



HYDROMETEOROLOGICAL REPORT 2007:

1. **HIGHLIGHTS**
- 1.1 A total number of six Monsoon lows originated from the Bay of Bengal, however only four out of six reached in the vicinity of Pakistan and recorded heavy rainfall in Sindh & Balochistan province.
- 1.2 The seasonal precipitation (July to September) Isopercental pattern, Indicates above normal rainfall over southwestern Sindh, Coastal areas of Blochistan, northern areas(Gilgit & Skardu) and northern Punjab. Slightly above normal rainfall is also indicated over lower NWFP.
- 1.3 During June 2007, unprecedented torrential rainfall occurred over the Balochistan which causes heavy to very heavy flooding in vast area.
- 1.4 In all six-rainfall spells occurred during this period.
- 1.5 FFD, Lahore continued to maintain the liaison with the dam operating authorities at Mangla and Tarbela, in order to link up the dam operations with the movement of weather system and flood forecasts.
- 1.6 The provision of the hydro-meteorological data by WAPDA along with 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 2007.
- 1.8 The City District Government, Solid waste management (SWM), Water and Sanitation Agency (WASA), Lahore Development Authority (LDA), Rescue 1122 along with 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 carry out their drainage & rescue programmes in accordance with the weather forecasts.
- 1.9 The concerned Federal and Provincial Authorities were also daily kept abreast with the prevailing weather/flood conditions.
- 1.10 The routine daily weather/flood forecasts were regularly issued from 15th June 2007 to 2nd October 2007. Moreover the significant flood advisory/warnings were also issued according the prevailing weather situations.



TRACKS OF MONSOON LOW/DEPRESSION

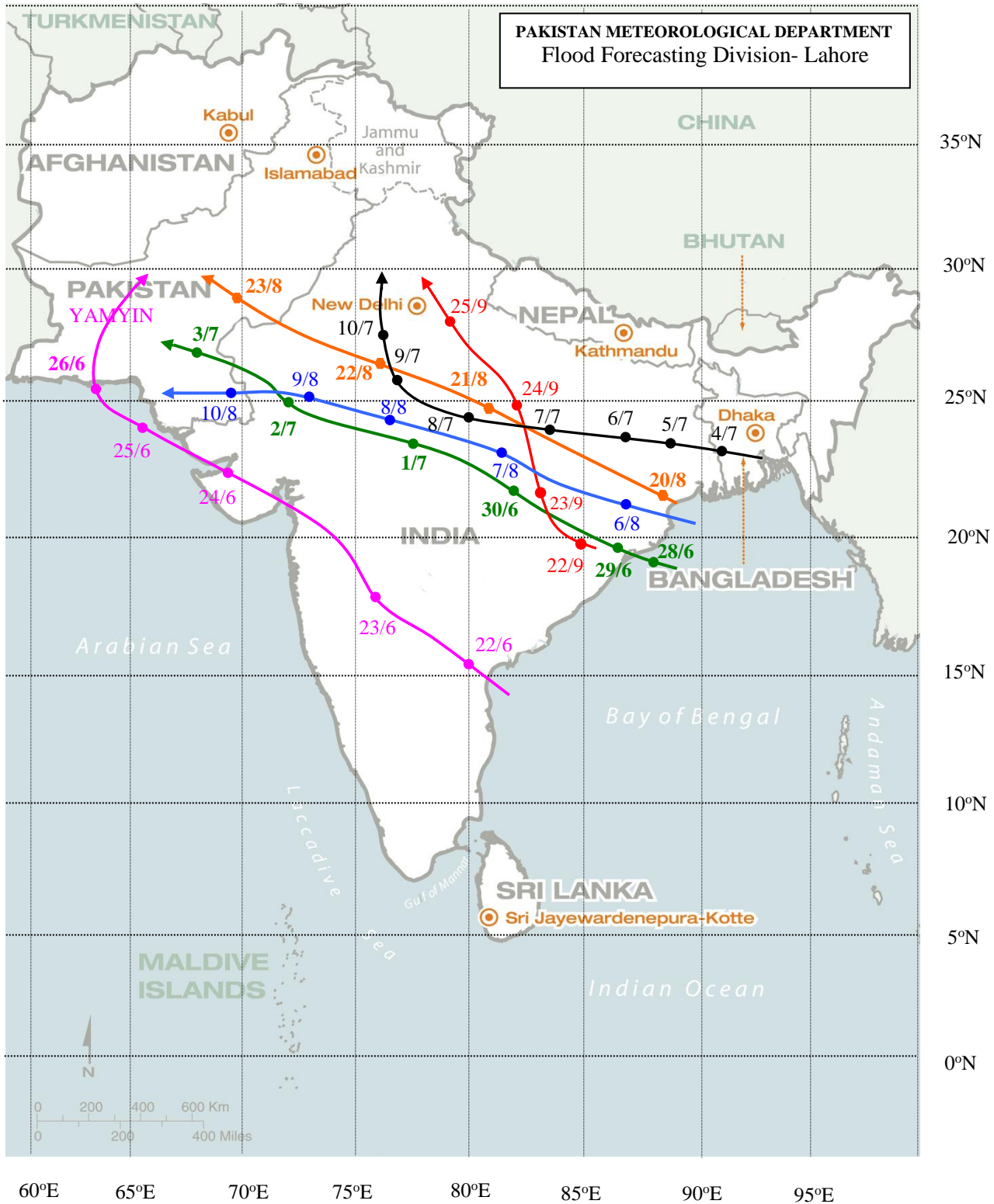


Figure 1: Tracks of Monsoon low/Depression during Flood season 2007



2. SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF JUNE, 2007

2.1 METEOROLOGICAL EVENTS

A monsoon low which was developed over Andhra Pradesh coast on 21st June 2007, moved in a west northwesterly direction and reached over northeastern Arabian Sea on 24th June 2007. Here it concentrated into Tropical cyclone and named YEMYIN and affect the vast areas of Balochistan vigorously from 26th June 2007.

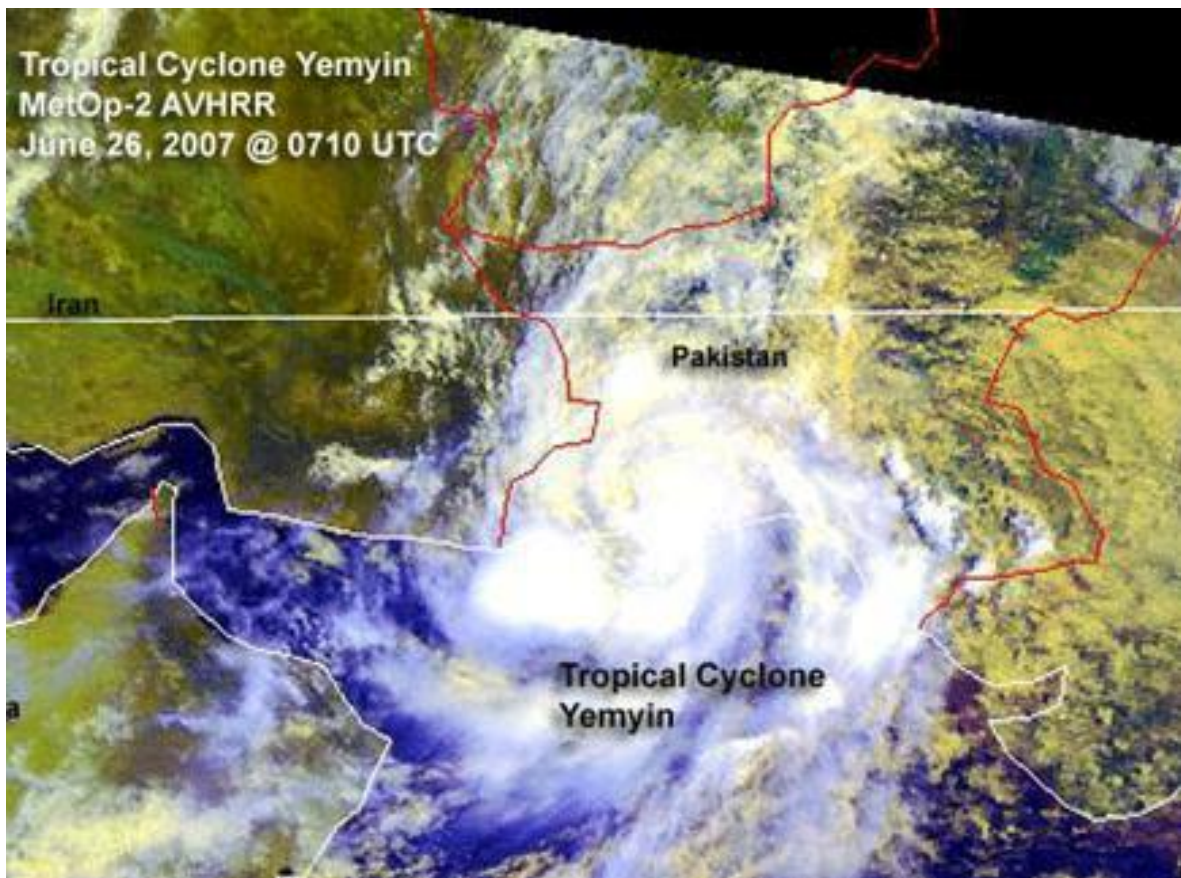


Figure 2: Satellite Image of Tropical cyclone (YEMYIN)



2.2 FIRST SPELL OF JUNE 2007 FROM 26-06-2007 TO 01-07-2007

Widespread rainfall of torrential intensity was recorded during this spell was reported from the Balochistan and Lower Sindh. Significant accumulated rainfall of the spell is given below:-

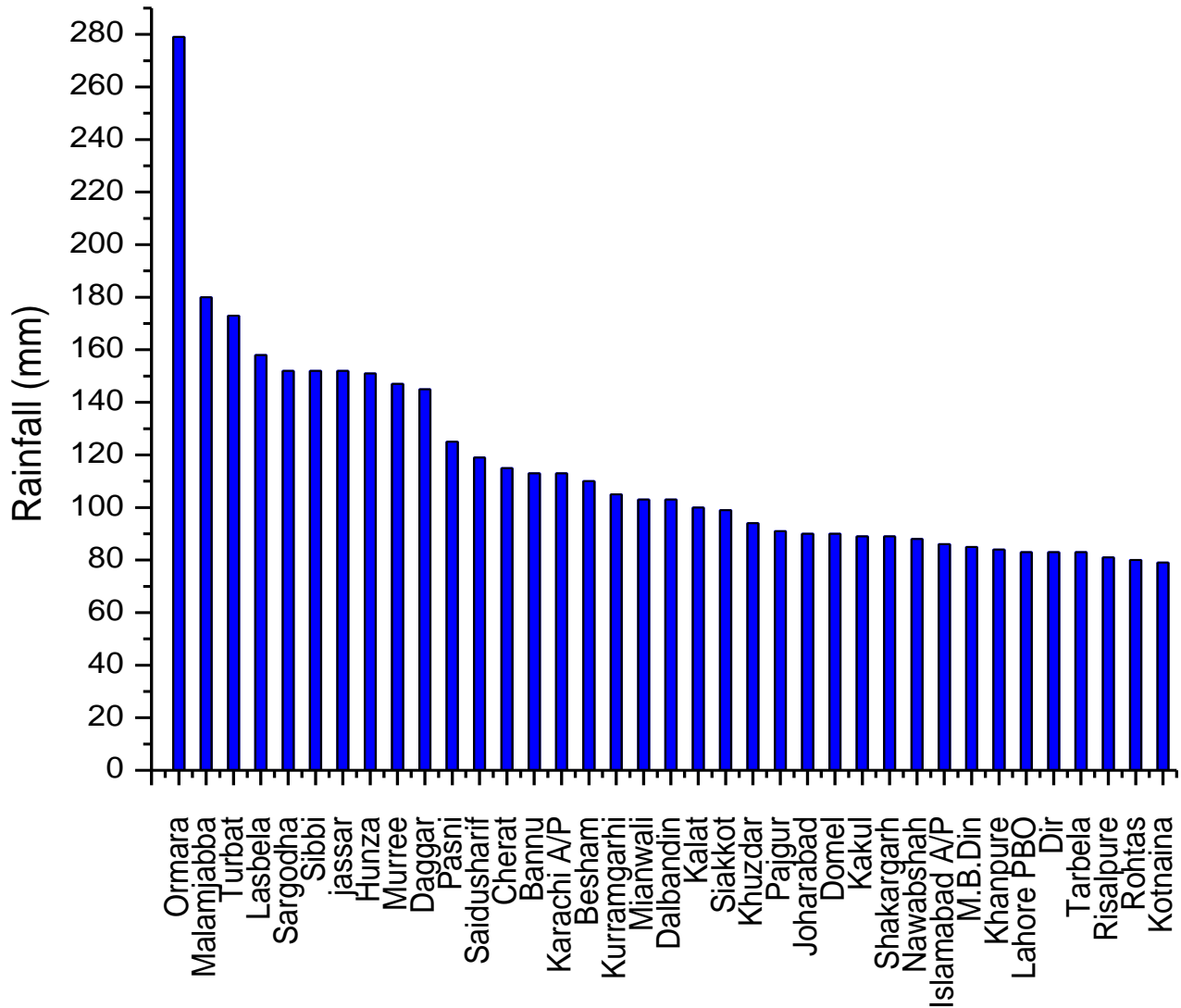


Figure 3: Wet spell of June from 26-06-2007 to 01-07-2007 (Part-I)

