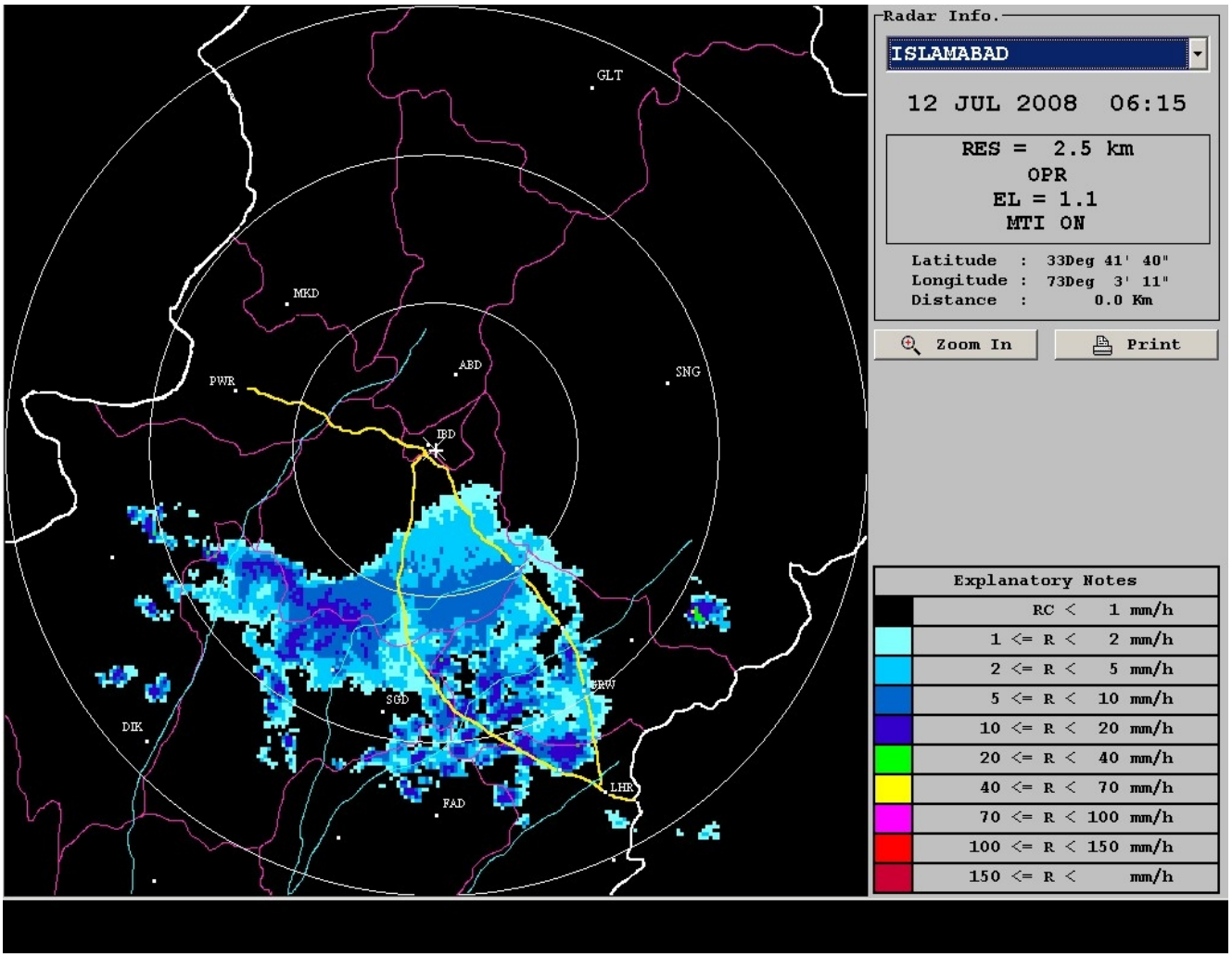

Fig -22: Radar image July, 2008

4. SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF AUGUST 2008.

4.1 METEOROLOGICAL EVENTS

Only one monsoon low developed in the Bay of Bengal on 10-08-2008 which initially moved rapidly in a northwesterly direction and reached over southeast Madhya Pradesh India on 11-08-2008 and moving west northwestwards reached Rajasthan on 13-08-2008. After recurving in northeast direction 0n 14-08-2008 and moved over Indian Punjab and Himachal Pradesh where it gave very heavy rain over the plains of Sutlej and Beas rivers in India. . According to a news item (DAWN NEWS) flood affected the areas of Kasur, Kanganpur, & several villages in Okara. According to another news item about more than 250 villages were inundated in Kasur districts due to increase inflow in Sutlej river from Ganda singh Wala.

A strong westerly wave accentuated the seasonal low causing currents influx from Bay of Bengal & Arabian Sea into the areas of Punjab and surroundings cause to a heavy downpour

over Suleman range & hill torrents in DG Khan & Rajanpur districts .According to press (DAWN) six people were reported died & dozens of villages submerged, and over 100,000 people displaced.

4.1.1 FIRST WET SPELL OF AUGUST 2008 FROM 02-08-2008 TO 06-08-2008

Passage of westerly wave, Accentuation of seasonal low due to westerly wave and induction of southeast & southwest monsoon current into Pakistan moderate with scattered heavy rainfall occurred during this spell over the Punjab and Sindh. Rain of moderate intensity was also reported from the upper catchments of river Indus and Jhelum.
Significant accumulated rainfall is shown below:-

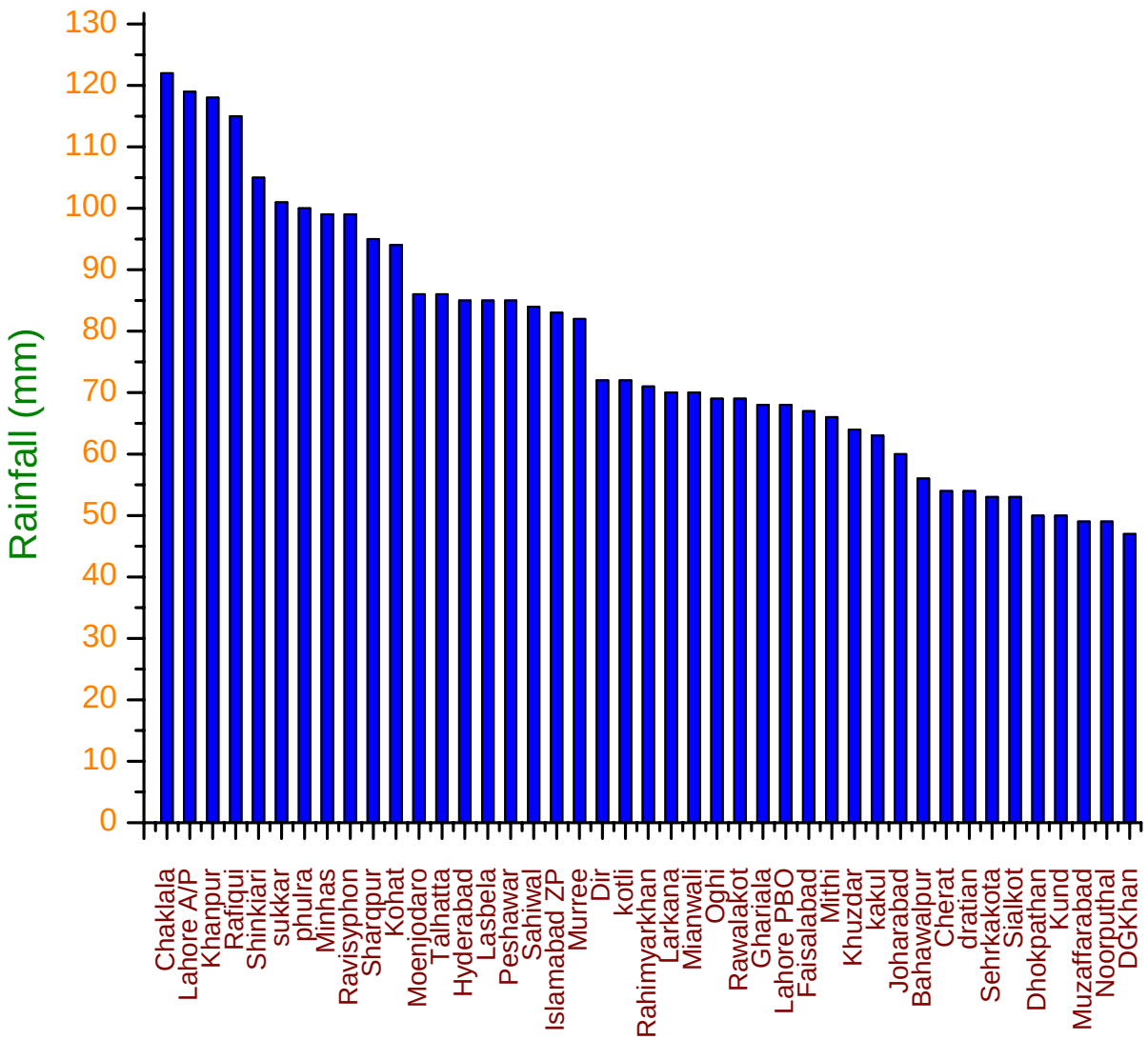

Fig -23: Wet Spell of August from 02-08-2008 to 06-08-2008

4.1.2 RIVER POSITION DURING THE SPELL

During this spell a low flood wave was observed in river Indus. A low flood situation also developed in the river Chenab at Marala, Khanki & Qadirabad. River Ravi at Balloki also attains a low flood peak.

4.1.3 SECOND WET SPELL OF AUGUST 2008 FROM 08-08-2008 TO 10-08-2008

Accentuation of seasonal low and induction of southwest monsoon current into Pakistan caused this spell. Moderate rain with isolated heavy fall occurred during this spell over the northeast Punjab. Light to moderate rain was also reported from Kashmir.
Significant Spell-wise accumulated rainfall is shown below: -