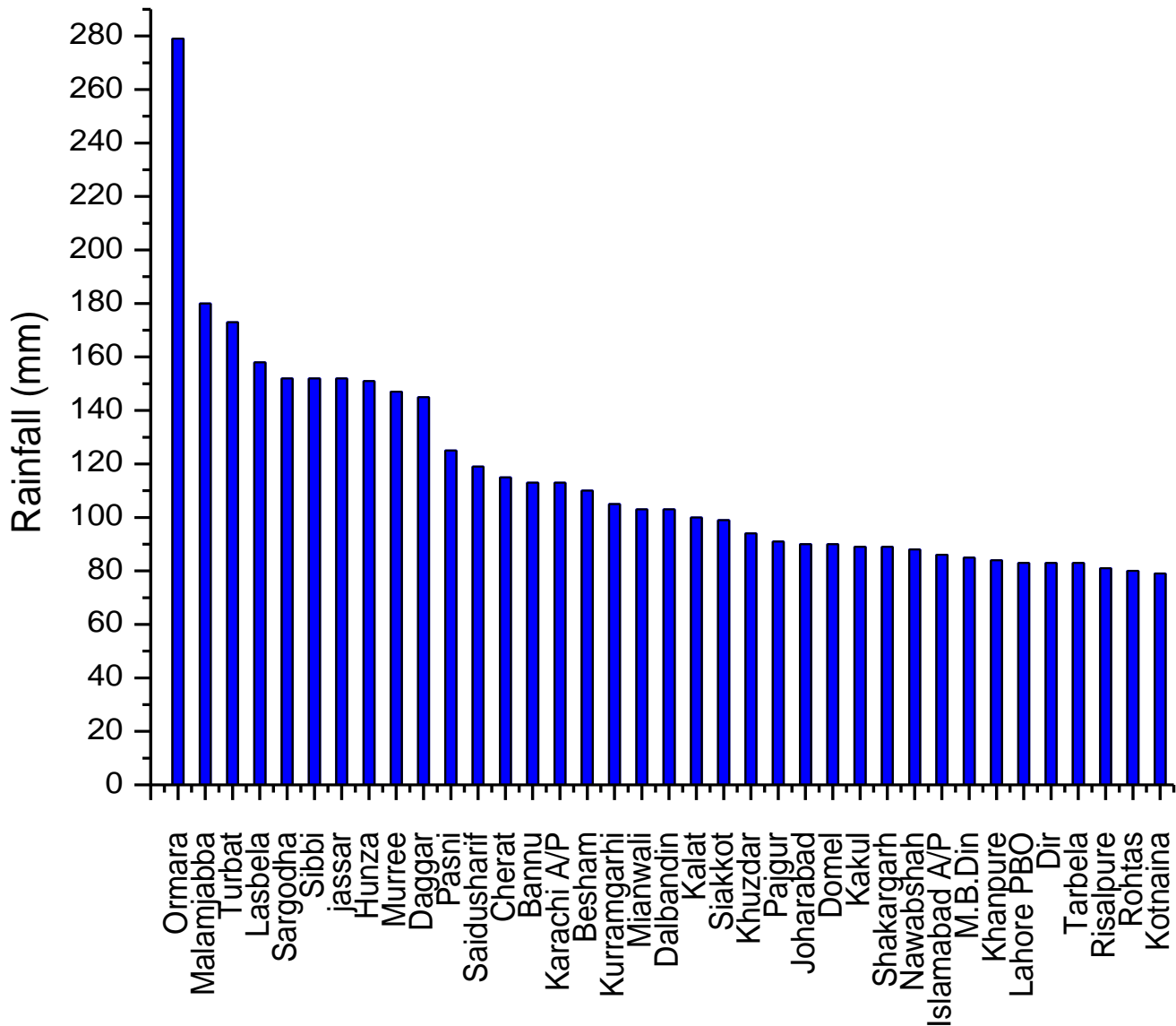


Figure 3: Wet spell of June 26-06-2007 to 01-07-2007 (Part-II)

2.3 RIVER POSITION

Generally all the major rivers, hill torrents and nullahs maintained their normal flows during the period. However areas of Balochistan observed rural and urban flooding which cause loss of life and property.

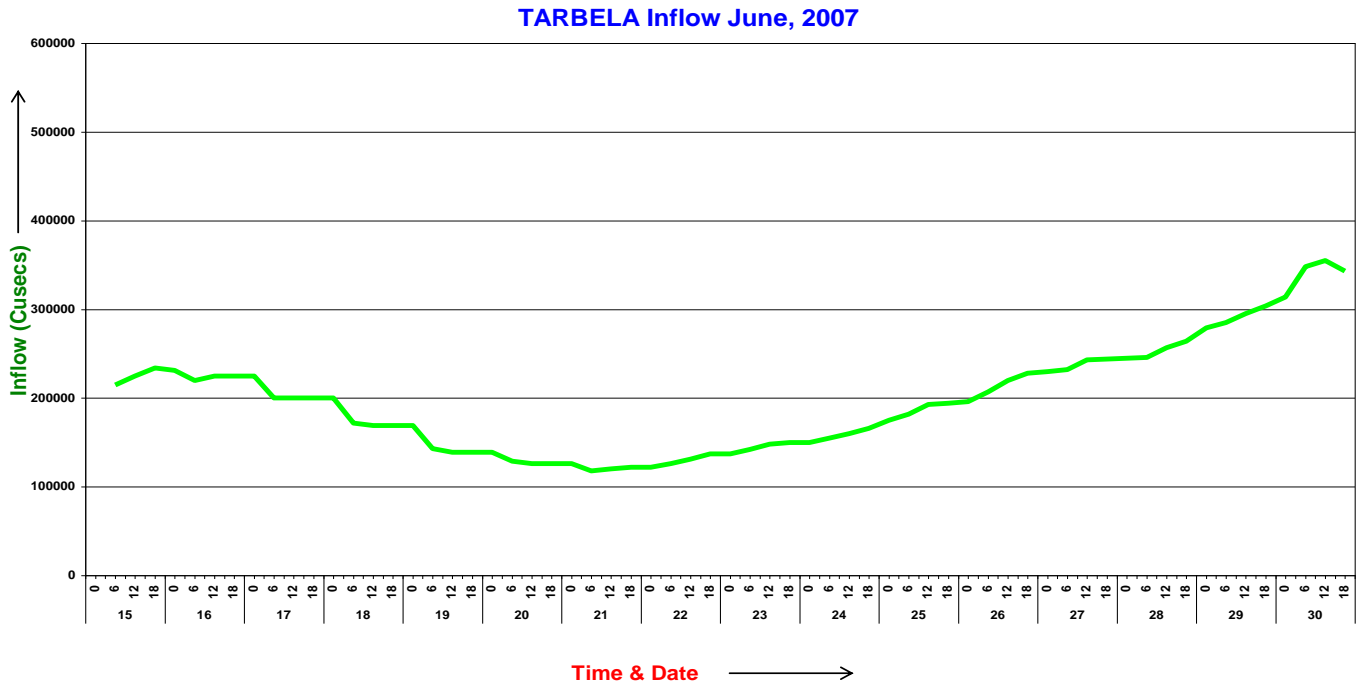


Figure 4: Hydrograph of Tarbela Inflow for the month of June, 2007

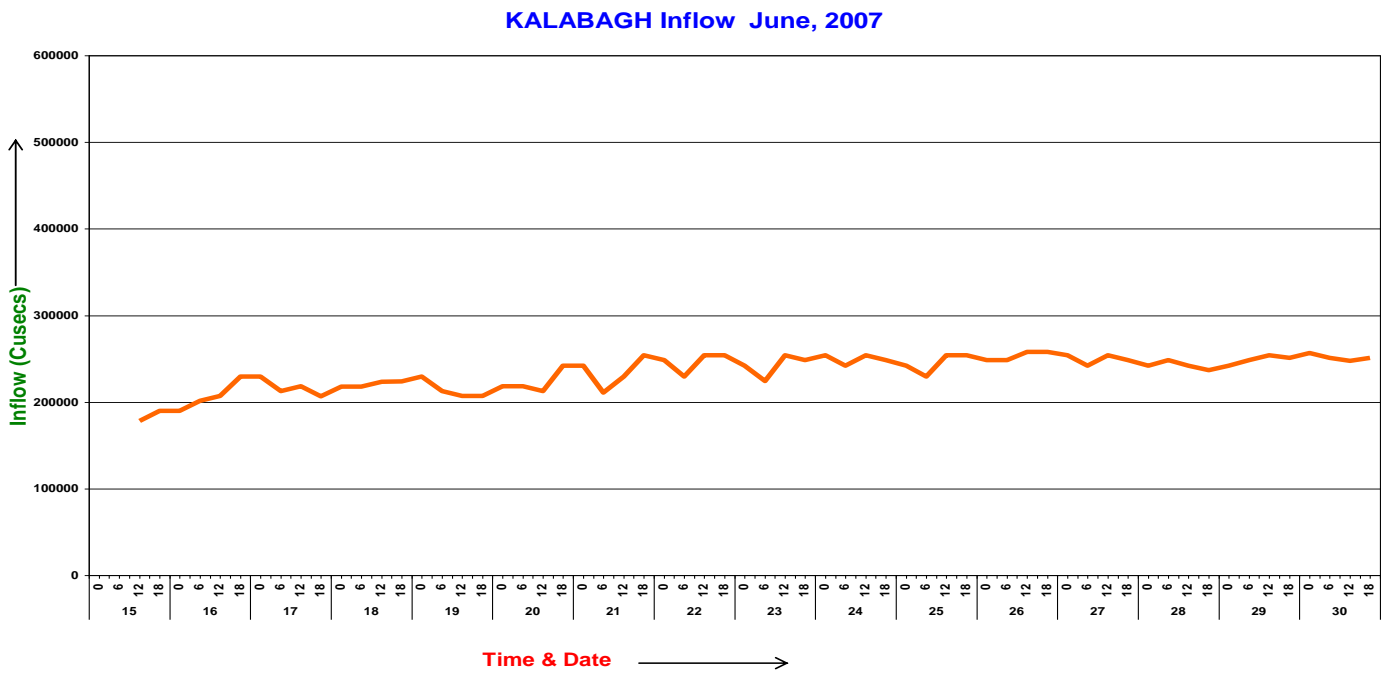


Figure 5: Hydrograph of Kalabagh Inflow for the month of June, 2007

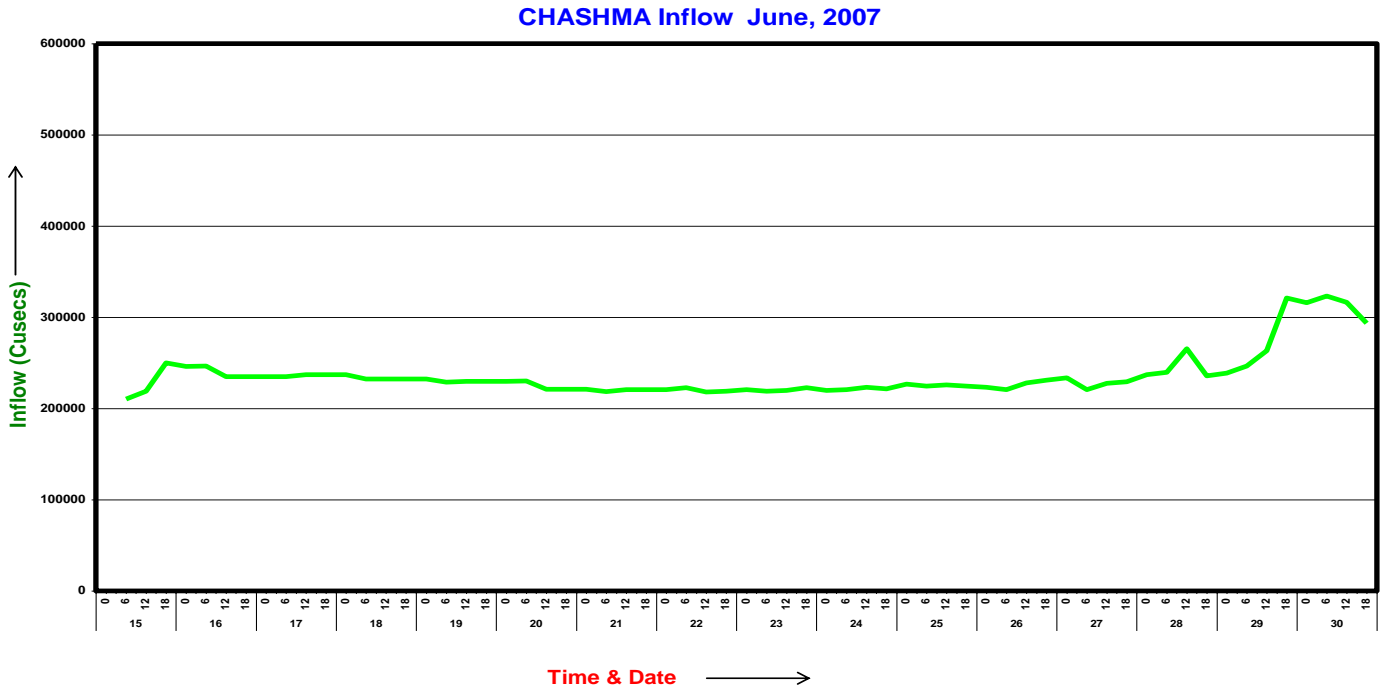


Figure 6: Hydrograph of Chashma Inflow for the month of June, 2007

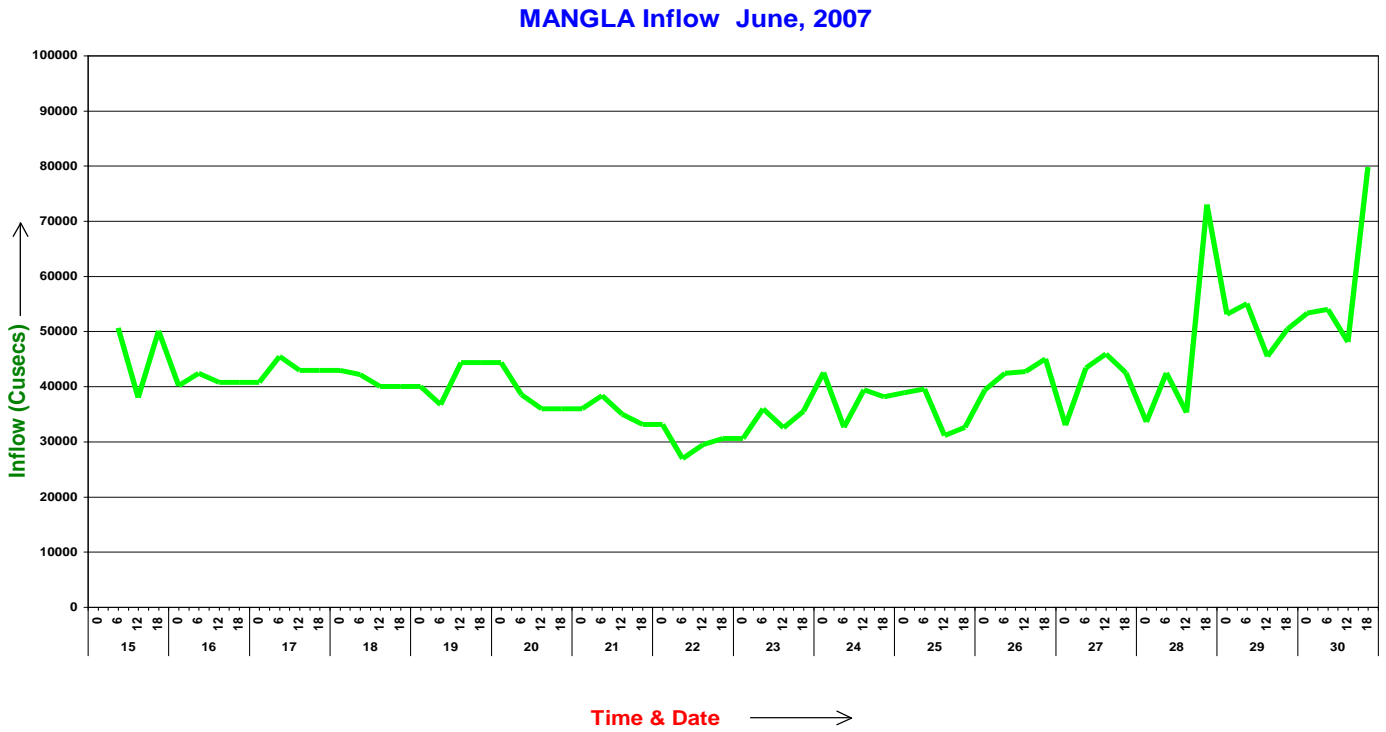


Figure 7: Hydrograph of Mangla Inflow for the month of June, 2007

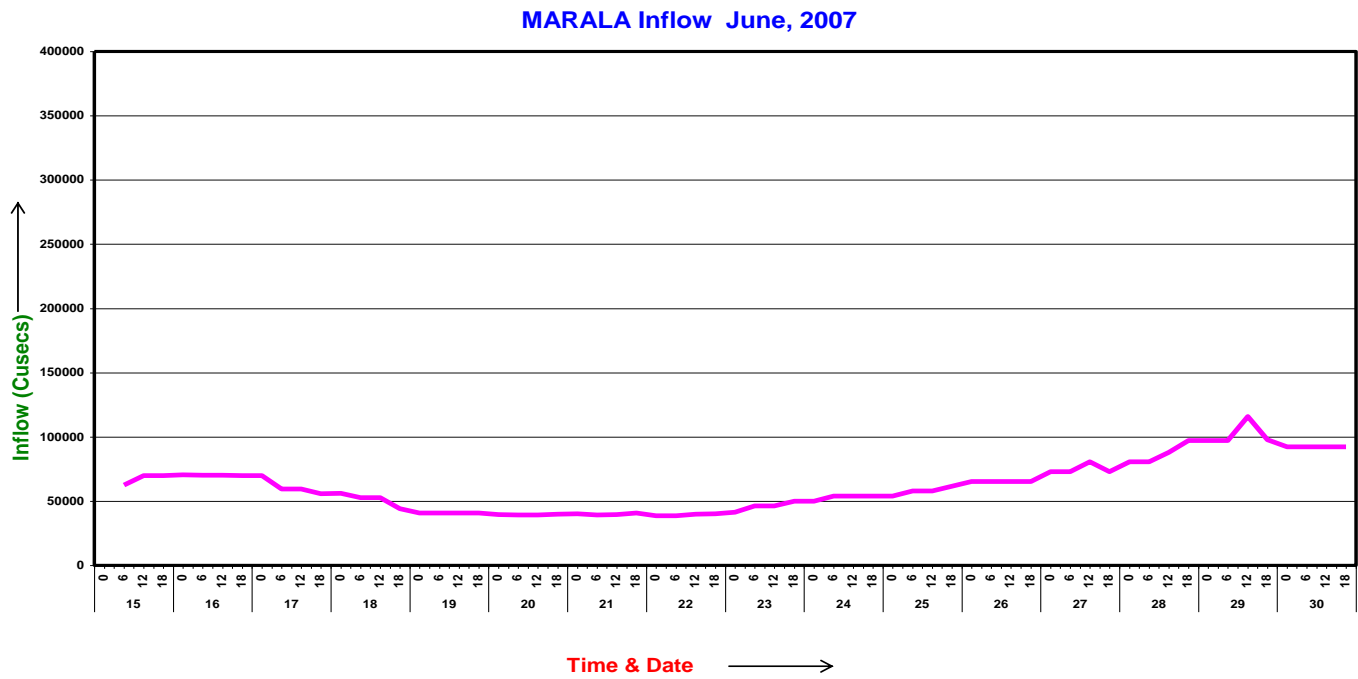


Figure 8: Hydrograph of Marala Inflow for the month of June, 2007

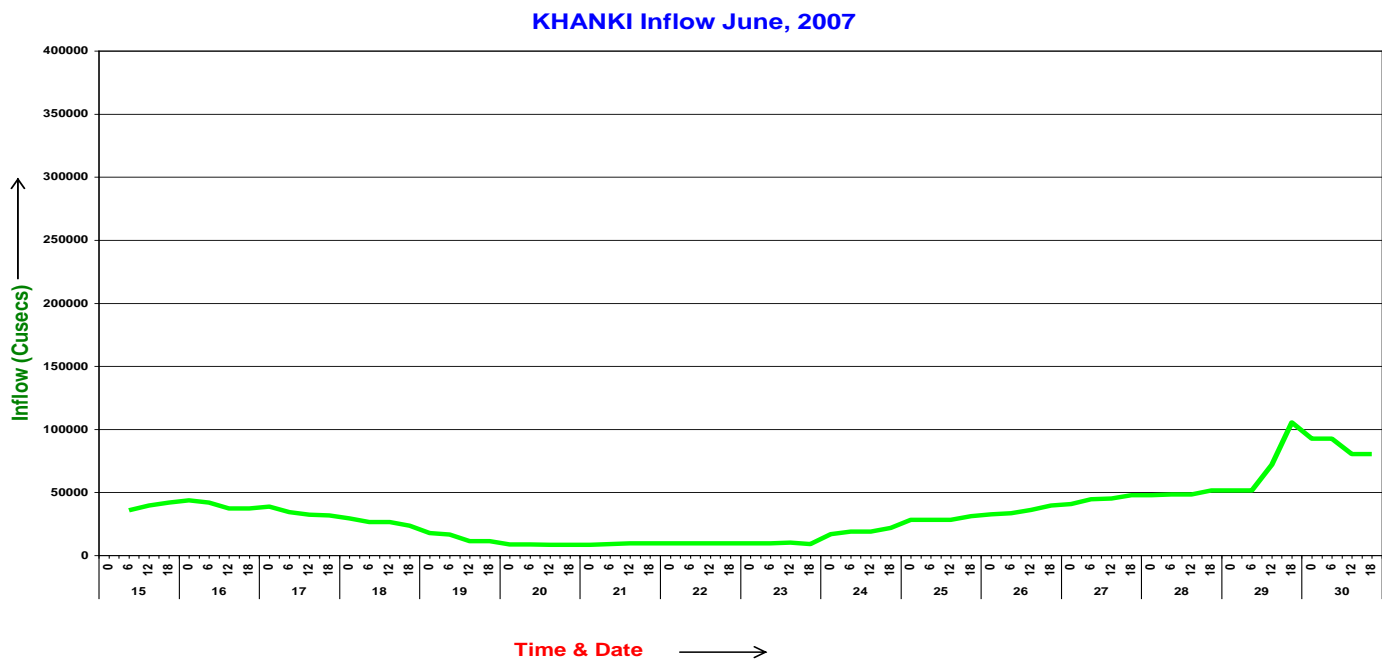


Figure 9: Hydrograph of Khanki Inflow for the month of June, 2007

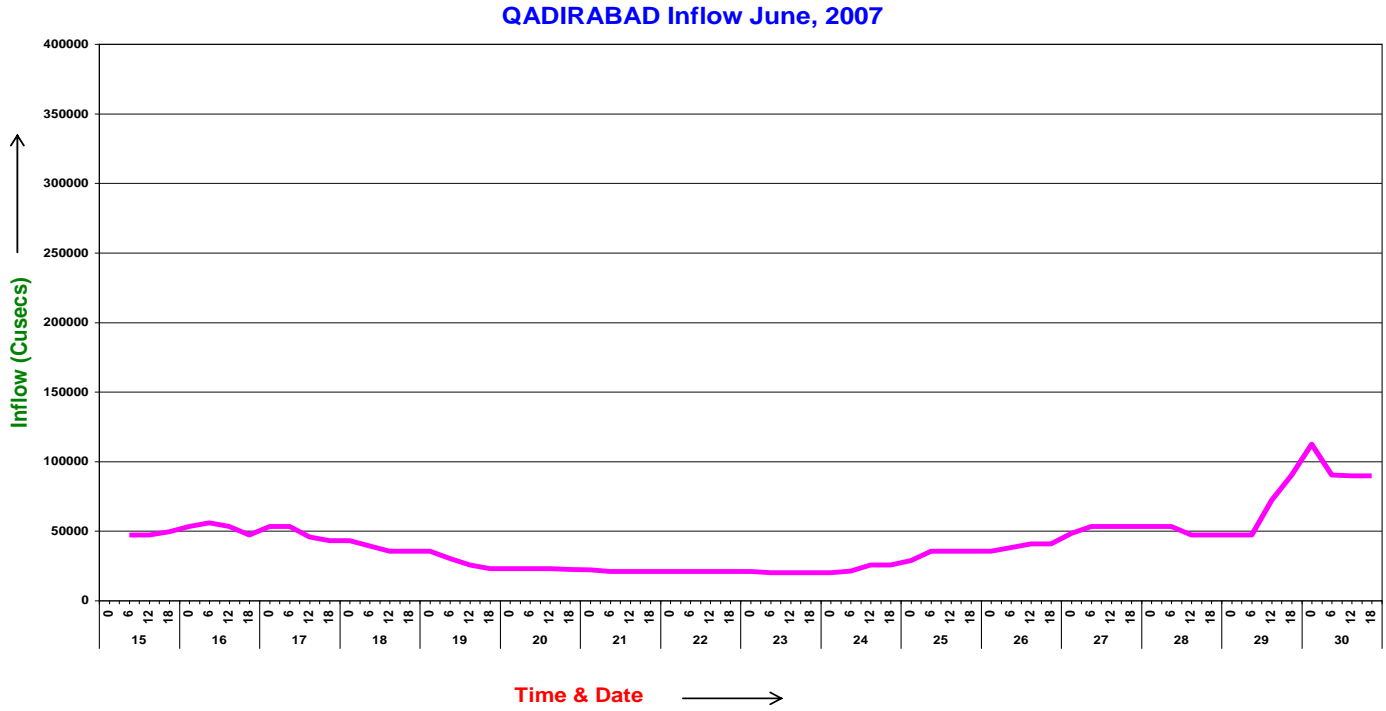


Figure 10: Hydrograph of Qadirabad Inflow for the month of June, 2007

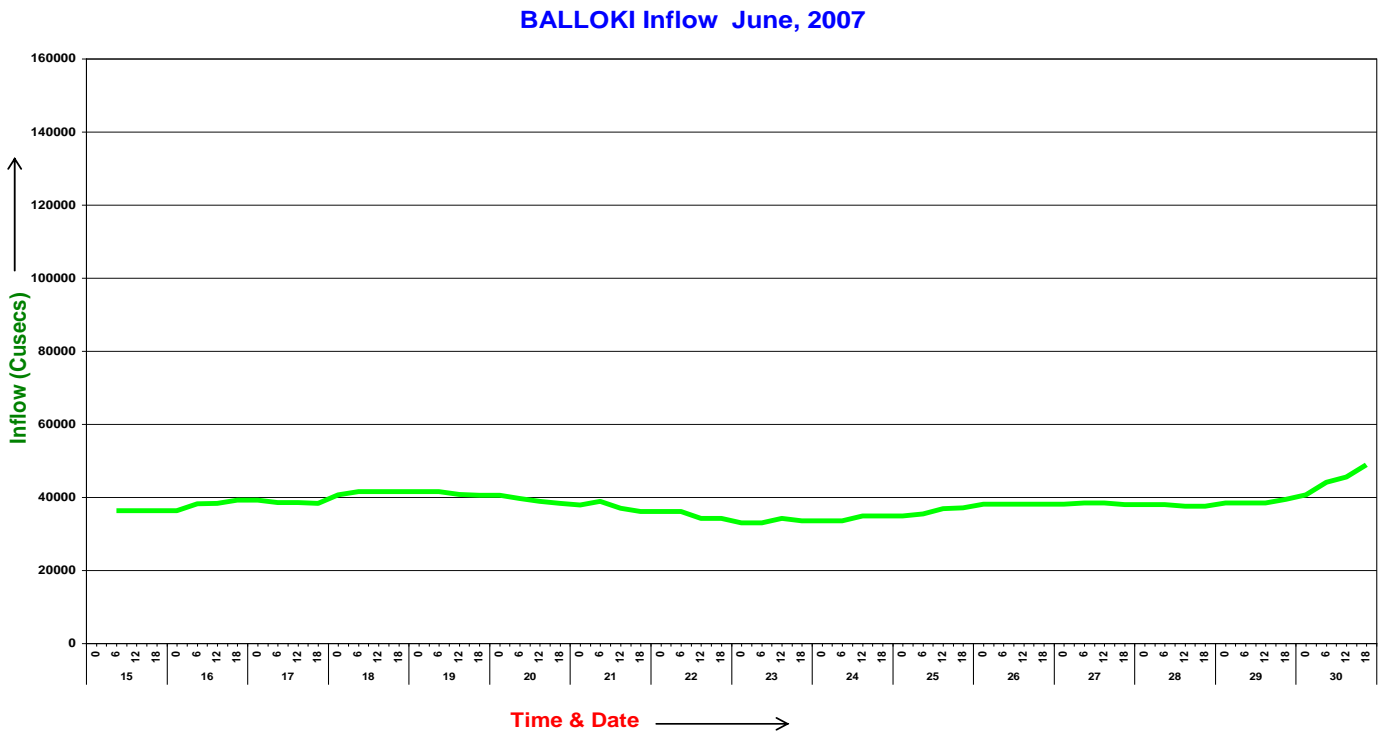


Figure 11: Hydrograph of Balloki Inflow for the month of June, 2007



2.4 RAINFALL PATTERNS FOR THE MONTH OF JUNE 2007 (15TH TO 30TH JUNE).

Generally light to moderate rain occurred over the upper catchments of river Indus and Jhelum along with Punjab. Heavy to very heavy rain was reported from Blochistan and Sindh.

3. SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF JULY 2007.

3.1 METEOROLOGICAL EVENTS

One monsoon low initially originated from the Bay of Bengal, in the last of June on 28th. It took a west northwest course and after crossing Madhya Pradesh (India) it finally reached over Rajasthan and adjoining Pakistan on 03-07-2007 and dissipated. Under its Influence Light to moderate rain was recorded in Sindh and Balochistan. Another monsoon low was also developed in July on 04-07-2007 and dissipated on 11-07-2007 around Delhi (India). No significant rainfall was observed due to this weather system. All the rainfall spell during the month was attribute to westerly waves and accentuation of seasonal low.