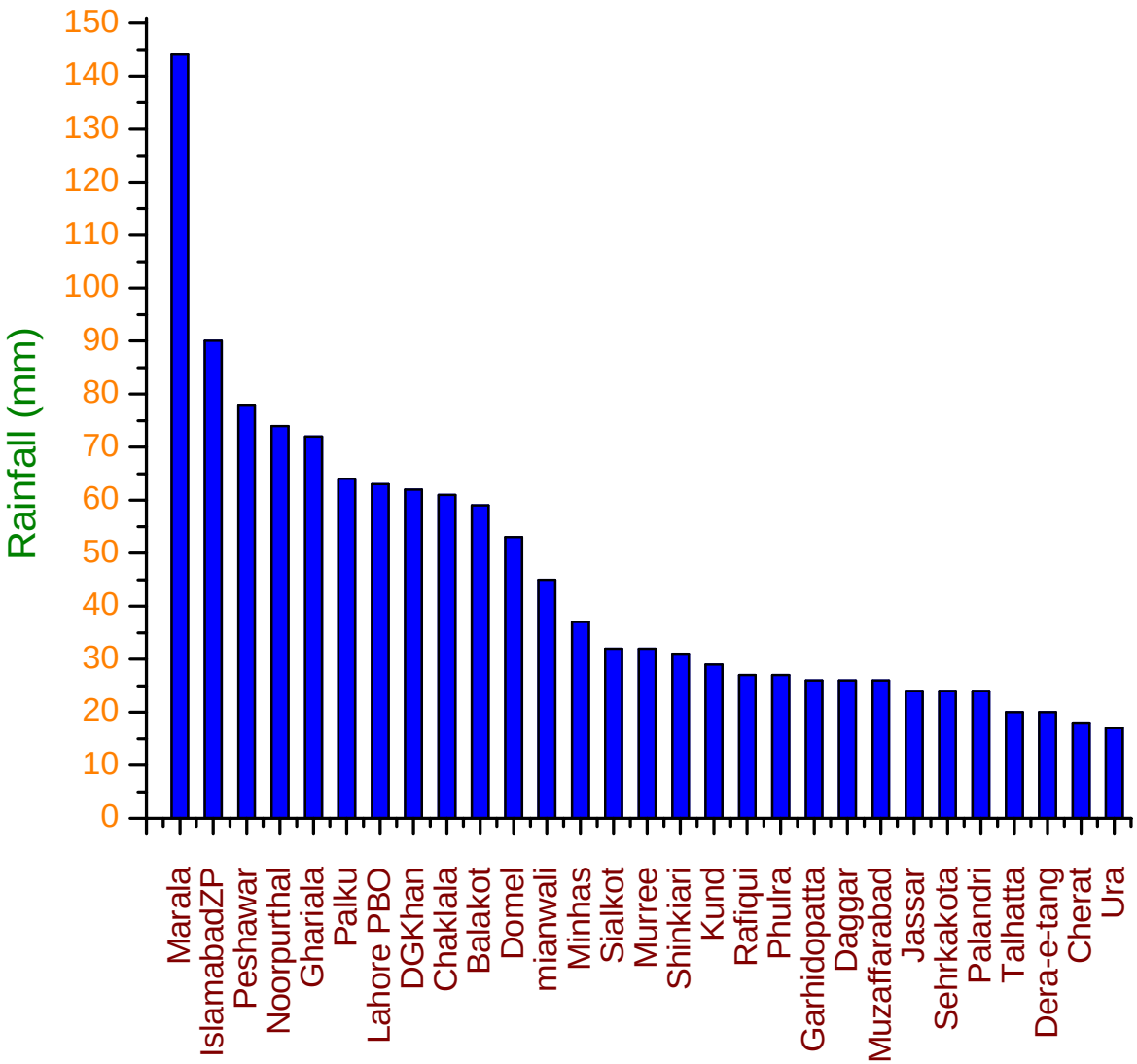

Fig -24: Wet Spell of August from 08-08-2008 to 10-08-2008

4.1.4 RIVER POSITION DURING THE SPELL

River Chenab at Marala, Khanki & Qadirabad attain a medium flood level while low flood was also registered in river Ravi at Balloki & Sidhnai, & in river Indus in Tarbela, Kalabagh, Chashma, Taunsa, & Guddu.

4.1.5 THIRD SPELL OF AUGUST 2008 FROM 12-08-2008 TO 16-08-2008

A monsoon low developed in the Bay of Bengal on 10-08-2008 which initially moved rapidly in a northwesterly direction and reached over southeast Madhya Pradesh India on 11-08-2008 and moving west northwestwards reached Rajasthan on 13-08-2008. After recurving in northeast direction 0n 14-08-2008 and moved over Indian Punjab and Himachal Pradesh where it gave very heavy rain over the plains of Sutlej and Beas rivers in India. Movement of westerly wave, incursion of southeast & southwest monsoon current Moderate rain with isolated heavy fall was observed during the spell over northeast Punjab around Lahore. Moderate rain was also reported over north Punjab, NWFP & Kashmir.
Significant Spell-wise accumulated rainfall is given below:

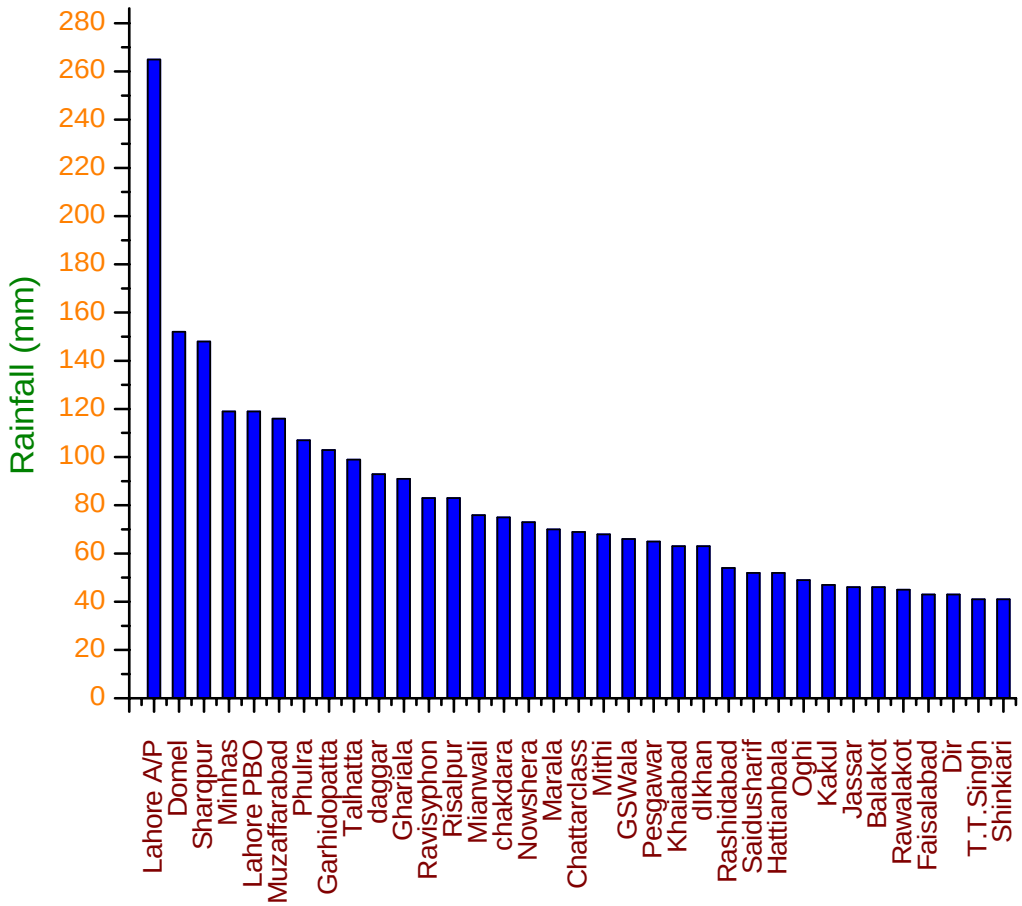

Fig -25: Wet Spell of August from 12-08-2008 to 16-08-2008

4.1.6 RIVER POSITION DURING THE SPELL

Low flood level was observed in River Indus at Kalabagh, Chashma, Taunsa, Guddu, Sukkar, in river Chenab at Marala, & in river Ravi at Balloki and Sidhnai.

4.1.7 RIVER POSITION DURING AUGUST, 2008

One high flood peak in river Ravi at Balloki, & one in River Chenab at Khanki & Qadirabad was registered during the month of August, 2008. Medium flood peaks were also observed in river Sutlej at Sulemanki, river Ravi at Sidhnai, River Chenab at Khanki & Qadirabad. River Indus at all sites except Kotri, River Chenab at Marala, Khanki, Qadirabad, and River Ravi at Balloki & Sidhnai attain low flood level during the month.

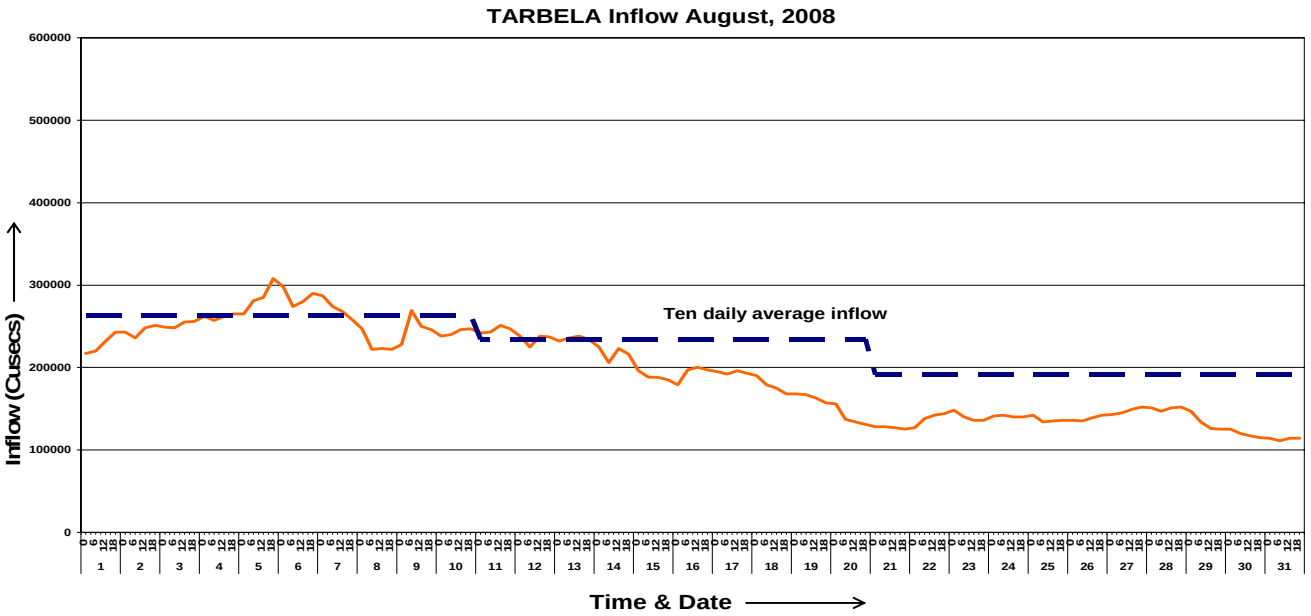

Fig -26: Hydrograph of Tarbela inflow of August, 2008

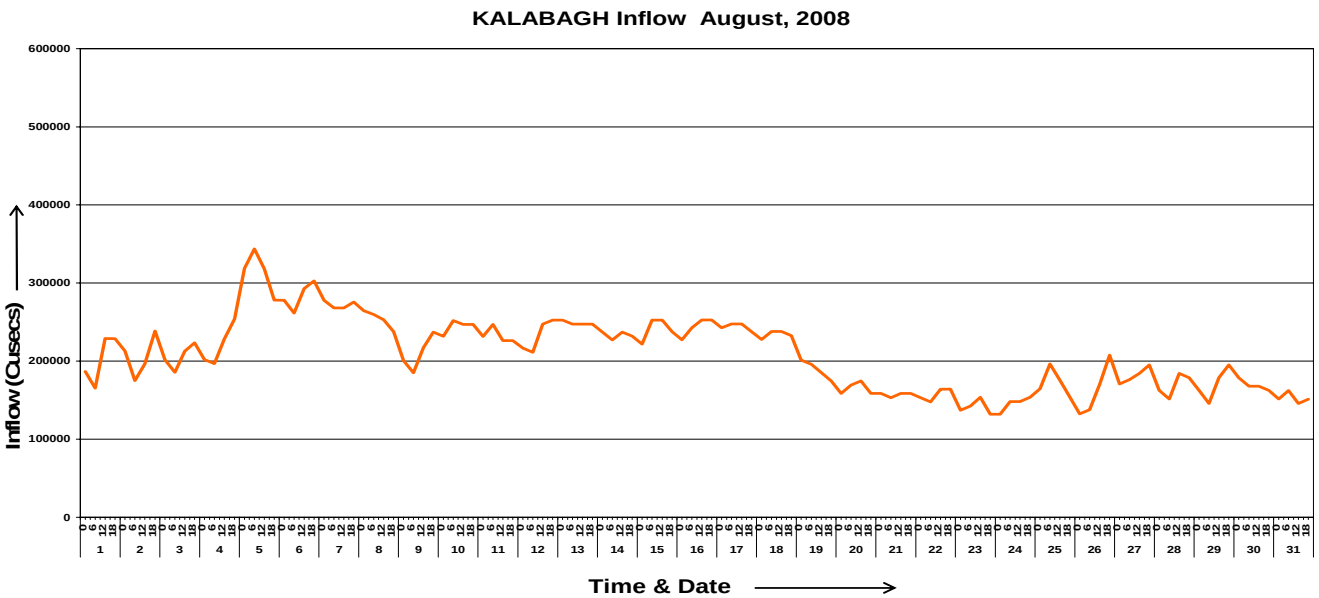

Fig -27: Hydrograph of Kalabagh inflow of August, 2008

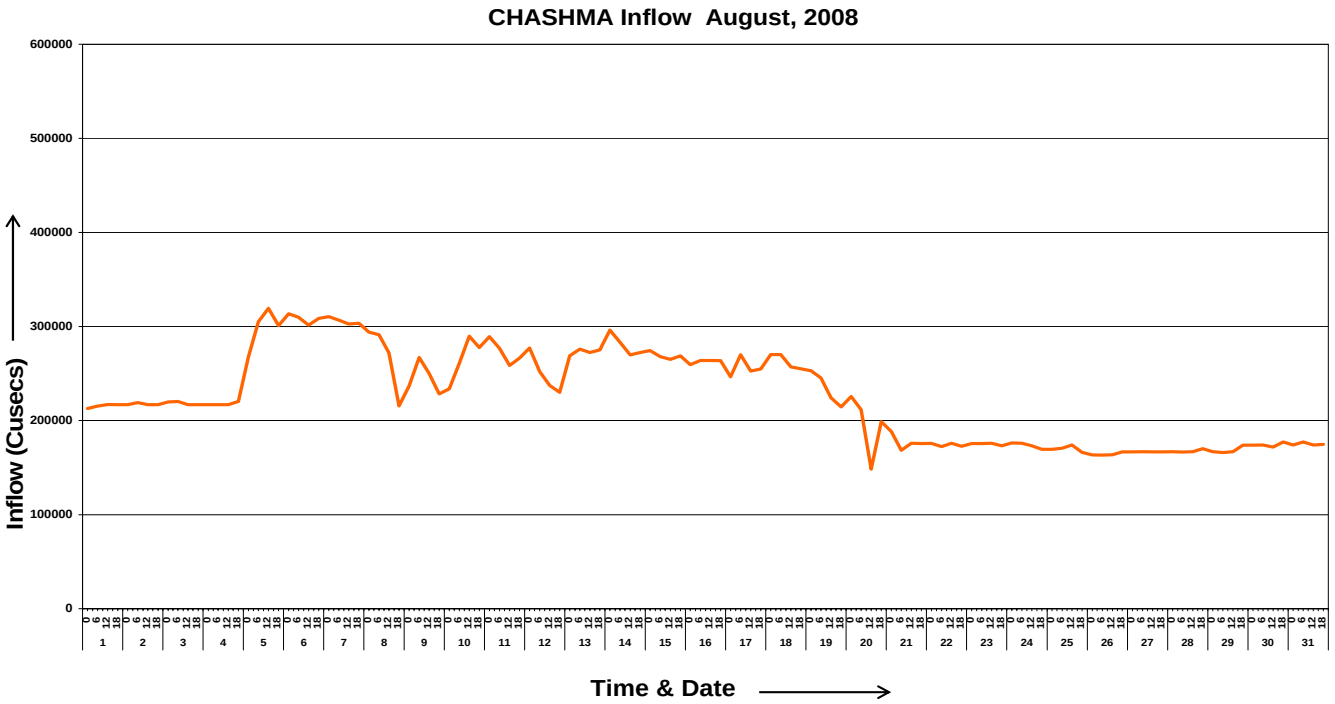

Fig -28: Hydrograph of Chashma inflow of August, 2008

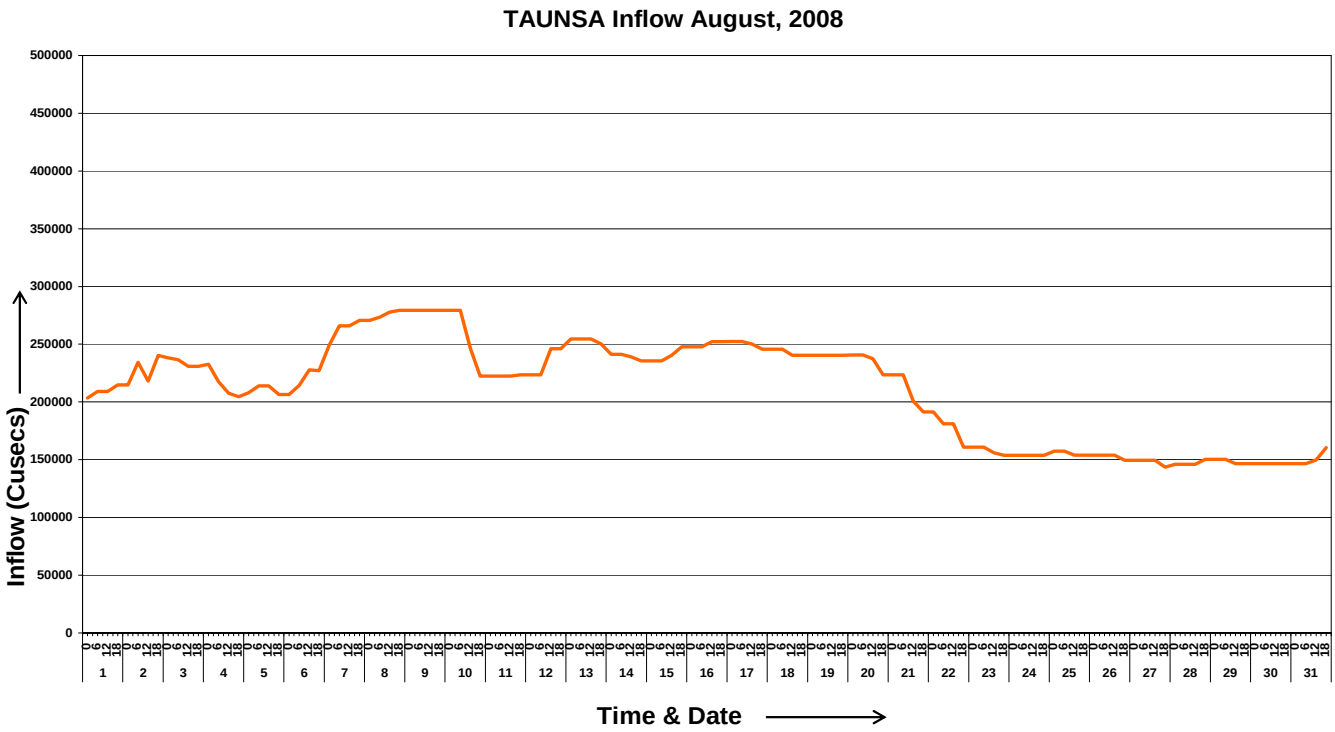

Fig -29: Hydrograph of Taunsa inflow of August, 2008

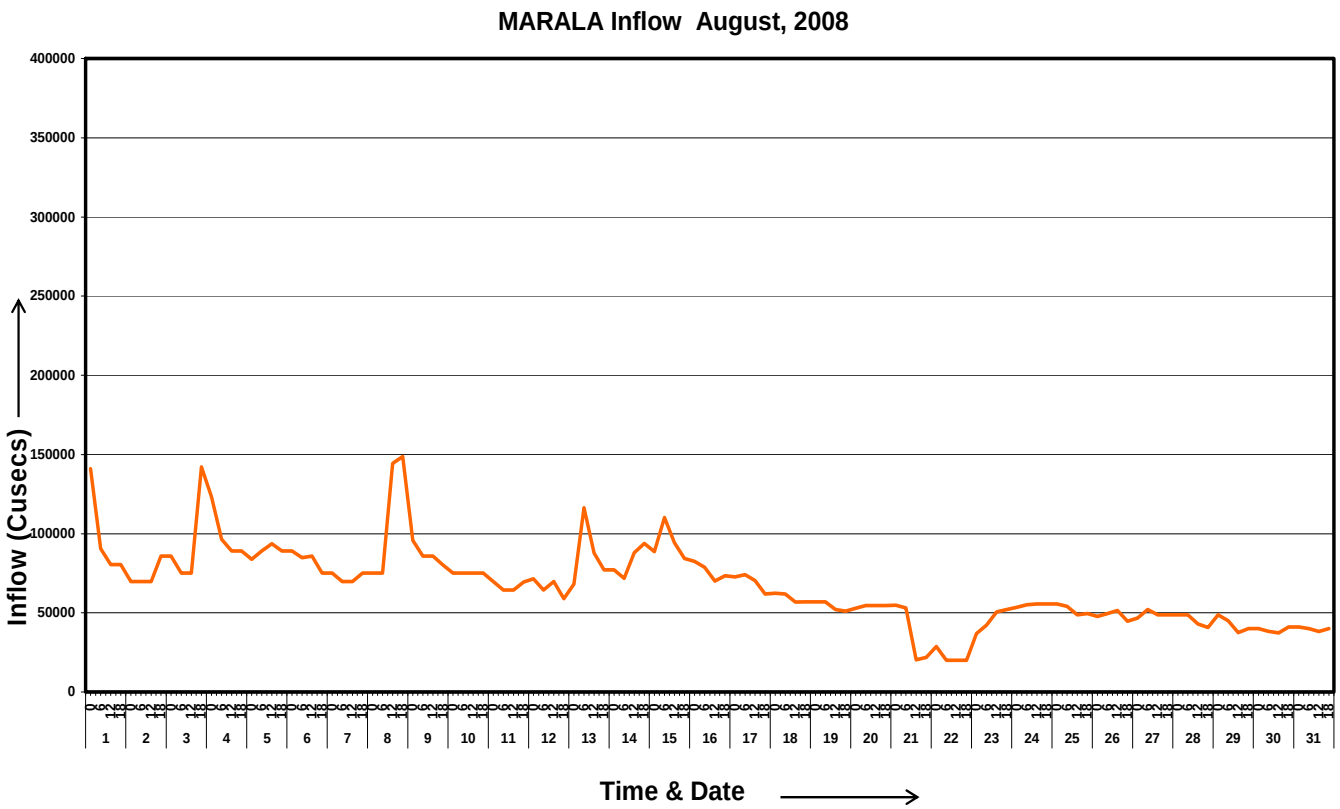

Fig -30: Hydrograph of Marala inflow of August, 2008

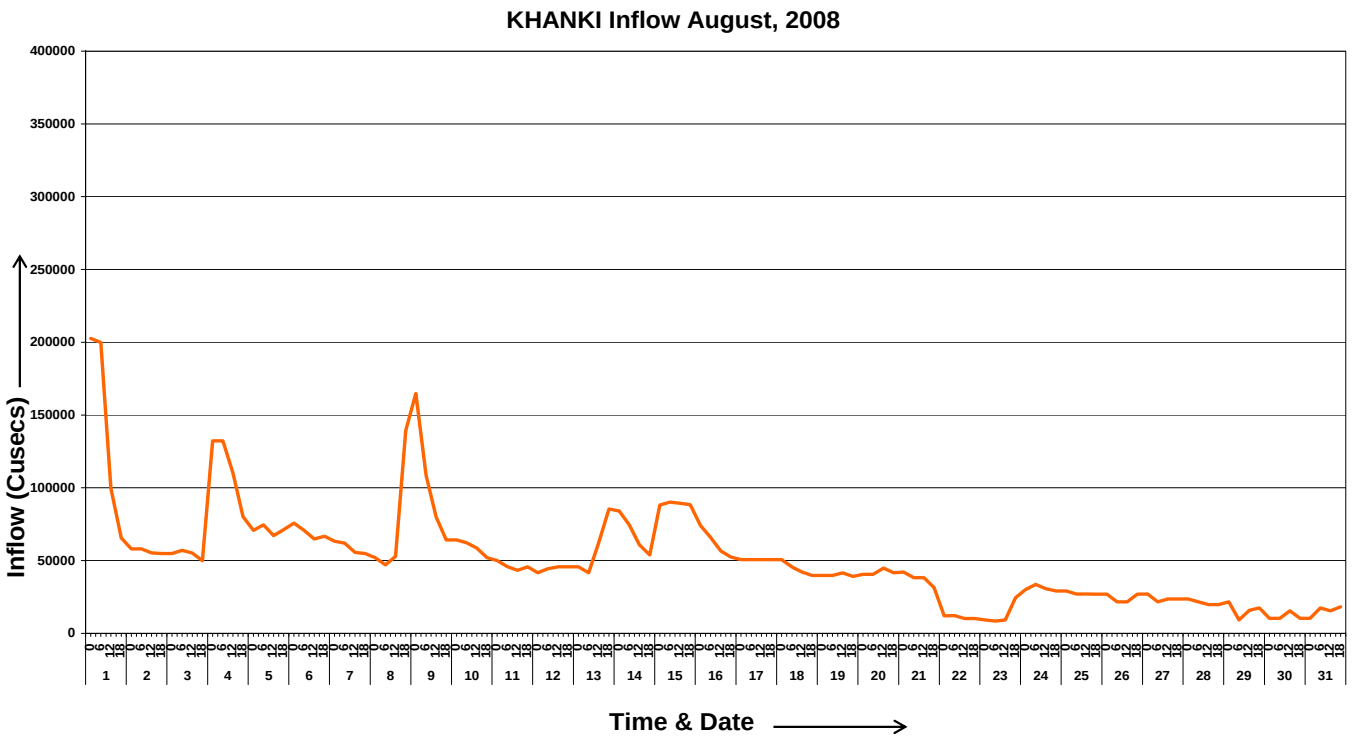

Fig -31: Hydrograph of Khanki inflow of August, 2008

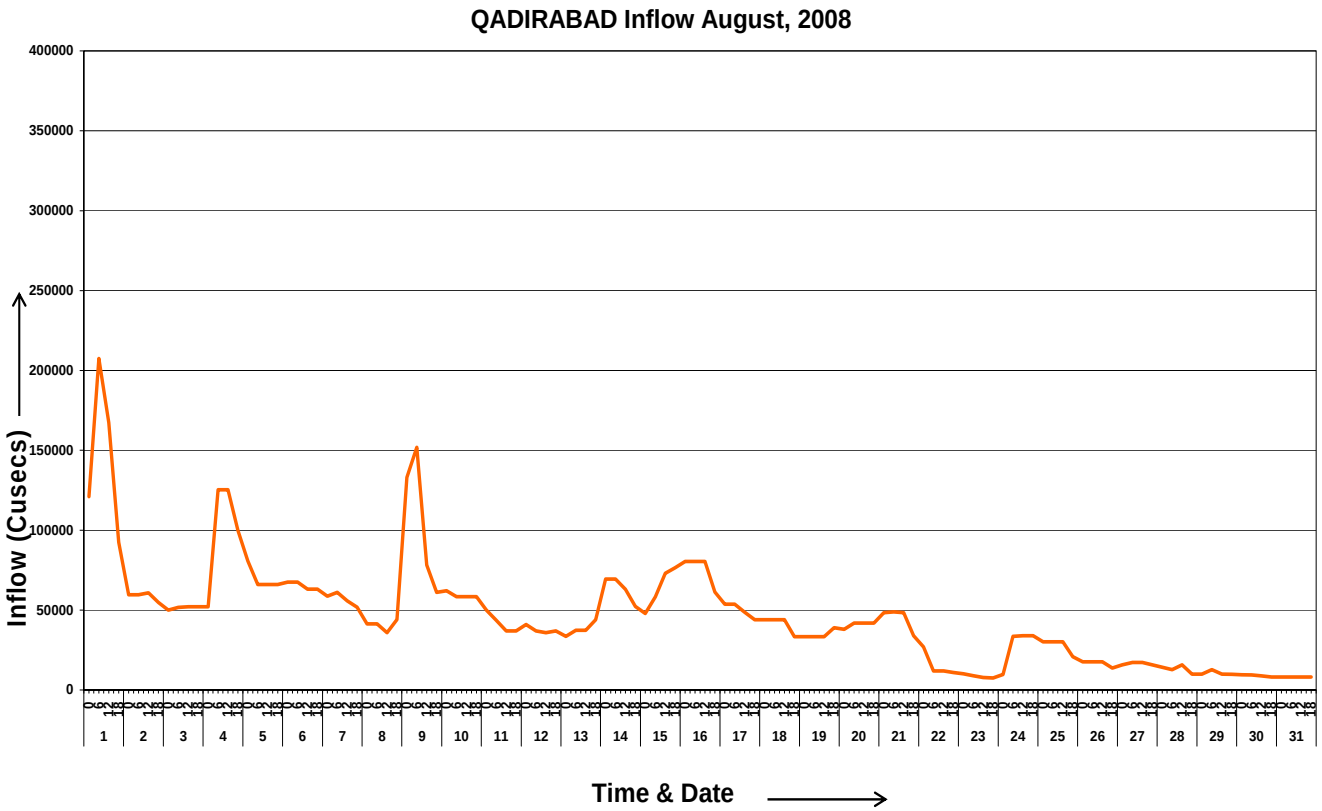

Fig -32: Hydrograph of Qadirabad inflow of August, 2008

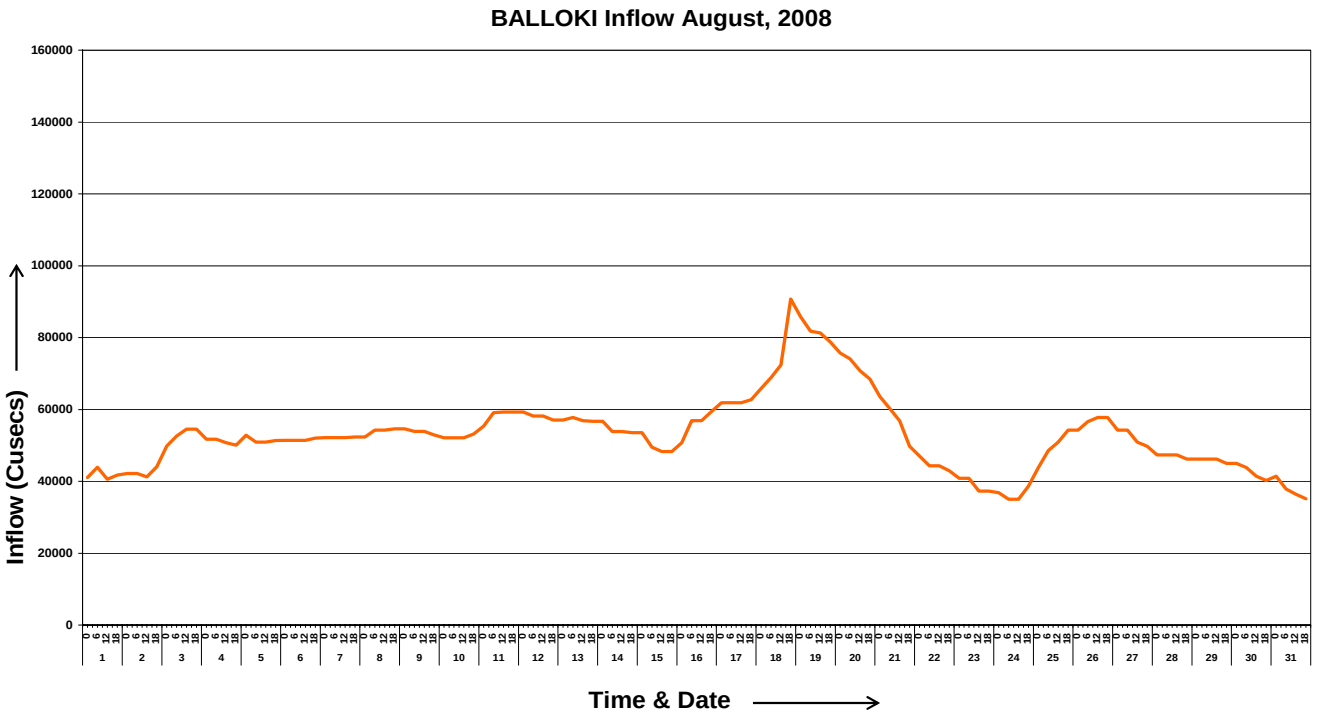

Fig -33: Hydrograph of Balloki inflow of August, 2008

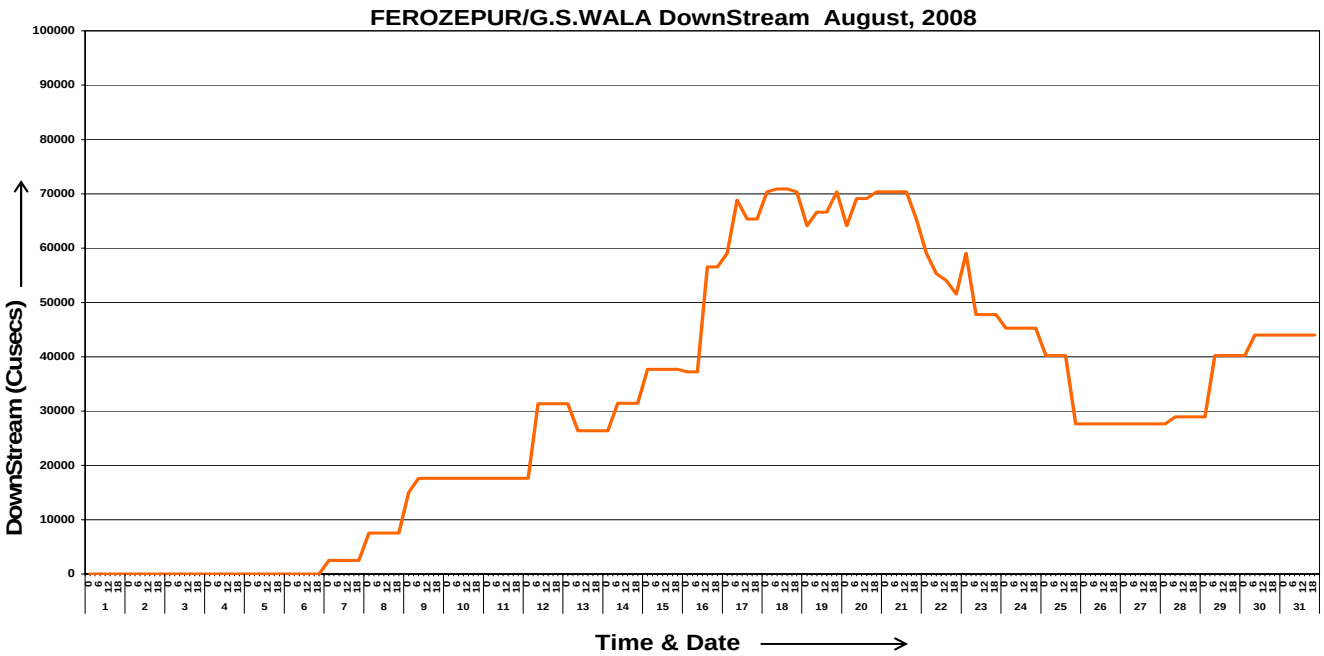