3.2 FIRST SPELL OF JULY 2007 FROM 21-07-2007 TO 23-07-2007

This spell which was lasted for three days occurred due to the accentuation of seasonal low, resulting in the incursion of monsoon current from Arabian Sea in the districts of Punjab & Kashmir. Rainfall maxima exceeding 100mm were observed around Kakul, & Marala. The intensity of rainfall during this spell was ranged between light to moderate.

Significant spell wise accumulated rainfall is given below.

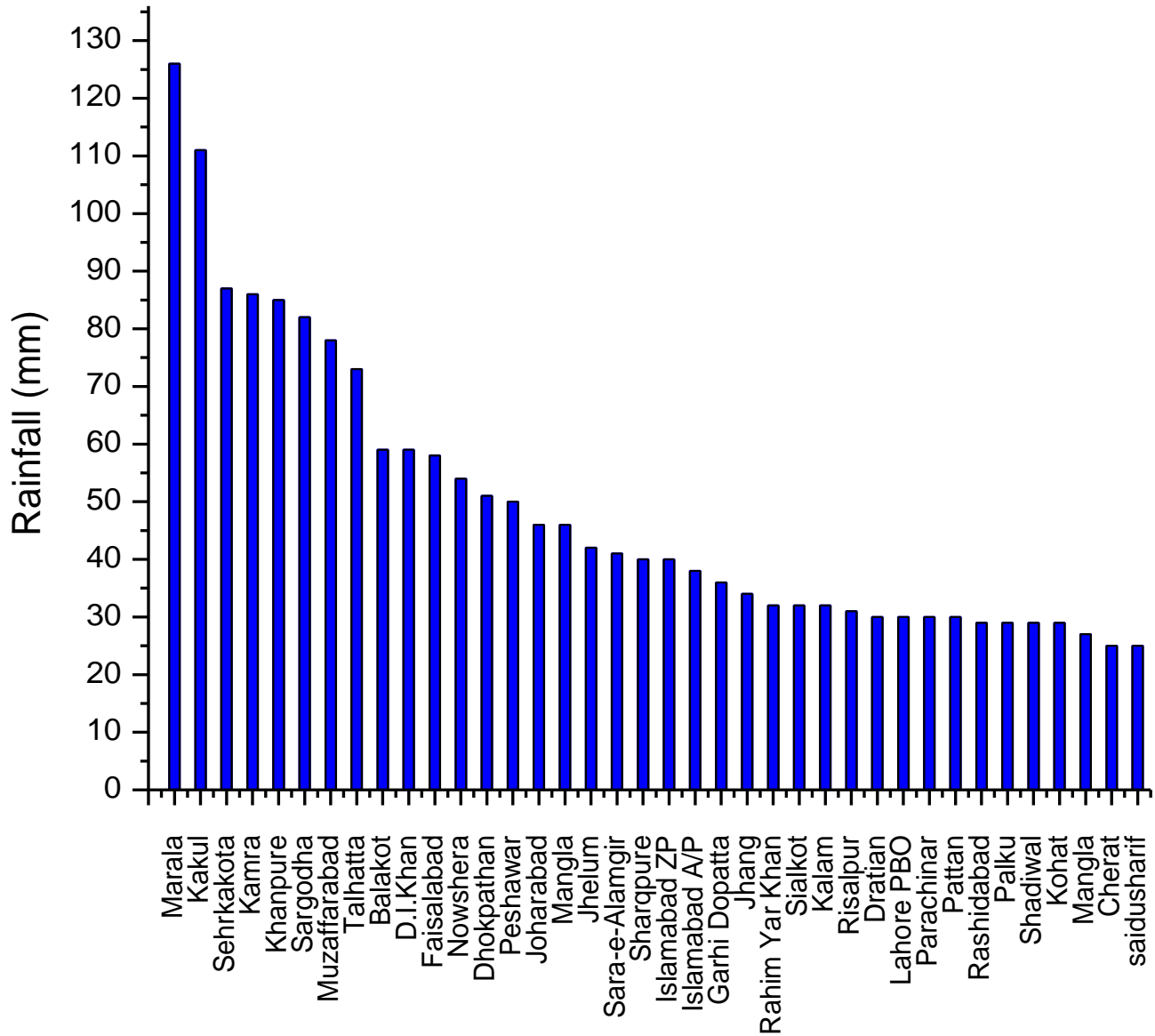


Figure 12: Wet Spell of July from 21-07-2007 to 23-07-2007

3.3 RIVER POSITION

Generally normal flows were observed during the month of July, 2007 however low flood peaks were observed in river Indus at Tarbela, Kalabagh, Chashma Taunsa and Guddu & in river Ravi at Balloki.