Fig -34: Hydrograph of Ferozepur/Ganda singh wala inflow of August, 2008

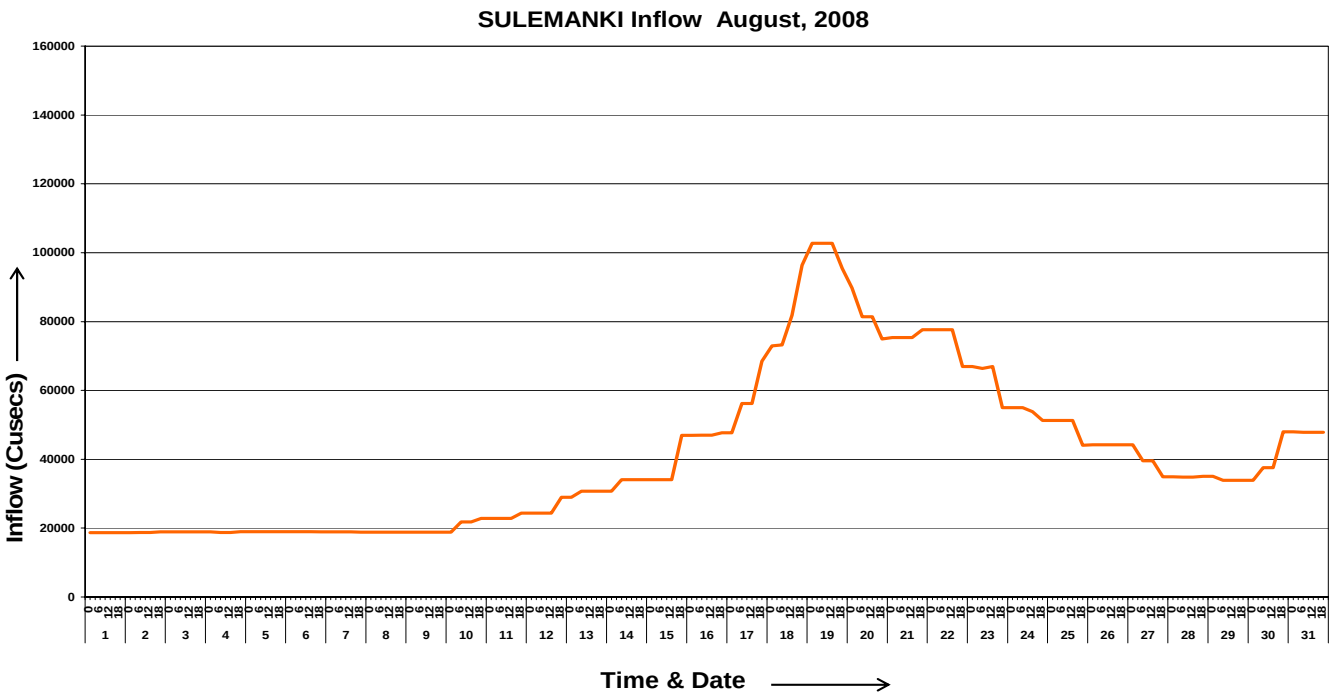

Fig -35: Hydrograph of Sulemanki inflow of August, 2008

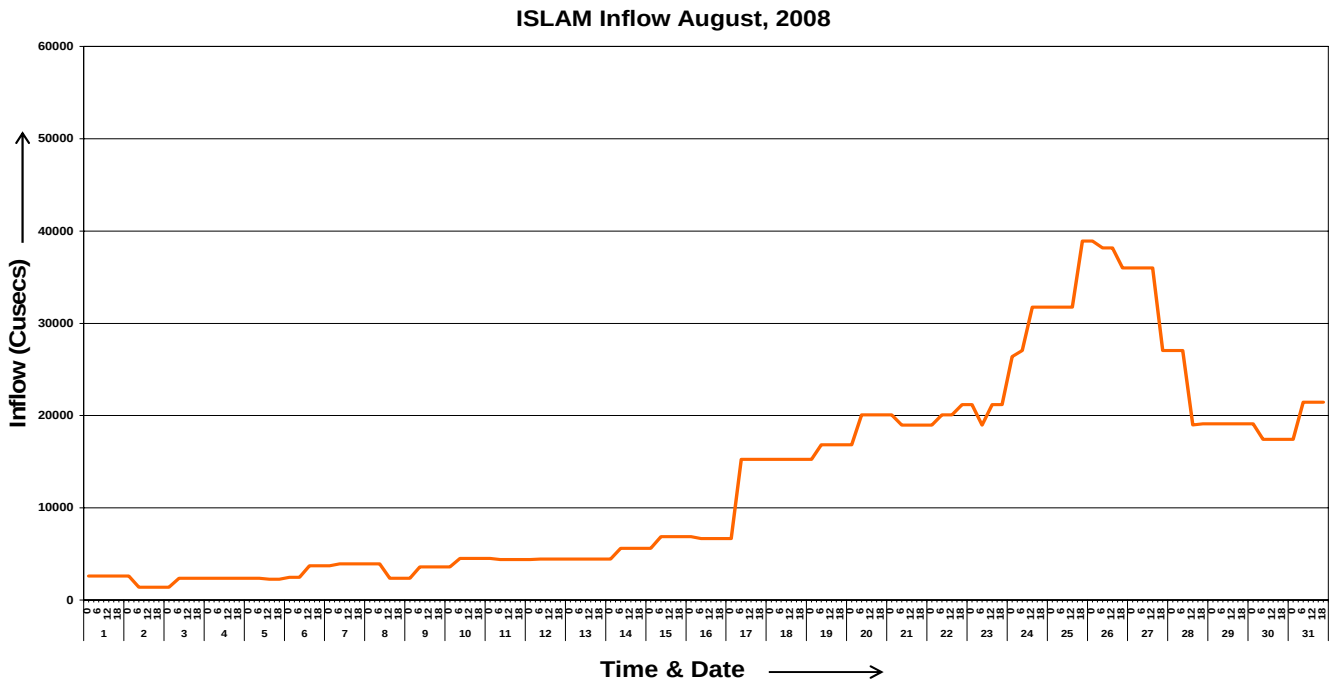

Fig -36: Hydrograph of Islam inflow of August, 2008

4.1.8 RAINFALL PATTERN FOR THE MONTH OF AUGUST 2008

One rainfall maxima exceeding 400 mm in the month of August 2008 were located one around Lahore. One lesser maxima exceeding 300 mm were located around Islamabad Two maxima exceeding 100mm were observed one around Hyderabad, second around khanpur. North Western Balochistan was remained almost dry during the month as shown in fig-37.

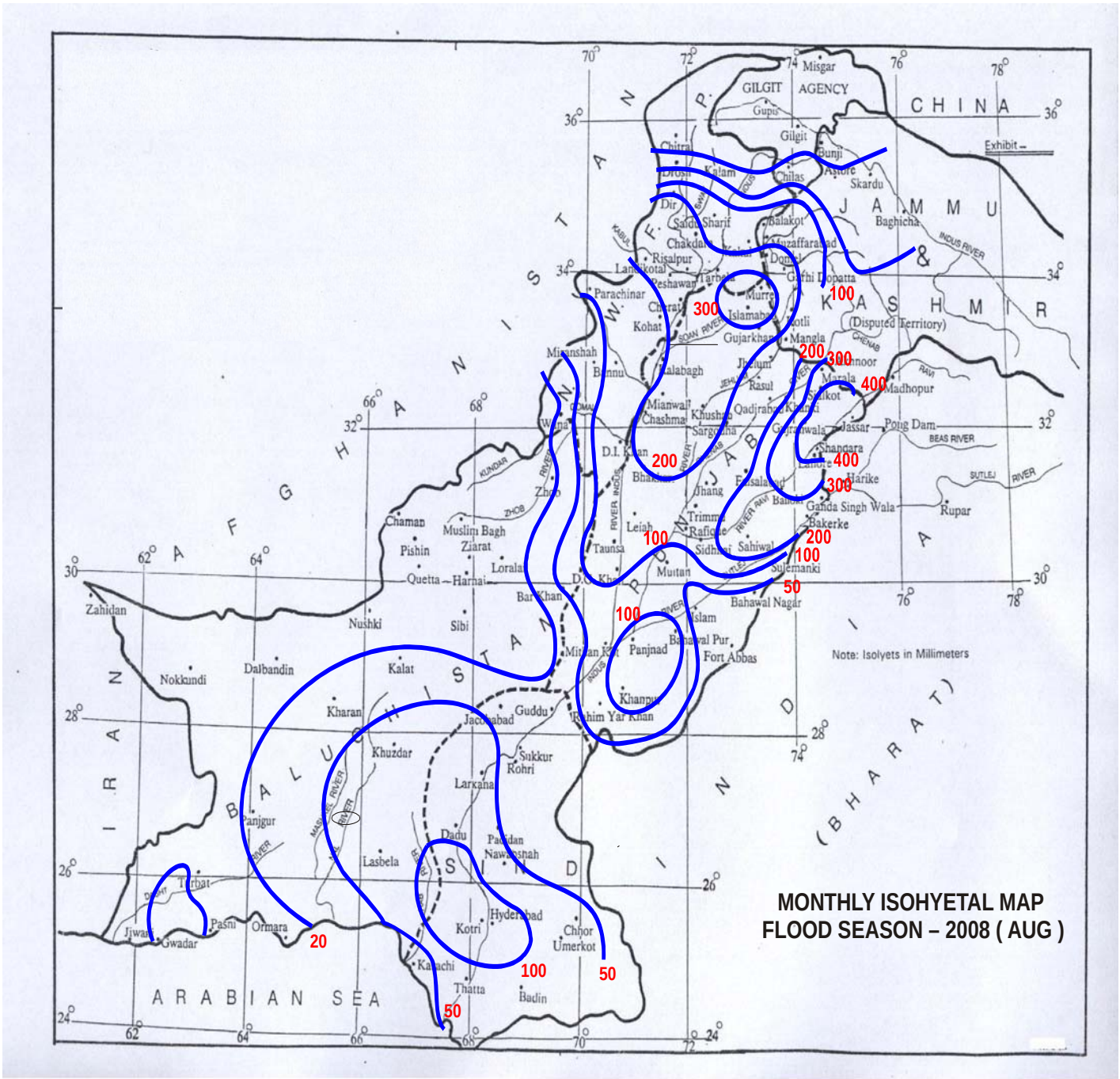

Fig -37: Isohyetal map August 2008

RADAR IMAGE AUGUST 2008

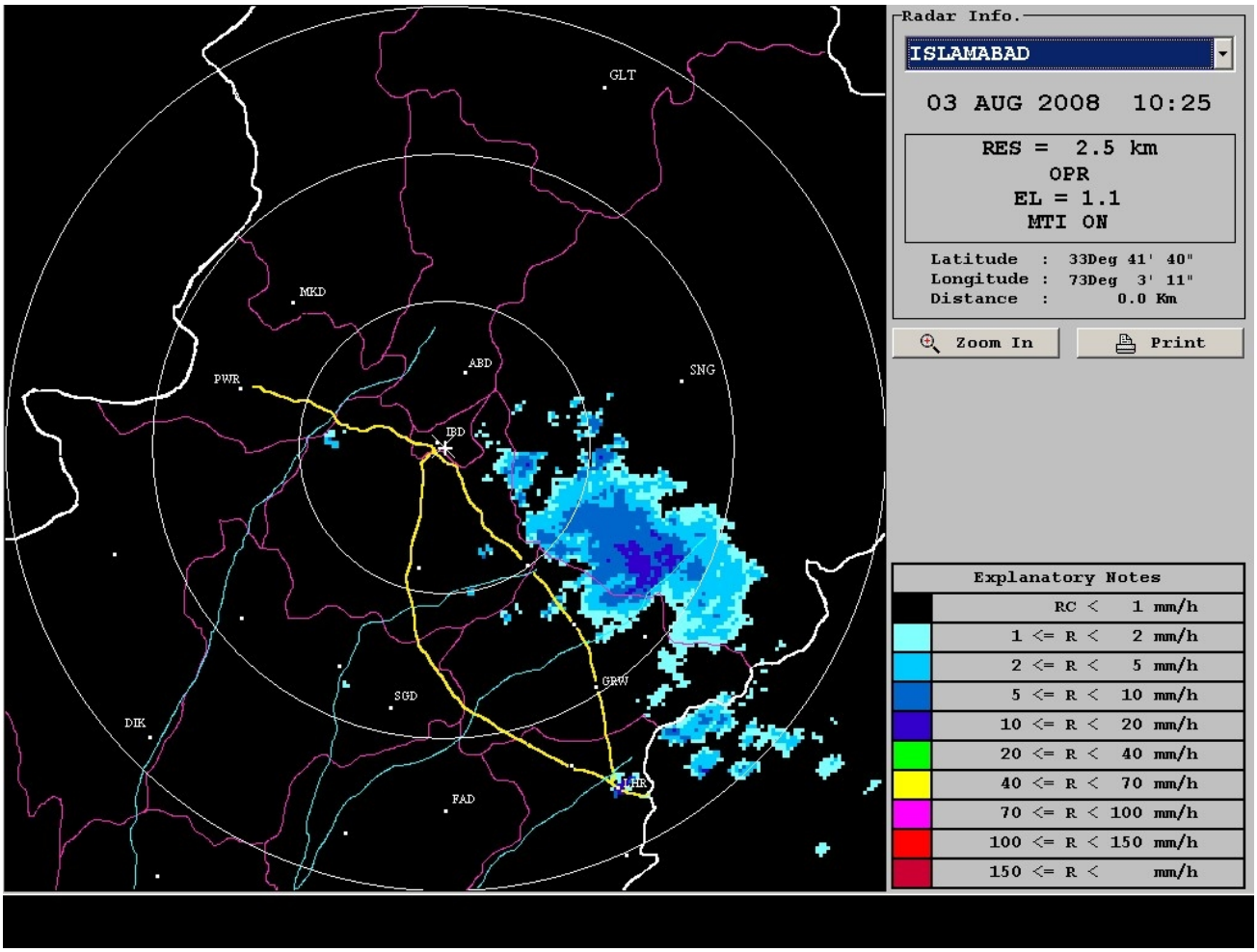

Fig -38: Radar image August, 2008

5. SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF SEPTEMBER 2008.

5.1 METEOROLOGICAL EVENTS

During this month monsoon lows/Depressions originated from the Bay of Bengal, one on 11-09-2008 and second on 16-09-2008.First low which was developed near Andhra coast, took a northwesterly course till it reached over Rajistan on 14-09-2008 and dissipated there. Second monsoon low which developed around Orissa coast took almost westerly track and reached Western Orissa on 18-09-2008 and then moving in a northwesterly course and dissipated over Uttar Pradesh 20-09-2008. However the second of these Weather systems was quite strong and more than 60 people were reported dead. The rainfall activity during the month was mostly confined to Kashmir & upper catchments of river Indus & northeastern parts of Punjab. Two rainfall spells were recorded during the month of September 2008.

5.1.1 FIRST RAINFALL SPELL OF SEPTEMBER 2008 FROM 05-09-2008 TO 07-09-2008

The seasonal low over Balochistan got accentuated due to moving of westerly wave which increased the incursion of monsoon current from Arabian Sea. Light to moderate rain with one or two heavy falls were observed over Kashmir, Moderate rain was also reported from Punjab & NWFP. Significant Spell-wise accumulated rainfall is shown below: -

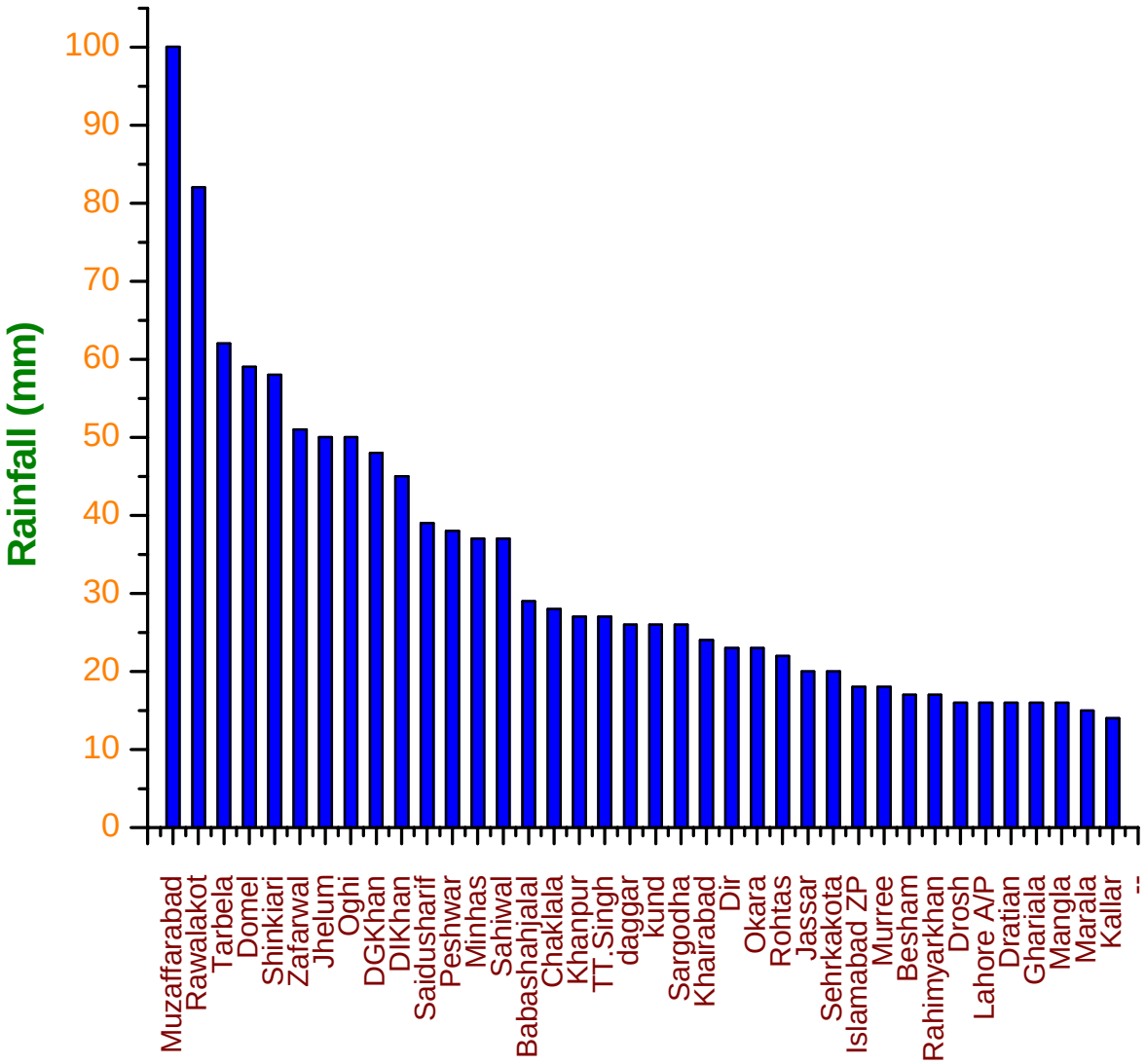

Fig -39: Wet spell of September from 05-09-2008 to 09-09-2008

5.1.2 RIVER POSITION DURING THE SPELL

No significant change in the river was observed during the spell.

5.1.3 SECOND WET RAINFALL SPELL OF SEPTEMBER 2008

FROM 17-09-2008 TO 19-09-2008

The spell, which lasted for three days, was resulted due to passage of westerly wave in northern parts of the country. Result of this light rain was reported from NWFP, Kashmir north Punjab.
Significant Spell-wise accumulated rainfall is given below: -

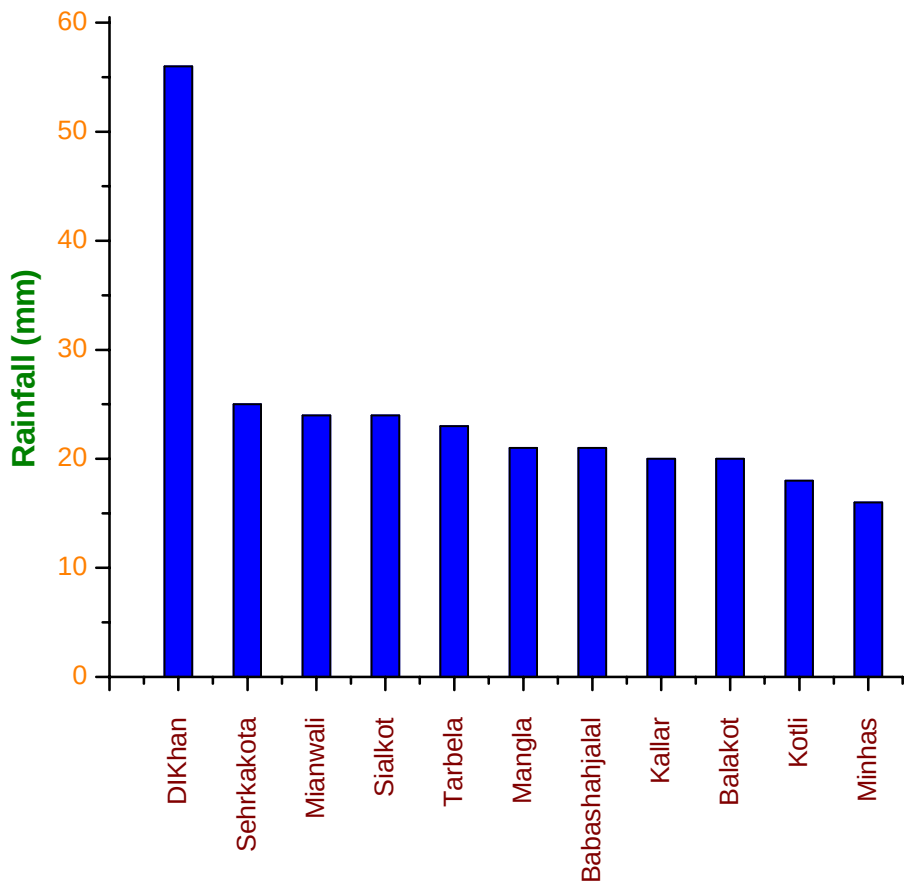

Fig -40: Wet spell of September from 17-09-2008 to 19-09-2008

5.1.4 RIVER POSITION DURING THE SPELL

No significant change in the river was observed during the spell.

5.1.5 RIVER POSITION DURING SEPTEMBER, 2008.

All the major rivers and nullahs maintained their normal flow conditions at all the sites except one Low flood peak in river Ravi at Sidhnai.

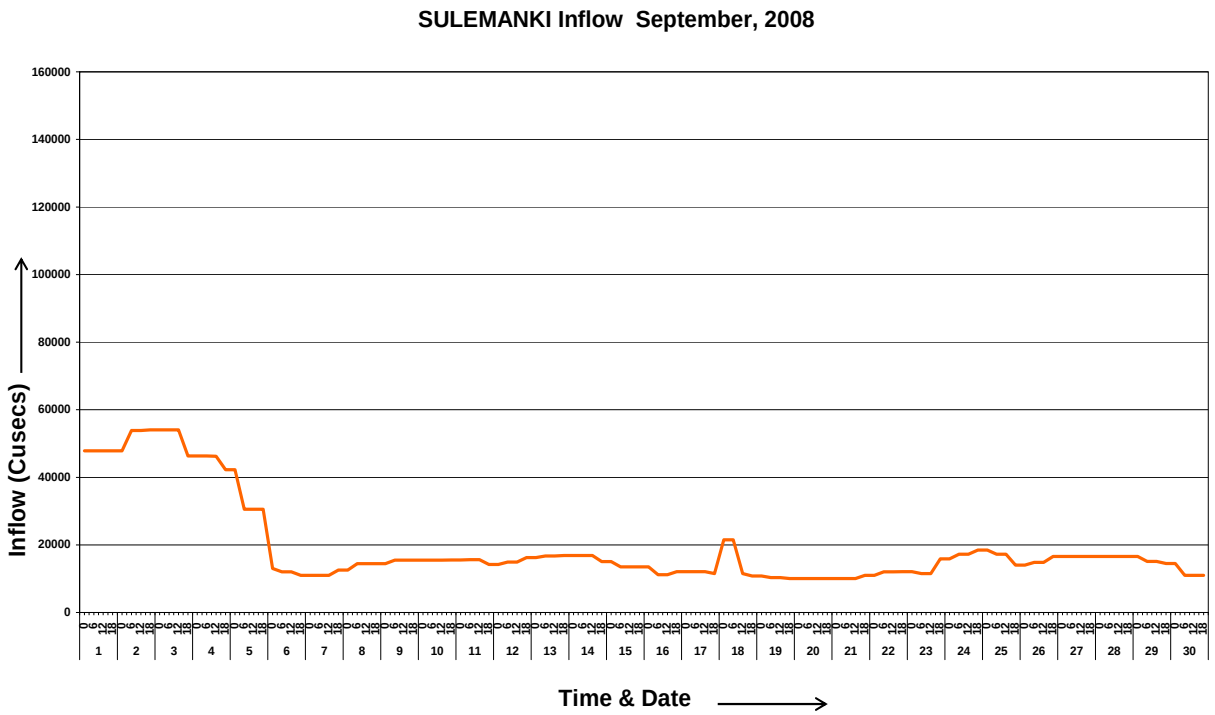

Fig -41: Hydrograph of Sulemanki Inflow September, 2008

5.1.6 RAINFALL PATTERN FOR THE MONTH OF SEPTEMBER 2008**.**

The four rainfall maxima were observed during the month of September 2008, exceeding 100 mm, one occurred over Kashmir, second over Sialkot, third over Barkhan & fourth around southeastern Sindh as shown in fig- 42.