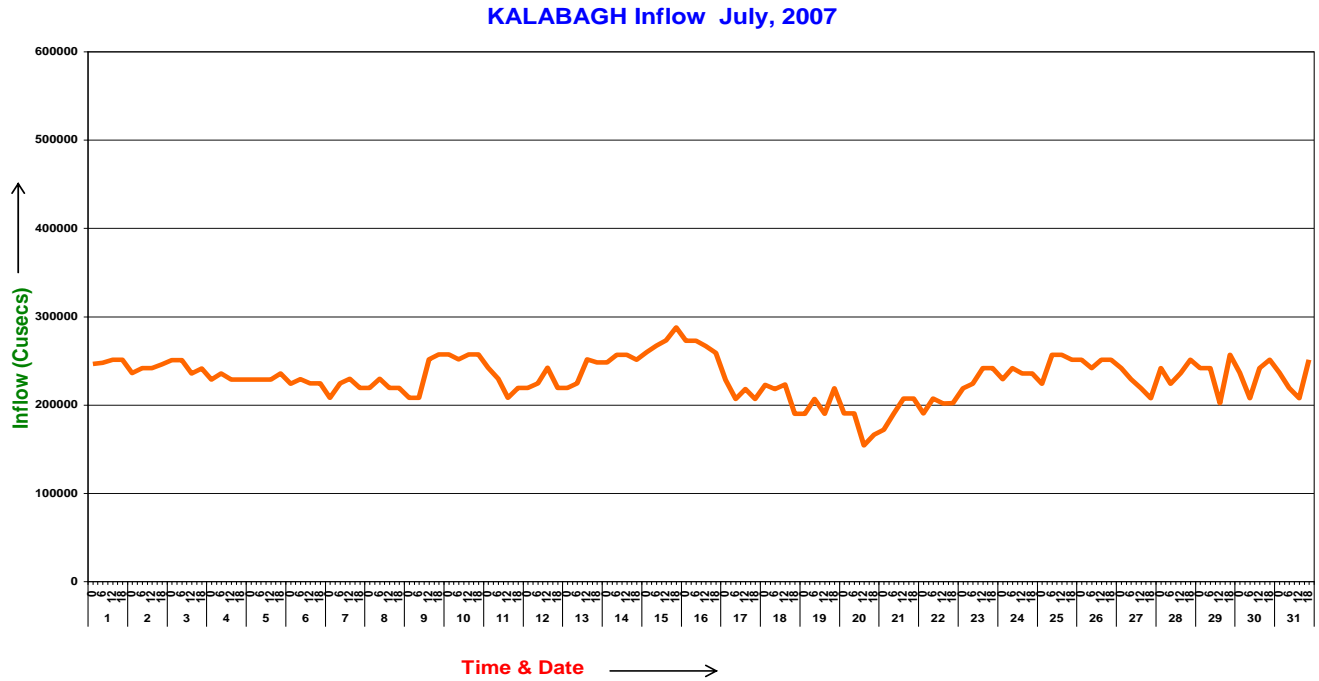


Figure 13: Hydrograph of Kalabagh Inflow for the month of July, 2007

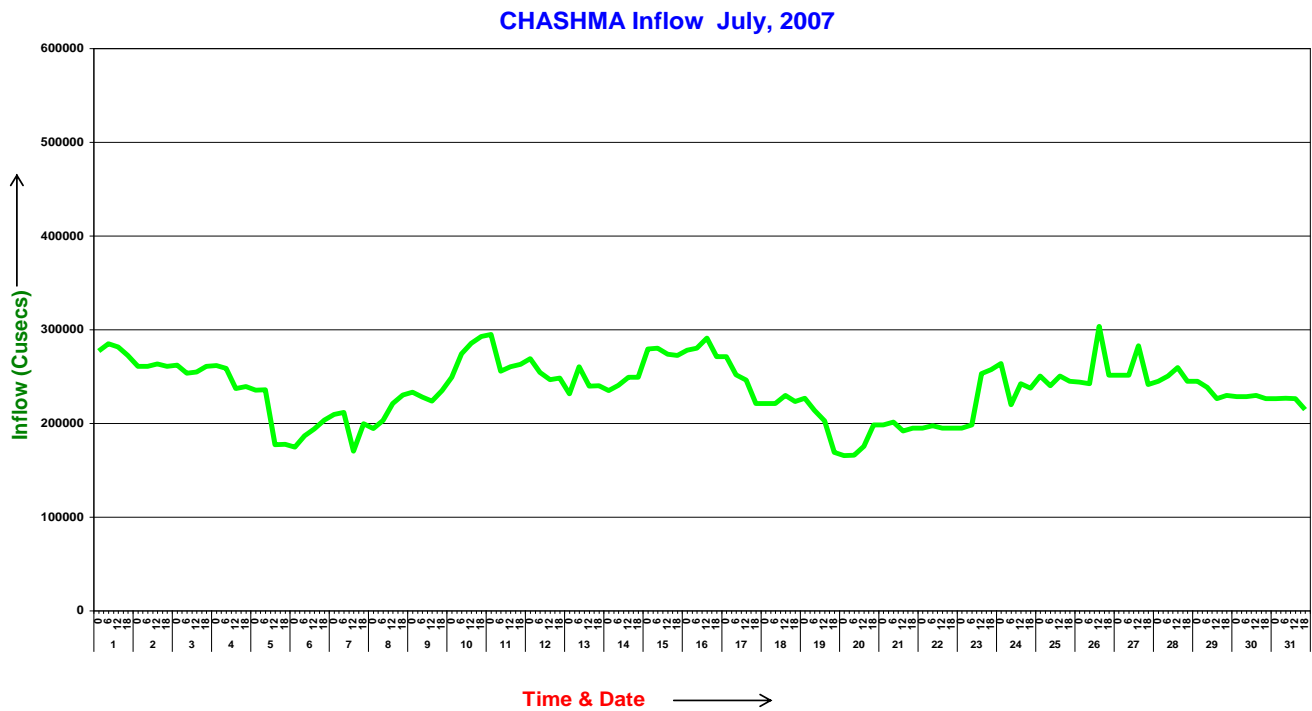


Figure 14: Hydrograph of Chashma Inflow for the month of July, 2007

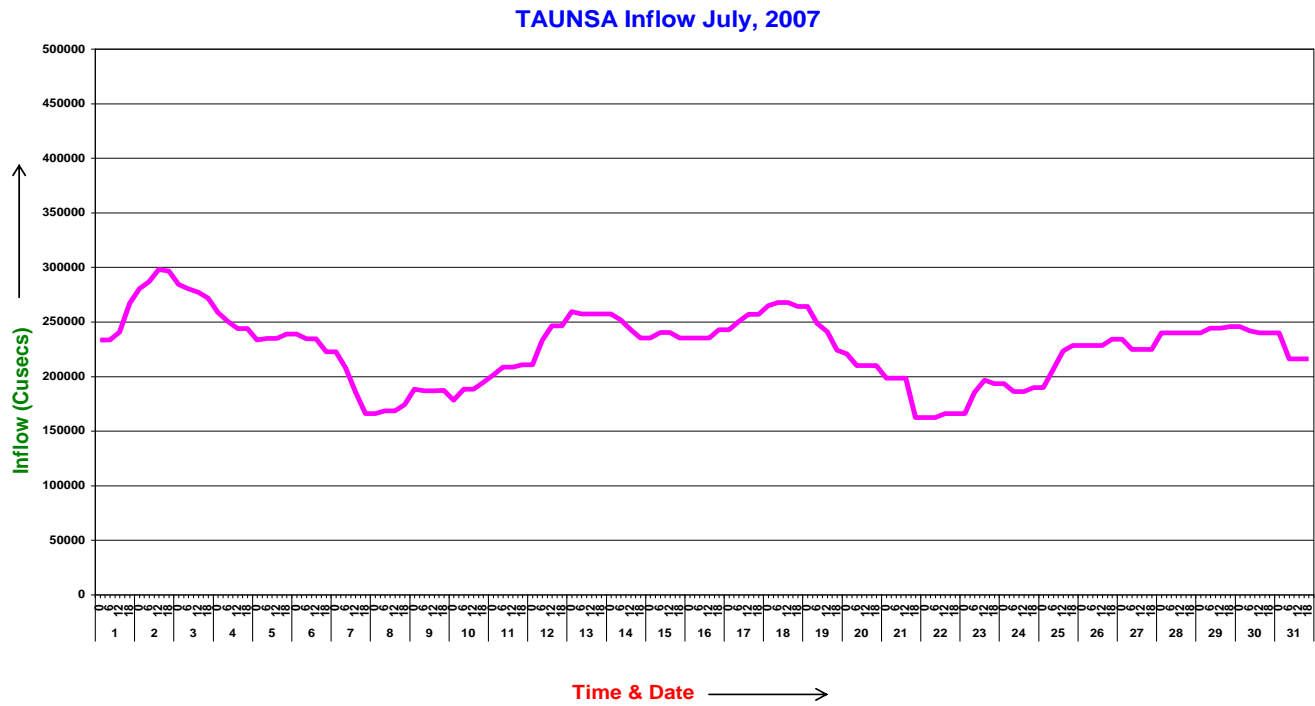


Figure 15: Hydrograph of Taunsa Inflow for the month of July, 2007

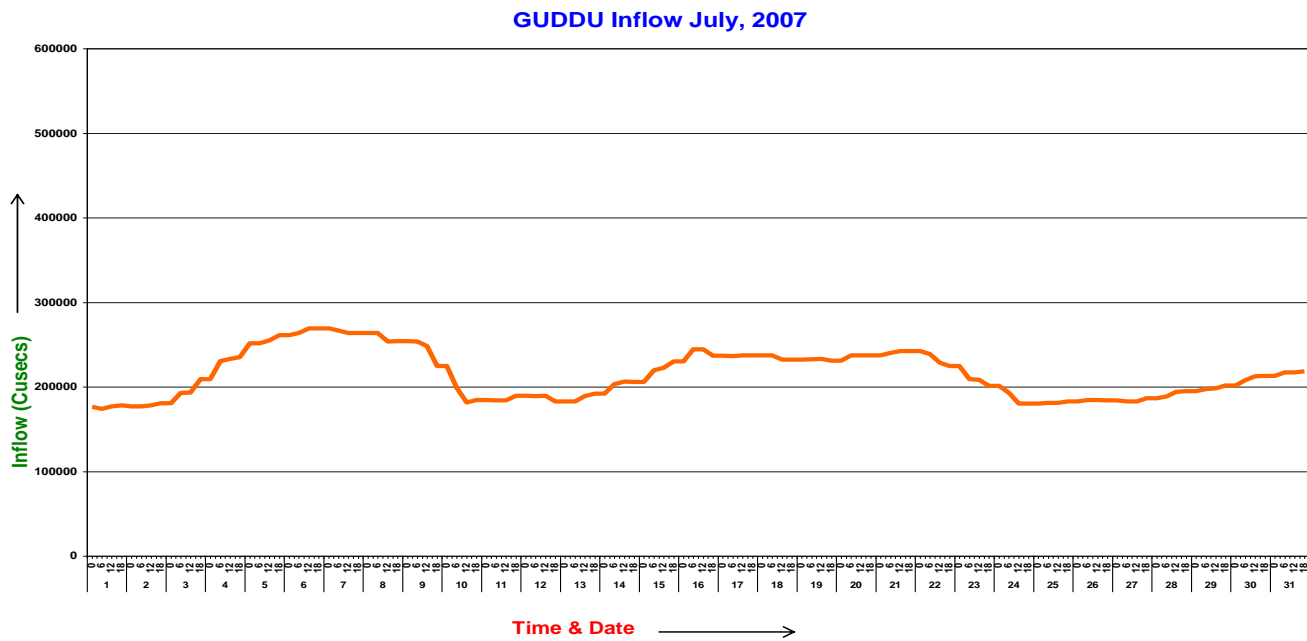


Figure 16: Hydrograph of Guddu Inflow for the month of July, 2007

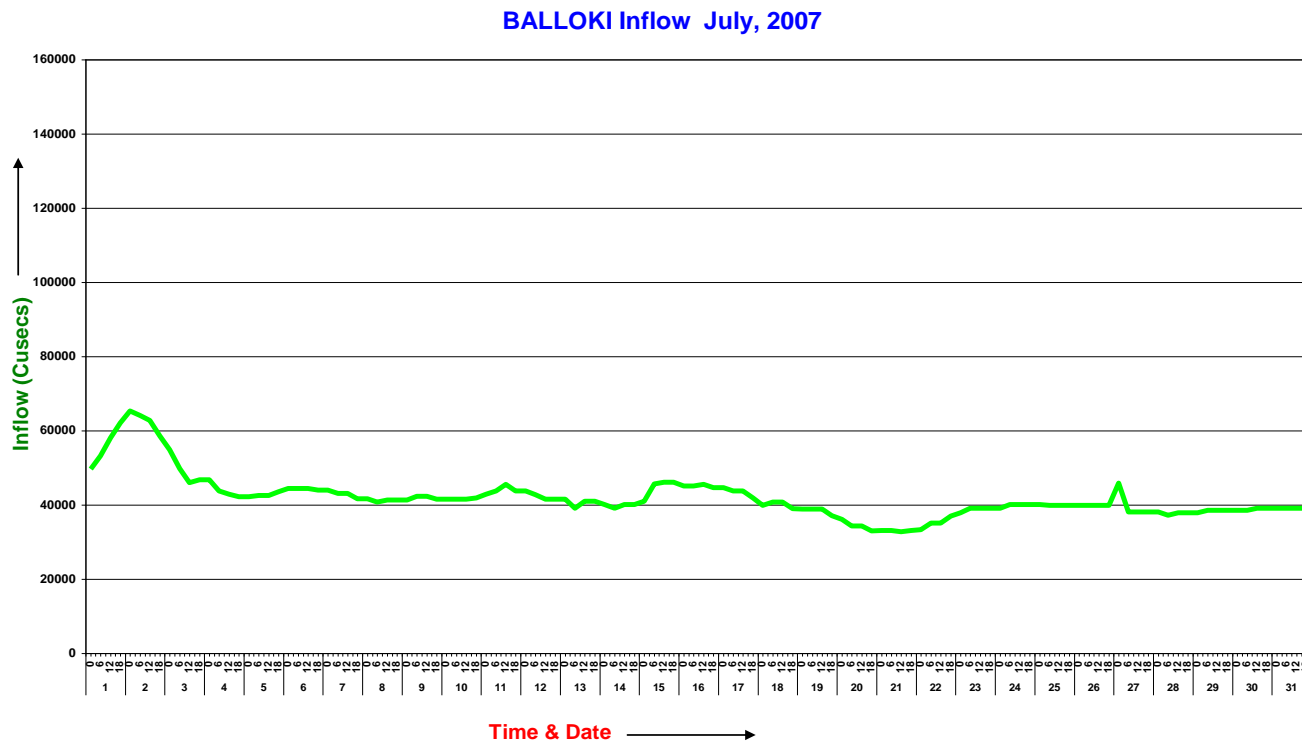


Figure 17: Hydrograph of Balloki Inflow for the month of July, 2007

3.4 RAINFALL PATTERN FOR THE MONTH OF JULY 2007

Isohyetal pattern of July 2007 indicates that the maximum precipitation occurred in sub mountain districts of Punjab and southern slopes of Pir Panjal range of lesser Himalaya in Kashmir and northern Punjab. One rainfall maxima exceeding 400 mm. occurred in North Punjab (Islamabad). Another lesser rainfall maxima exceeding 100mm. was observed in northeast Balochistan around Barkhan and D.G.Khan hill torrents (Punjab). Rainfall exceeding 50mm was observed at central Sindh around Nawabshah mostly & Chhor. Mostly areas of western Balochistan remained almost dry during this month.

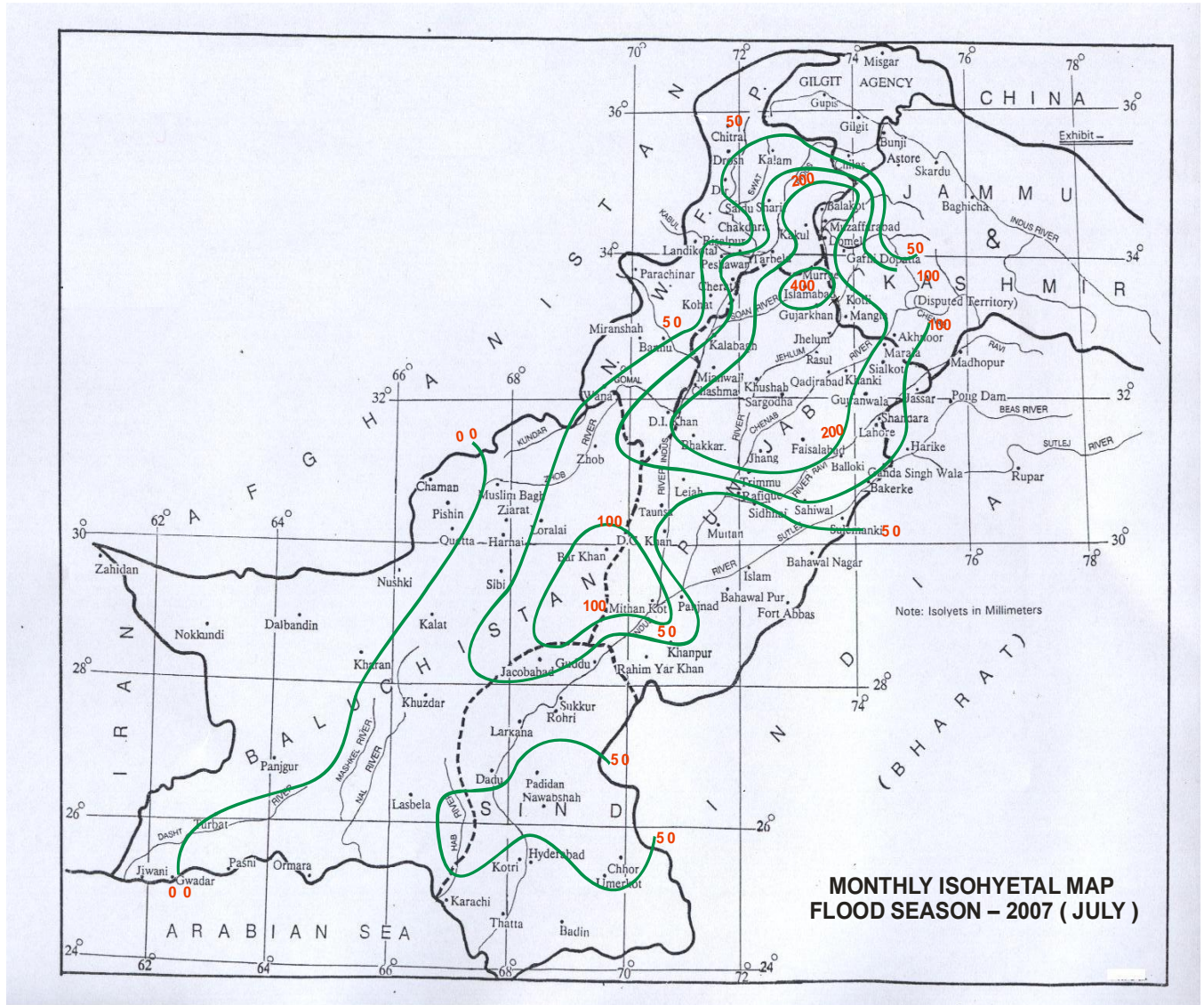


Figure 18: Isohyetal map for the month of July, 2007

4. **SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF AUGUST 2007.**

4.1 **METEOROLOGICAL EVENTS**

Two monsoon lows developed from Bay of Bengal. First of them developed on 06-08-2007 which moved in a northwesterly direction and reached over Southeastern Sindh on 10-08-2007. Due to this system moderate to heavy rains were recorded over Sindh, and isolated rains were also observed in southeastern Balochistan. The Second monsoon low, which developed on 20-08-2007. After moving northwestwards it reached over northern Madhya Pradesh. From here it further moved in northwesterly direction and reached Bahawalpur division on 23-08-2007 and dissipated. Due to this low moderate rain was reported from Sindh and Southern Punjab.



4.2 FIRST SPELL OF AUGUST 2007 FROM 09-08-2007 TO 11-08-2007

The first spell of the month was mainly caused by the influx of moderate monsoon current from the Arabian Sea & a low which was developed on 06-08-2007 over Bay of Bangal and moved in a northwesterly direction and reached over Southeastern Sindh on 10-08-2007 .Moderate to heavy rainfall occurred over Sindh .Isolated rains were also reported from Punjab & southeastern Balochistan

Significant accumulated rainfall of the spell is given below:-

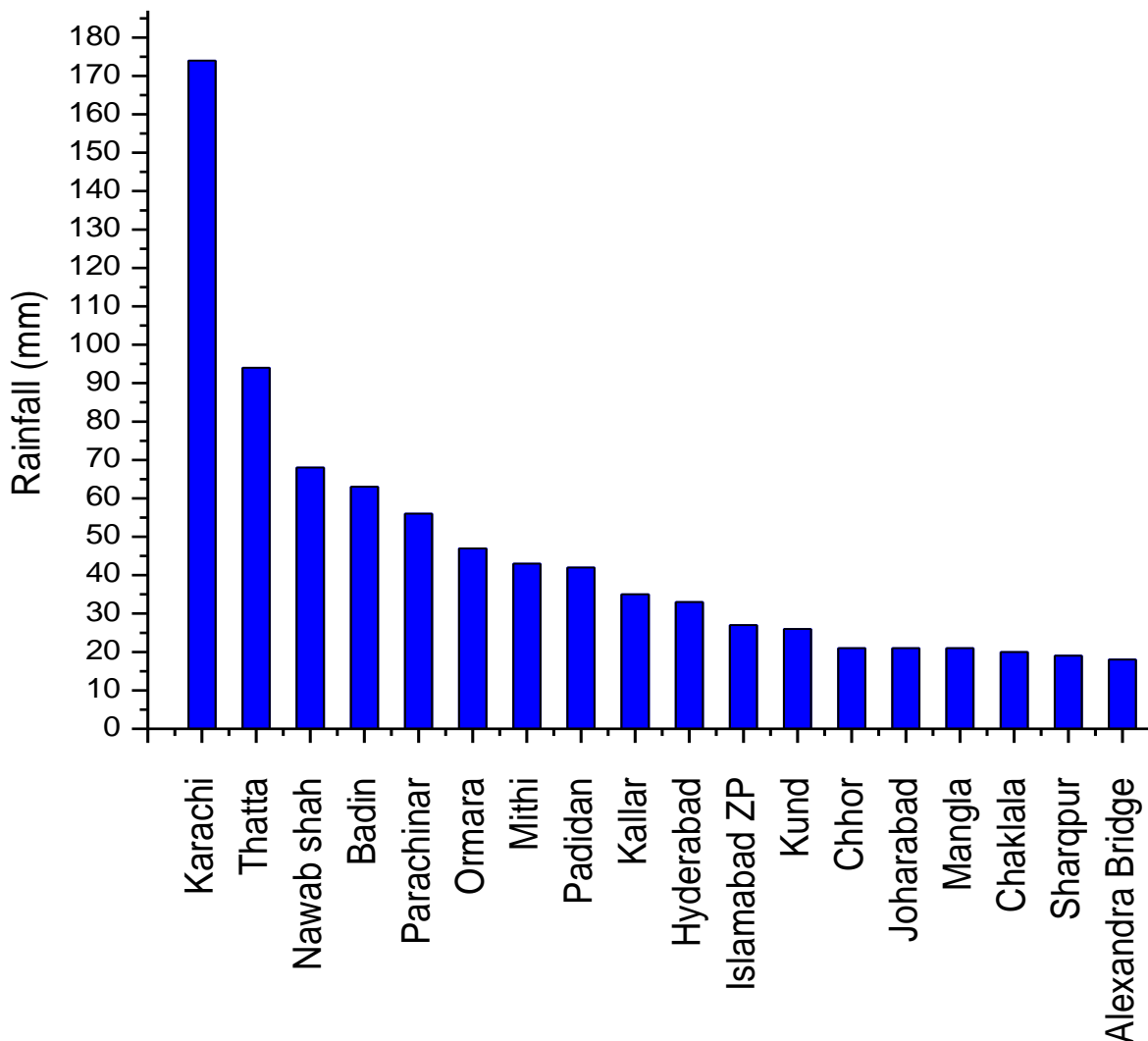


Figure 19: Wet Spell of August from 09-08-2007 to 11-08-2007



4.3 SECOND SPELL OF AUGUST 2007 FROM 13-08-2007 TO 15-08-2007

Passing of westerly wave through northern parts of the country, accentuation of seasonal low and induct of southwest monsoon current into Pakistan caused this spell. Moderate rain with isolated heavy rain occurred during this spell over the north Punjab and Kashmir, upper NWFP