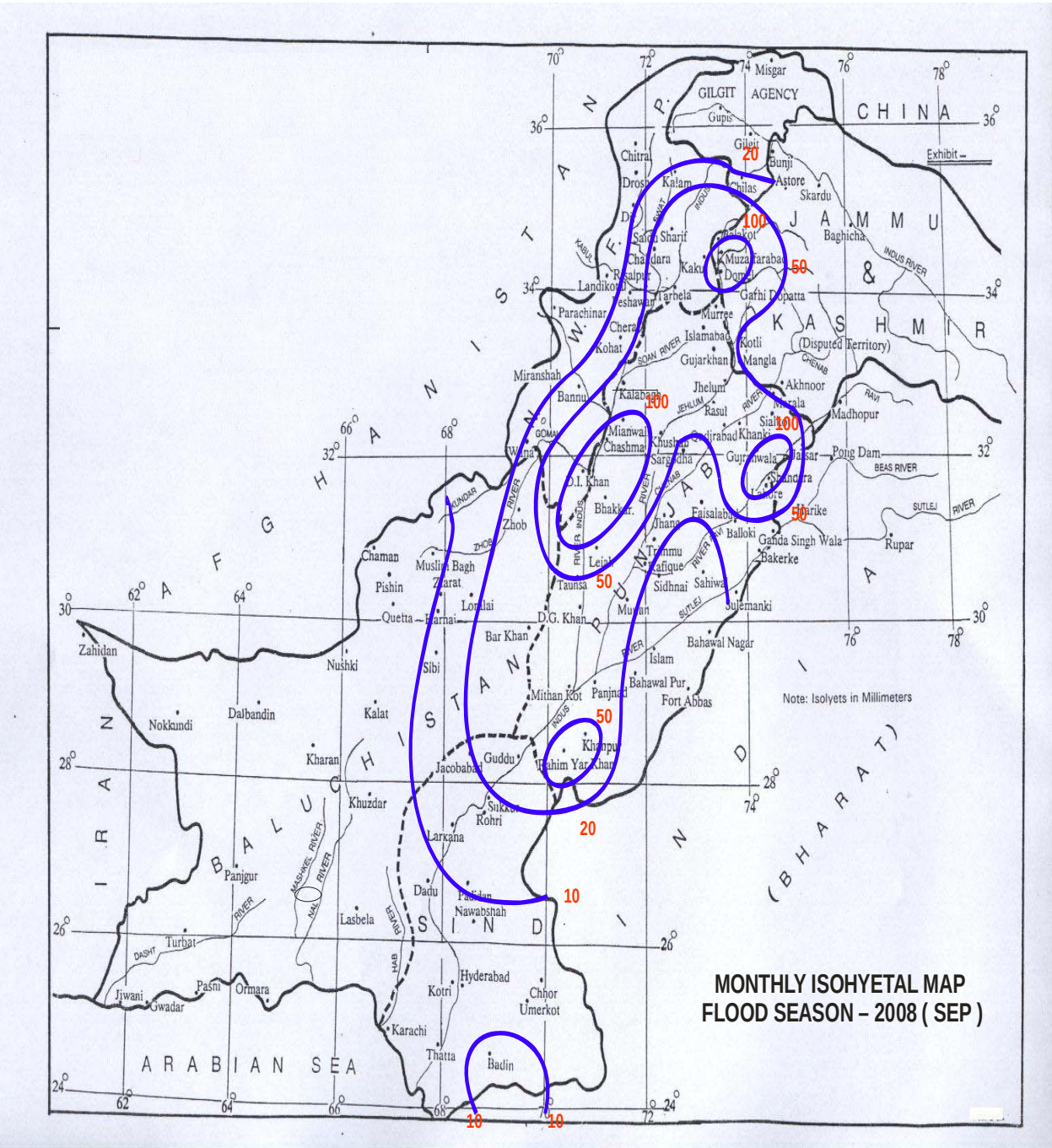

Fig - 42: Isohyetal map September, 2008

RADAR IMAGE OF SEPTEMBER 2008

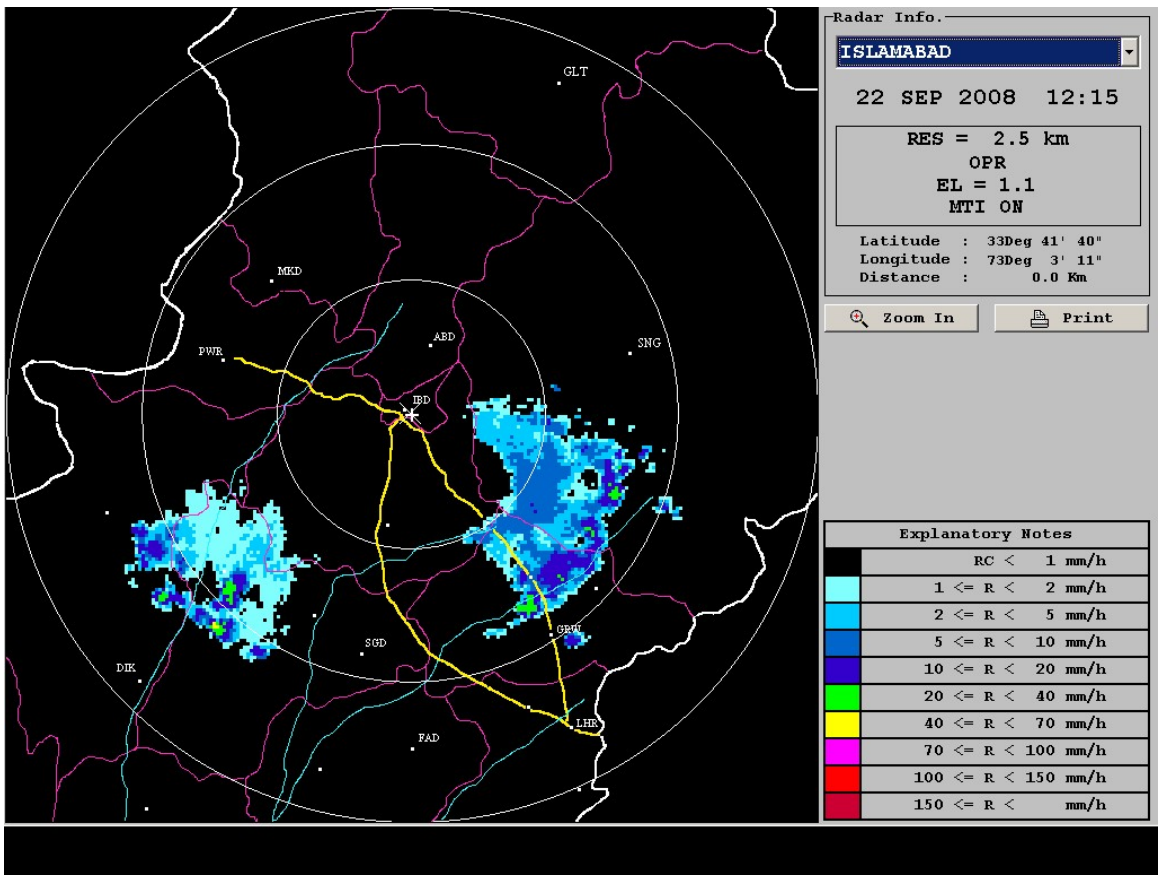

Fig - 43: Radar image September, 2008

6. SEASONAL ISOHYETAL MAP FROM JULY TO SEPTEMBER 2008

The main belt of maximum precipitation can be seen along the submontain area of Punjab, parts of Kashmir. One rainfall maximum exceeding 700 mm, which took place during the monsoon season, is located in north Punjab around Minhas. Two lesser rainfall maximum exceeding 600 mm one is located over Northeast Punjab around Sialkot & second is located in Kashmir as shown below.

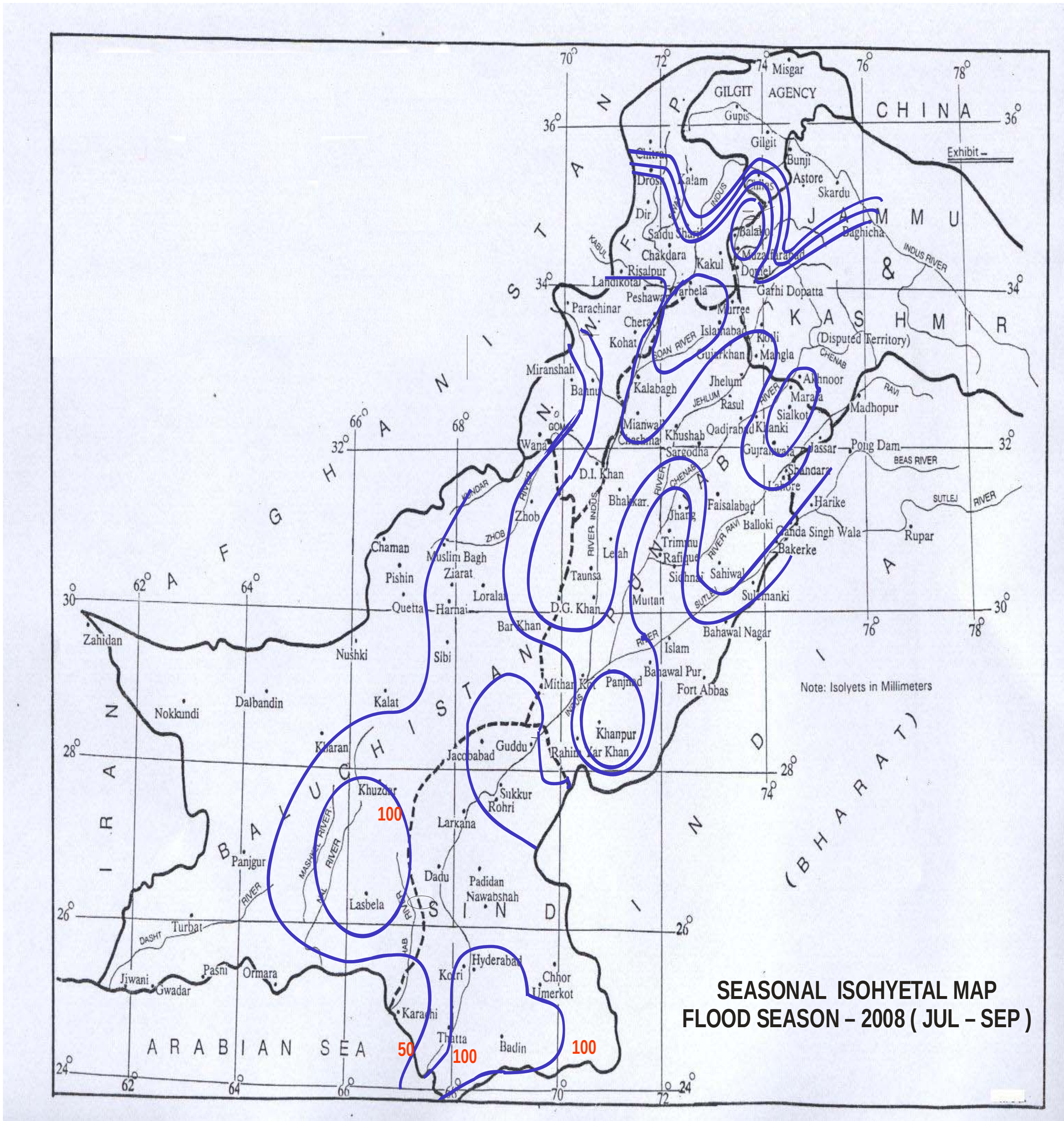

Fig- 44: Seasonal (July-Sep) 2008 Isohyetal map

7. SEASONAL ISOPERCENTAL OF NORMAL PRECIPITATION FROM JULY TO SEPTEMBER 2008.

The seasonal precipitation isopercental map indicates that the most parts of the country received below normal rainfall. However extreme Southern Punjab, Northeast Punjab, Northeast Balochistan and NWFP received above normal rainfall as shown below.