Significant accumulated rainfall of the spell is given below: -

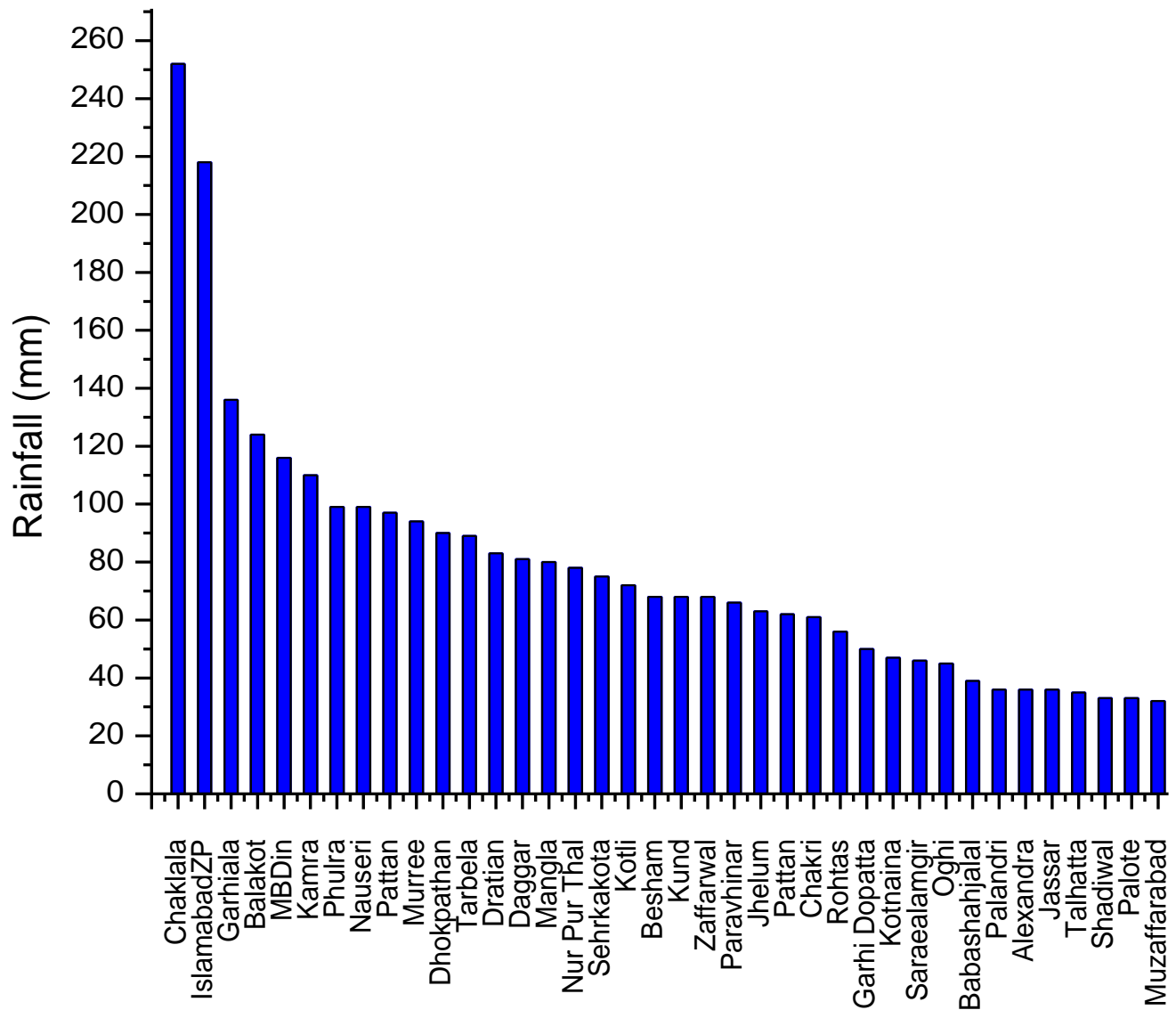


Figure 20: Wet Spell of August from 13-08-2007 to 15-08-2007



4.4 THIRD SPELL OF AUGUST 2007 FROM 22-08-2007 TO 24-08-2007

This spell was mainly caused due to movement of a monsoon low around southern Punjab and incursion of southeast monsoon current. The rainfall maxima exceeding 90 mm was occurred in Sindh around Hyderabad. Light to moderate rain with isolated heavy falls was observed during the spell.

Significant Spell-wise accumulated rainfall is given below: -

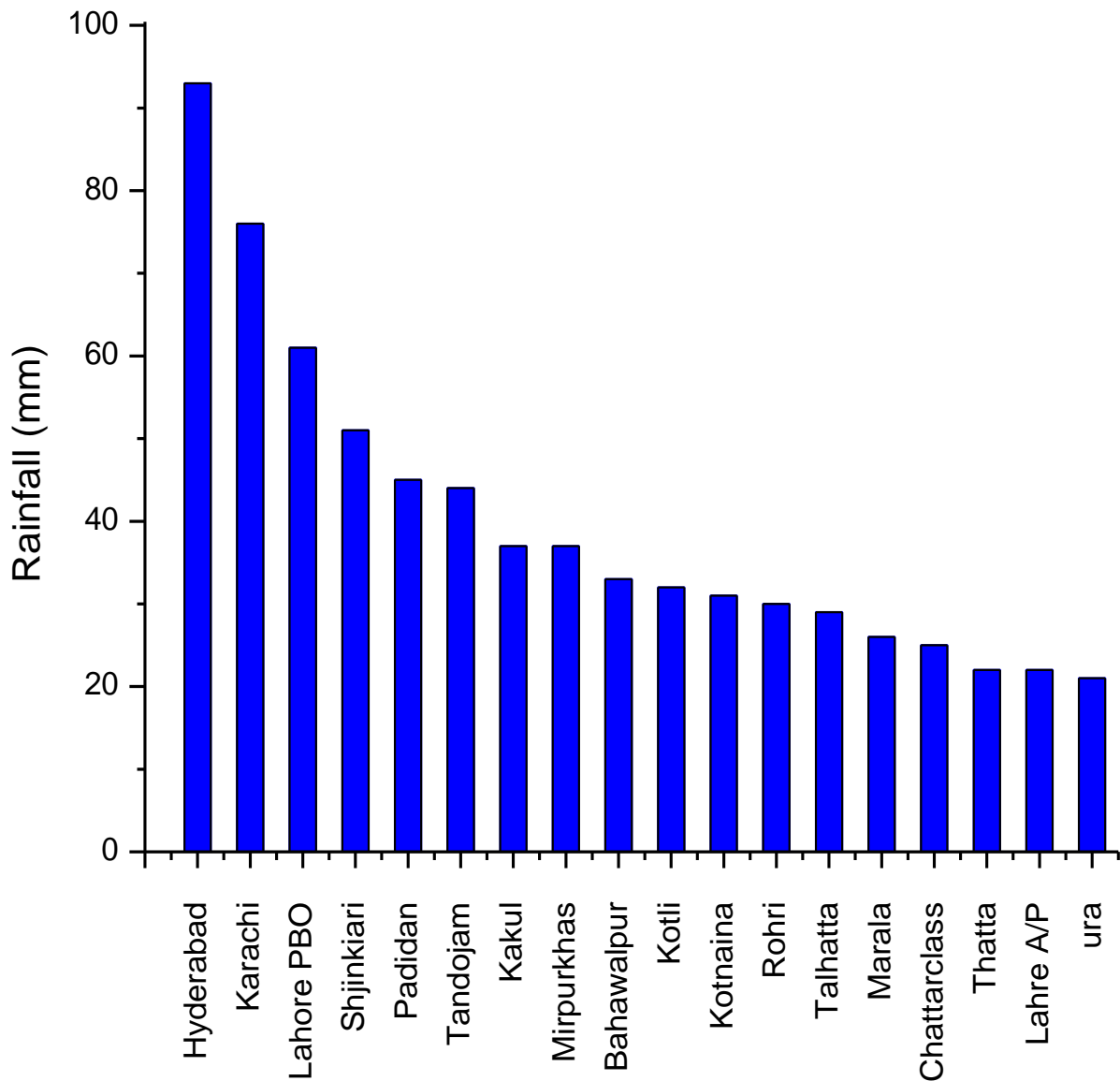


Figure 21: Wet Spell of August from 22-08-2007 to 24-08-2007



4.5 RIVER POSITION

All the Rivers and nullahs maintained the normal flow pattern during the month, with the exception of two medium flood peaks one in Indus at Chashma, and second in Chenab at Marala, Khanki & Qadirabad. Low flood peaks were also observed in river Jhelum at Mangla, in river Indus at Tarbela, Kalabagh, Chashma, & Taunsa and in river Chenab at Marala, Khanki & Qadirabad.

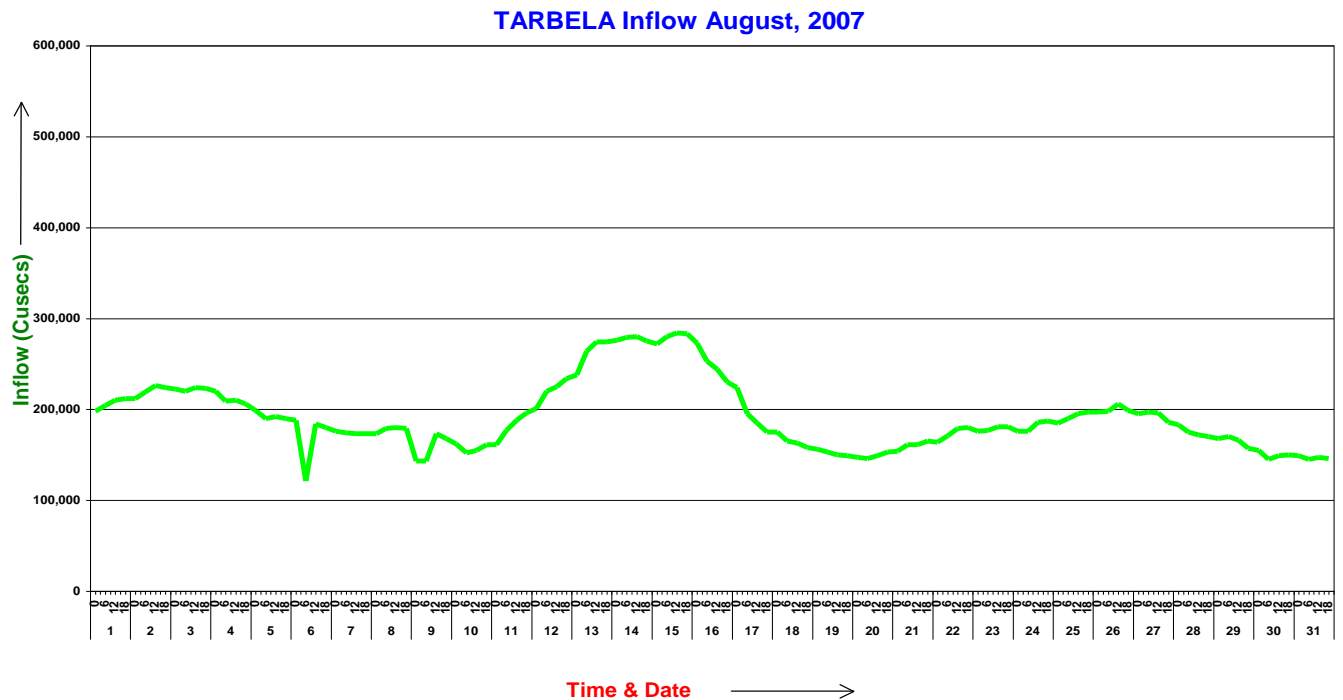


Figure 22: Hydrograph of Tarbela inflow for the month of August, 2007



KALABAGH Inflow August, 2007

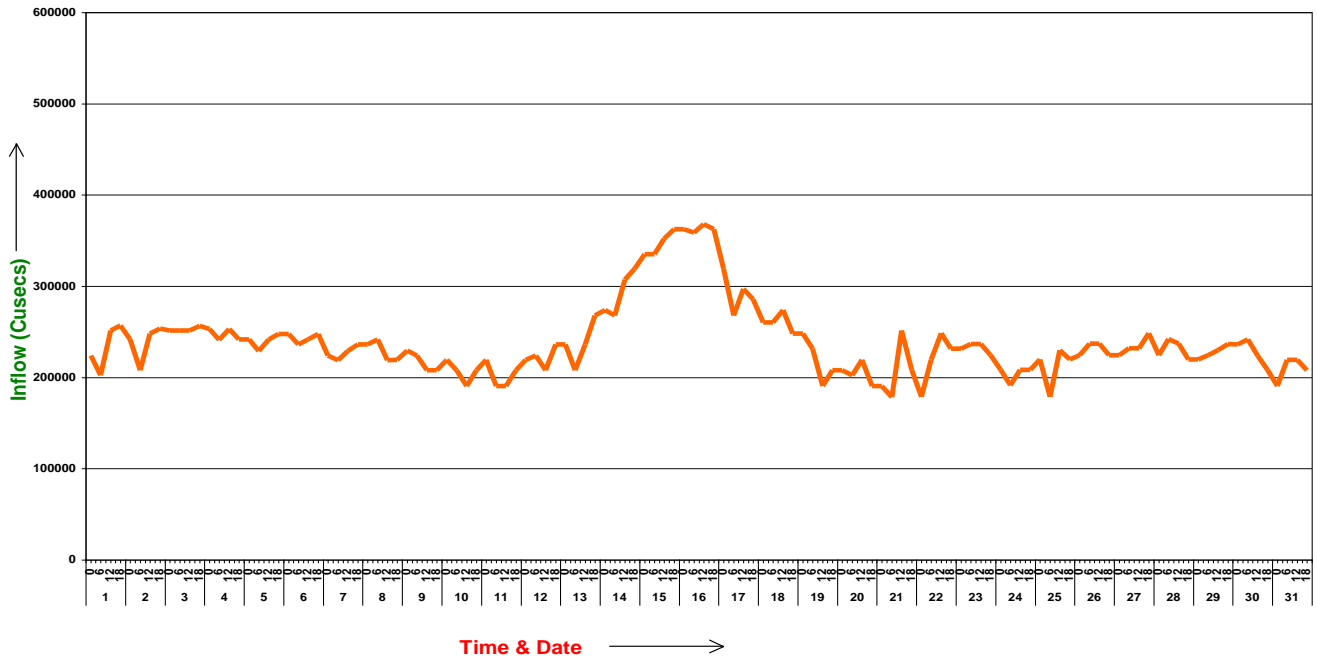


Figure 23: Hydrograph of Kalabagh inflow for the month of August, 2007

CHASHMA Inflow August, 2007

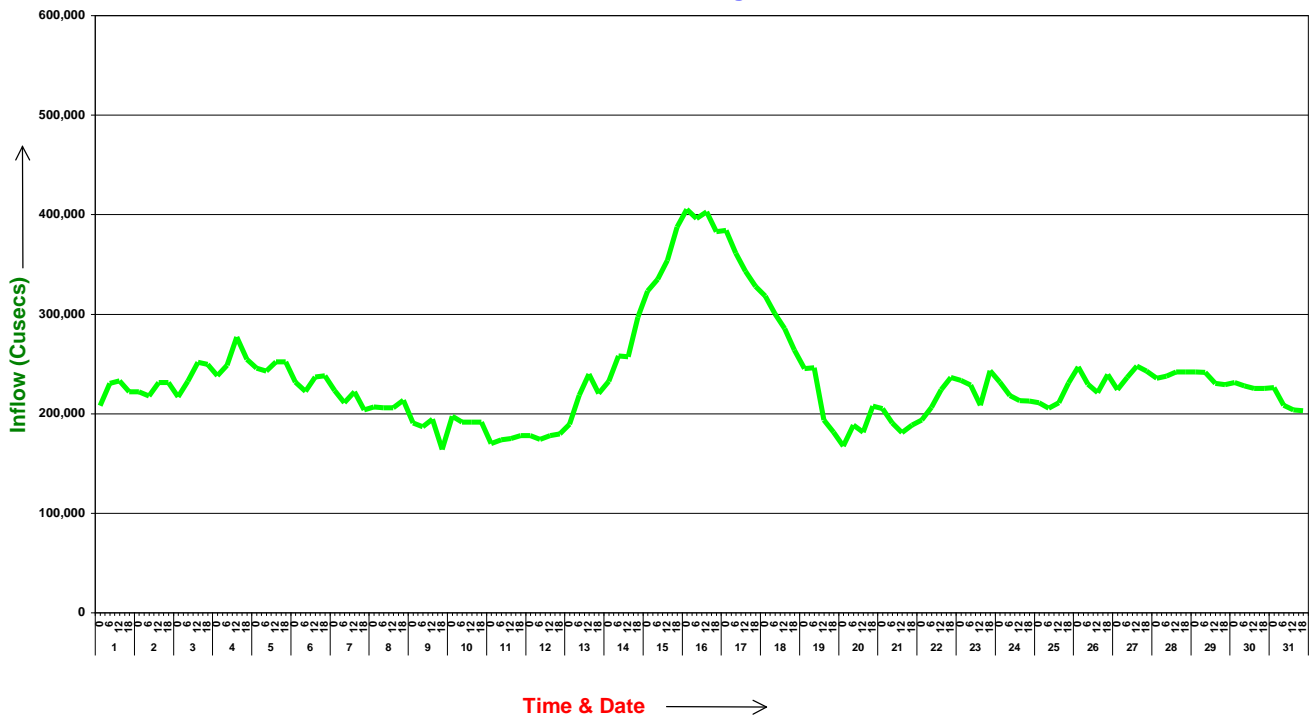


Figure 24: Hydrograph of Chashma inflow for the month of August, 2007



TAUNSA Inflow August, 2007

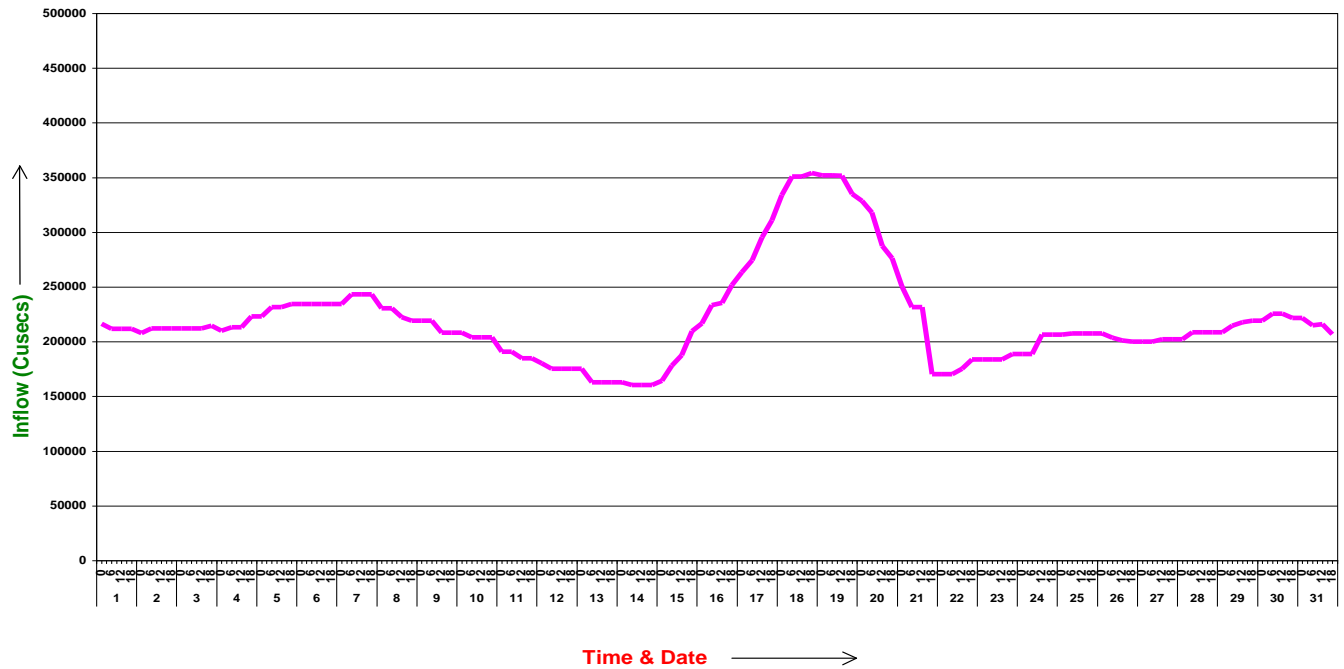


Figure 25: Hydrograph of Taunsa inflow for the month of August, 2007

GUDDU Inflow August, 2007

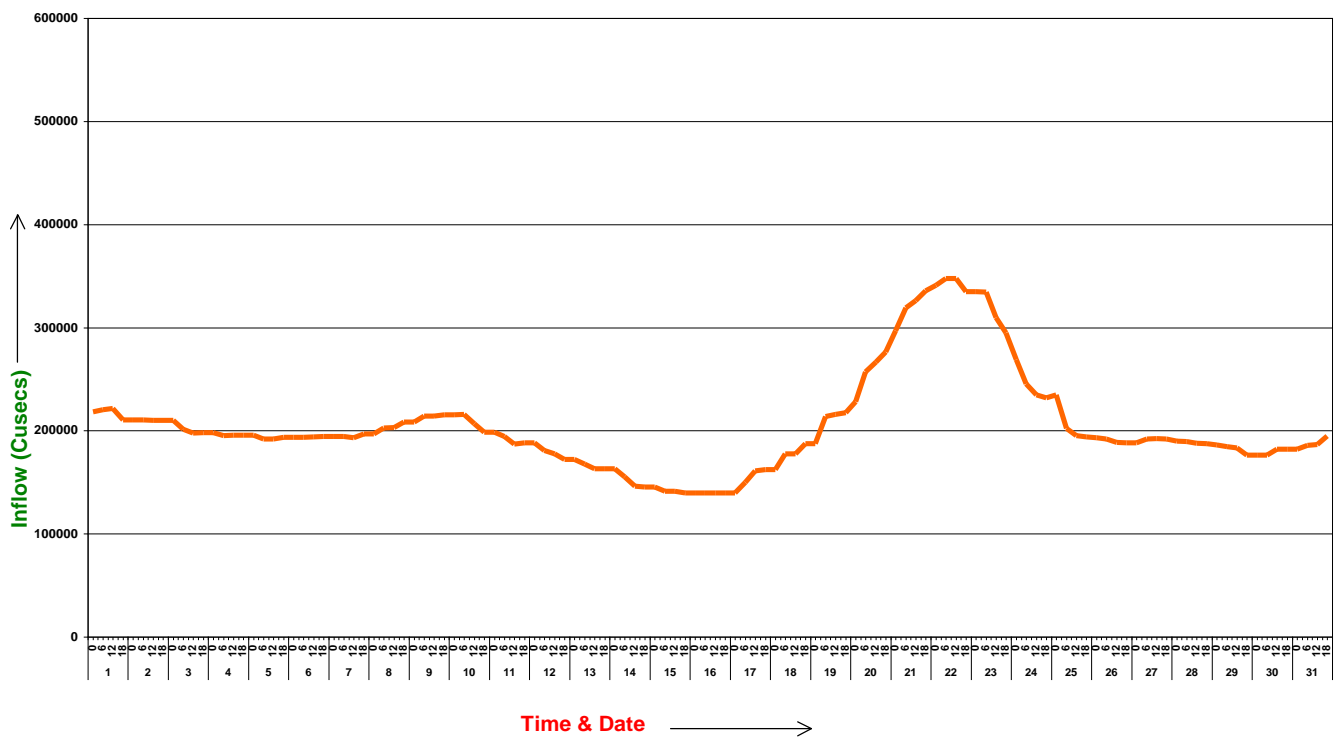


Figure 26: Hydrograph of Guddu inflow for the month of August, 2007



SUKKUR Inflow August, 2007

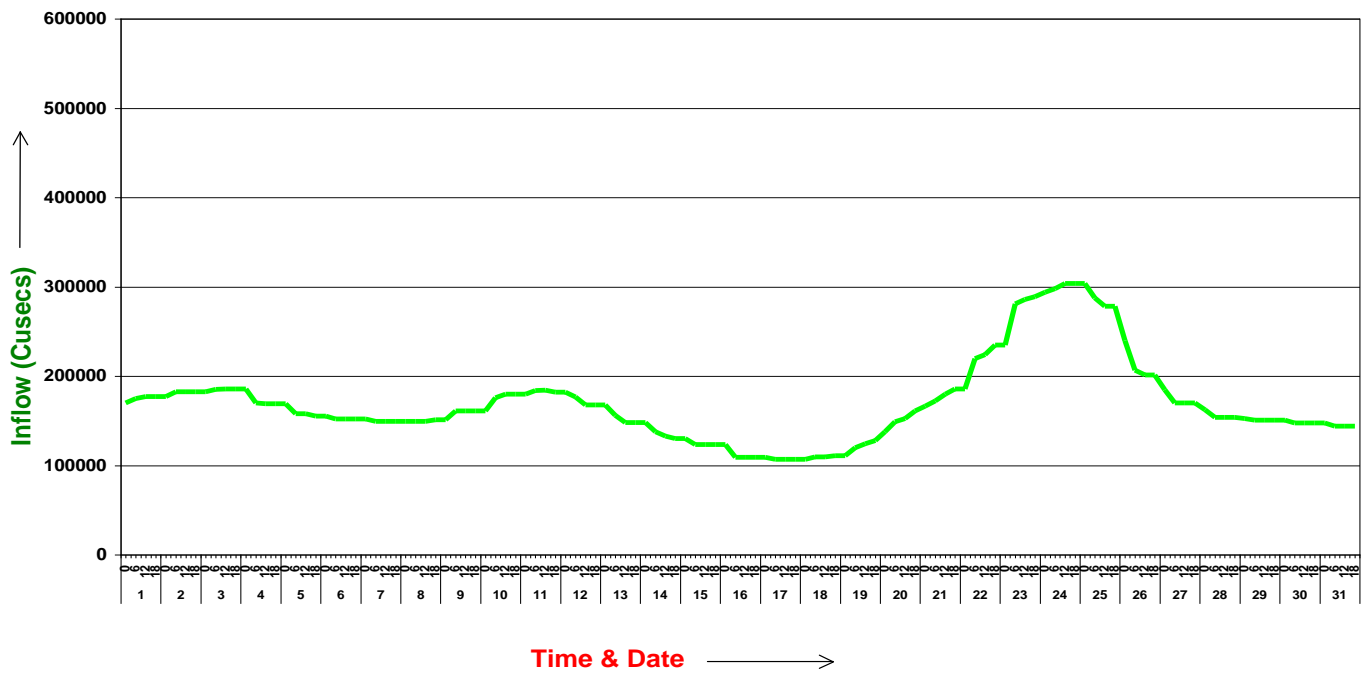


Figure 27: Hydrograph of Sukkur inflow for the month of August, 2007

MANGLA Inflow August, 2007

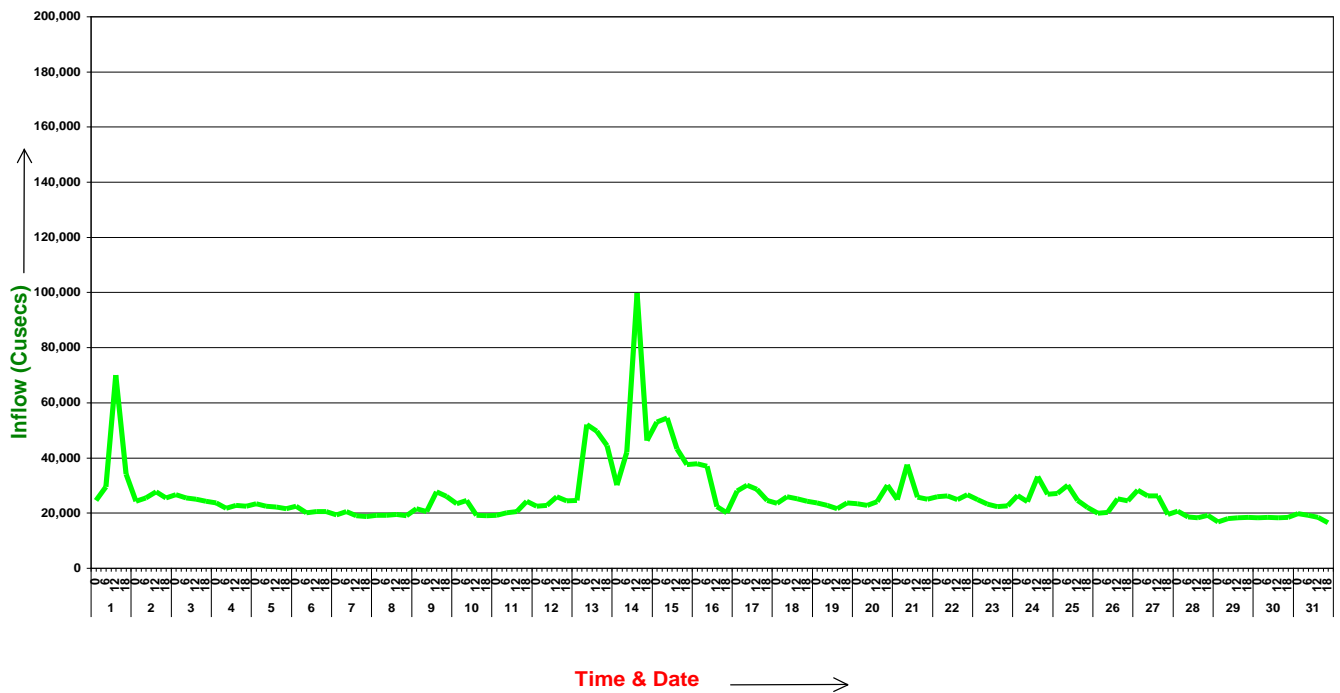


Figure 28: Hydrograph of Mangla inflow for the month of August, 2007