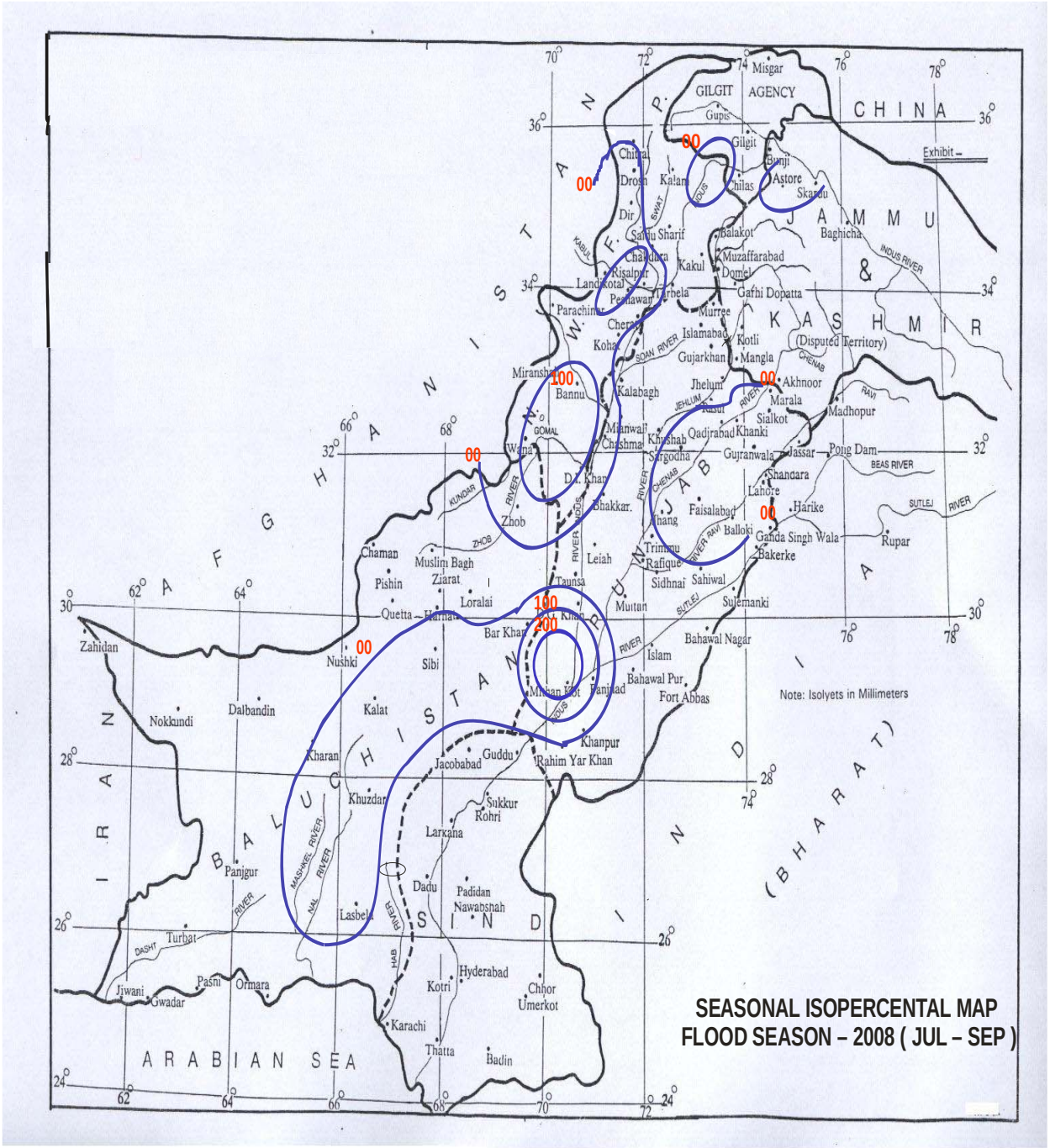

Fig -45: Seasonal Isopercental map (July – Sep) 2008

FLOOD LIMITS

RIVER	SITE	DESIGN CAPACITY	LOW	MED	HIGH	VERY HIGH	EXCEPTIONALLY HIGH
KABUL	NOWSHERA		.45	.47	1.0	2.0	4.0
INDUS	WARSAK	15.0	.30	.45	1.0	2.0	4.0
	TARBELA	15.0	2.5	3.75	5.0	6.5	8.0
	ATTOCK	-	2.5	3.75	5.0	6.5	8.0
	KALABAGH	9.5	2.5	3.75	5.0	6.5	8.0
	CHASHMA	9.5	2.5	3.75	5.0	6.5	8.0
	TAUNSA	10.0	2.5	3.75	5.0	6.5	8.0
	GUDDU	12.0	2.0	3.5	5.0	7.0	9.0
	SUKKUR	9.0	2.0	3.5	5.0	7.0	9.0
	KOTRI	8.5	2.0	3.0	4.5	6.5	8.0
JHELUM	KOHALA	-	1.0	1.5	2.0	3.0	4.0
	MANGLA	10.6	0.75	1.1	1.5	2.25	3.0
	RASUL	8.5	0.75	1.1	1.5	2.25	3.0
CHENAB	MARALA	11.0	1.0	1.5	2.0	4.0	6.0
	KHANKI	8.0	1.0	1.5	2.0	4.0	6.0
	QADIRABAD	8.07	1.0	1.5	2.0	4.0	6.0
	TRIMMU	6.45	1.5	2.0	3.0	4.5	6.0
	PANJNAD	7.0	1.5	2.0	3.0	4.5	6.0
RAVI	JASSAR	2.75	0.5	0.75	1.0	1.5	2.0
	RAVI SYPHON	4.5	0.4	0.65	0.9	1.35	1.8
	SHAHDARA	2.5	0.4	0.65	0.9	1.35	1.8
	BALLOKI	2.25	0.4	0.65	0.9	1.35	1.8
	SIDHNAI	1.5	0.3	0.46	0.6	0.9	1.3
SUTLEJ	SULEMANKI	3.25	0.5	0.8	1.2	1.75	2.25
	ISLAM	3.0	0.5	0.8	1.2	1.75	2.25

DETAILS OF LOSSES/DAMAGES DUE TO RAINFALL/FLOOD-2008
Provided by Relief & Crises Management Department Punjab

Sr.	District	Village affected	Persons affected	Area Affected (Acres)	Cropped Area Affected (Acres)	House Damages Partially	House Damages Fully	Persons Died	Persons Injured
1	**Muzaffargarh**	20	-	200	-	4	4	6	7
2	**Sahiwal**	-	-	-	-	-	-	9	1
3	**Chakwal**	-	-	-	-	-	-	1	1
4	**Rawalpindi**	-	-	-	-	-	-	6	-
5	**Gujrat**	-	-	-	-	-	-	1	-
6	**Sargodha**	-	-	-	-	-	-	1	3
7	**Khushab**	-	-	-	-	-	-	1	-
8	**Sialkot**	-	-	-	-	-	-	7	-
9	**TT Singh**	22	-	2287	21	41	-	2	-
10	**Rajanpur**	176	86,000	523,600	199,894	2074	9549	9	-
11	**DG Khan**	41	4,992	19783	19783	273	960	1	3
12	**Hafizabad**	-	-	-	-	-	-		-
13	**Mianwali**	19	-	2080	2080	155	23	1	-
14	**Kasur**	91	12,742	26656	26656	-	-	-	-
15	**Okara**	94	-	35194	35194	-	-	-	-
16	**Bahawalnagar**	88	6,574	59062	19807	34	64	-	-
17	**Vehari**	4	-	985	855	-	-	1	-
18	**Pakpattan**	15	-	270	1887	-	-	-	-
19	**Bahawalpur**	-	-	-	-	-	-	5	-
Total		570	110308	670117	306177	2581	10600	51	15

8. FLOOD FORECAST EVALUATION REPORT

The Flood Forecasting evaluation for 2008 for each category of flood is given here as under:-

Sr. No.	RIVER	SITE	ACTUAL UPSTREAM PEAK DISCHARGE			FORECASTED DISCHARGE IN THOUSAND OF CUSECS	PERCENTAGE ACCURACY OF FORECAST
			DATE	DISCHARGE IN CUSECS	FLOOD LIMIT		
1	Ravi	Balloki	18-06-2008	49235	L	43-48	97%
2	Jhelum	Mangla	15-06-2008	96000	L	60-100	100%
3	Jhelum	Mangla	16-06-2008	80380	L	60-100	100%
4	Jhelum	Mangla	16-06-2008	83000	L	60-100	100%
5	Indus	Tarbela	15-06-2008	322000	L	285-310	96%
6	Indus	Tarbela	16-06-2008	315000	L	270-300	95%
7	Indus	Tarbela	19-06-2008	283000	L	240-275	96%
8	Indus	Kalabagh	16-06-2008	252372	L	200-230	91%
9	Indus	Kalabagh	17-06-2008	257538	L	230-270	100%
10	Indus	Kalabagh	25-06-2008	251592	L	210-240	96%
11	Indus	Kalabagh	27-06-2008	251602	L	250F170	99%
12	Indus	Chashma	29-06-2008	251679	L	230-260	100%
13	Ravi	Balloki	23-07-2008	49495	L	40-50	100%
14	Chenab	Marala	06-07-2008	155837	M	70-100	64%
15	Chenab	Marala	31-07-2008	208450	H	200-230	100%
16	Chenab	Khanki	06-07-2008	114220	L	35-70	61%
17	Chenab	Khanki	31-07-2008	202535	H	200-230	100%
18	Chenab	Qadirabad	07-07-2008	121033	L	80-120	99%
19	Jhelum	Mangla	31-07-2008	100110	L	30-60	60%
20	Indus	Tarbela	08-07-2008	264000	L	250-270	100%
21	Indus	Kalabagh	02-07-2008	257057	L	245-255	96%
22	Indus	Kalabagh	06-07-2008	257597	L	230R270	100%
23	Indus	Kalabagh	07-07-2008	252441	L	230-255	100%
24	Indus	Kalabagh	08-07-2008	293350	L	240R290	99%
25	Indus	Kalabagh	16-07-2008	251204	L	210-245	98%
26	Indus	Kalabagh	21-07-2008	325577	L	240-290	88%
27	Indus	Chashma	09-07-2008	287868	L	255R270F240	94%
28	Indus	Chashma	13-07-2008	254997	L	220-245	96%
29	Indus	Chashma	21-07-2008	293572	L	240-280	96%
30	Indus	Taunsa	24-07-2008	283428	L	276R290F270	100%
31	Indus	Guddu	27-07-2008	224374	L	225-240	100%
32	Sutlej	Sulemanki	19-08-2008	102739	M	100-110	100%
33	Ravi	Balloki	03-08-2008	54530	L	50-60	100%
34	Ravi	Balloki	11-08-2008	59300	L	55-65	100%
35	Ravi	Balloki	18-08-2008	90740	H	68-75	82%
36	Ravi	Balloki	26-08-2008	57795	L	57-64	100%
37	Ravi	Sidhnai	12-08-2008	31500	L	31-35	100%
38	Ravi	Sidhnai	24-08-2008	53025	M	53-60	100%
39	Ravi	Sidhnai	30-08-2008	42869	L	35-40	93%
40	Chenab	Marala	03-08-2008	144692	L	90R180	100%

41	Chenab	Marala	08-08-2008	174565	M	120R180	100%
42	Chenab	Marala	13-08-2008	116380	L	90-140	100%
43	Chenab	Marala	14-08-2008	109652	L	95R170	100%
44	Chenab	Marala	15-08-2008	110099	L	90-130	100%
45	Chenab	Khanki	04-08-2008	132220	L	130F80	98%
46	Chenab	Khanki	08-08-2008	164700	M	90-160	97%
47	Chenab	Qadirabad	01-08-2008	207437	H	200-230	100%
48	Chenab	Qadirabad	04-08-2008	125317	L	130F80	100%
49	Chenab	Qadirabad	09-08-2008	151917	M	140F70	92%
50	Indus	Tarbela	05-08-2008	308000	L	285-310	100%
51	Indus	Tarbela	09-08-2008	269000	L	240-270	100%
52	Indus	Kalabagh	05-08-2008	343580	L	360F250	100%
53	Indus	Chashma	05-08-2008	319300	L	310R380	100%
54	Indus	Chashma	13-08-2008	296162	L	280R340	100%
55	Indus	Taunsa	09-08-2008	279320	L	240-280	100%
56	Indus	Taunsa	13-08-2008	254549	L	255-265	100%
57	Indus	Guddu	03-08-2008	220195	L	220-250	100%
58	Indus	Guddu	06-08-2008	215451	L	210-225	100%
59	Indus	Guddu	13-08-2008	279476	L	278F250	100%
60	Indus	Sukkar	05-08-2008	208727	L	210-220	99%
61	Indus	Sukkar	14-08-2008	250040	L	250-255	100%
62	Sutlej	Sulemanki	02-09-2008	54064	L	50-55	100%

MEAN PERCENTAGE ACCURACY = 96%