MARALA Inflow August, 2007

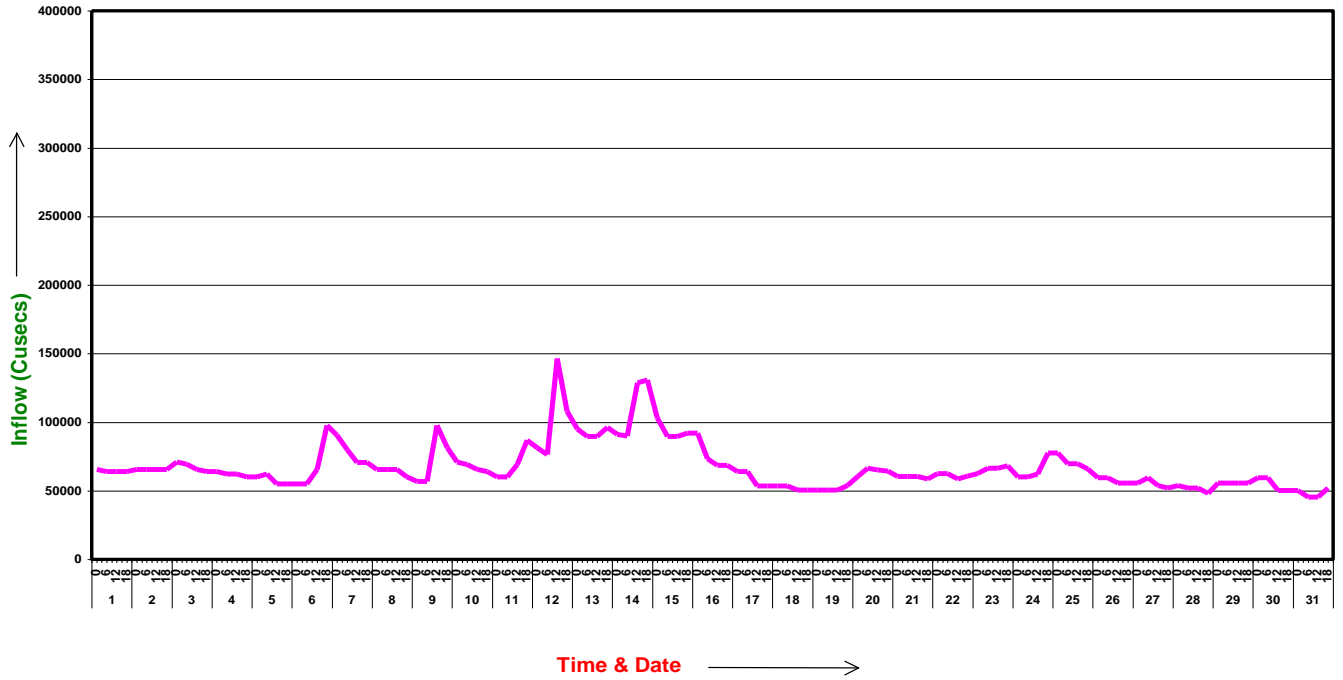


Figure 29: Hydrograph of Marala inflow for the month of August, 2007

KHANKI Inflow August, 2007

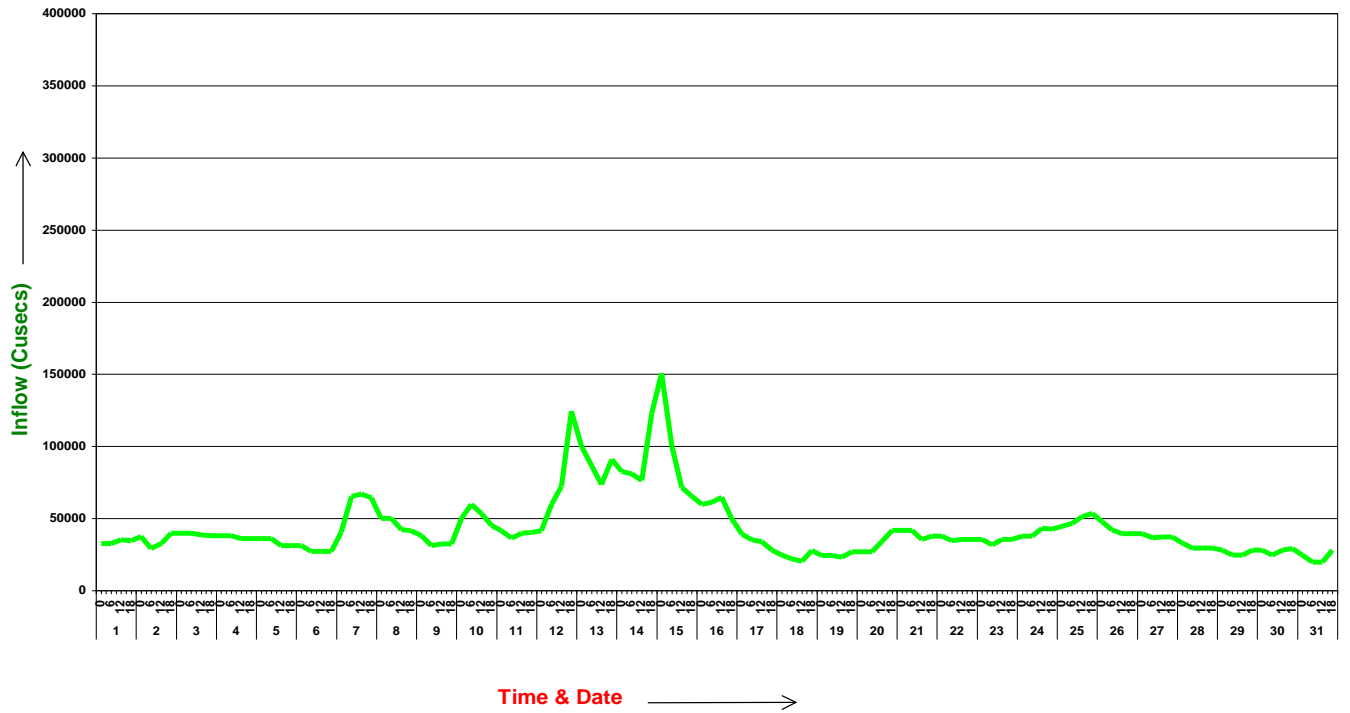


Figure 30: Hydrograph of Khanki inflow for the month of August, 2007

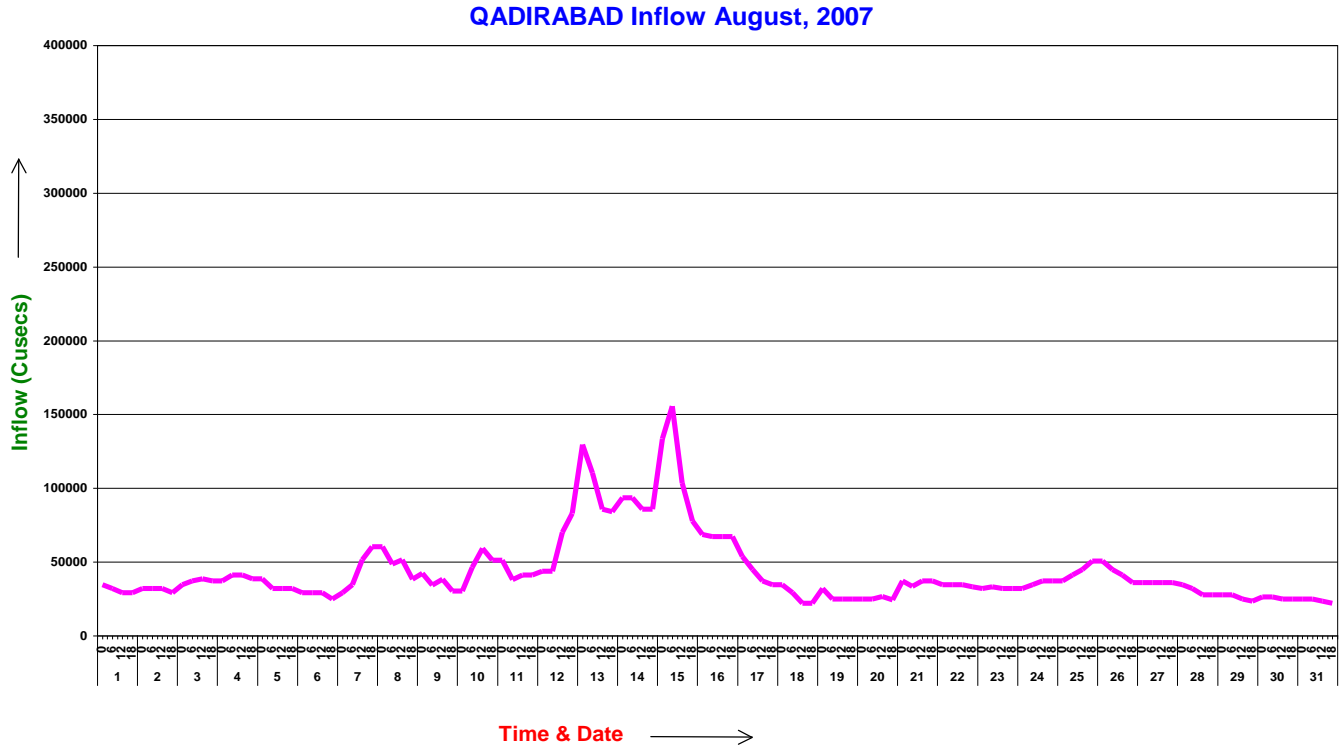


Figure 31: Hydrograph of Qadirabad inflow for the month of August, 2007

4.6 RAINFALL PATTERN FOR THE MONTH OF AUGUST 2007

One rainfall maxima exceeding 500 mm in the month of August 2007 was located around Islamabad. Three lesser maxima exceeding 200 mm were located one around Karachi, second around Sialkot, Marala and third around Balakot. Light rains were also recorded in Balochistan during the month.

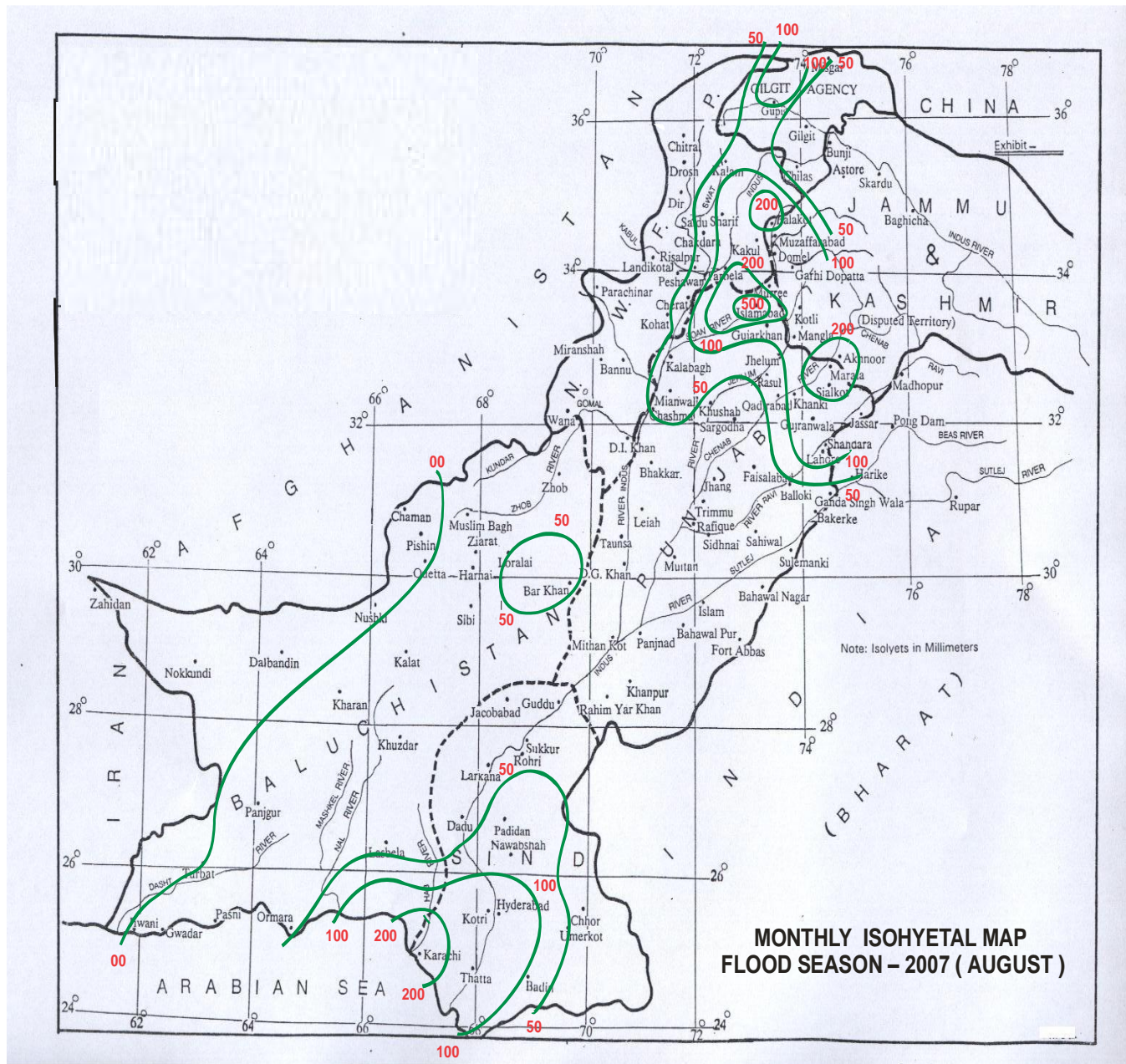


Figure 32: Isohyetal map for the month of August, 2007

5. **SIGNIFICANT HYDROMETEOROLOGICAL EVENTS DURING THE MONTH OF SEPTEMBER 2007.**

5.1 **METEOROLOGICAL EVENTS**

Only one monsoon low originated from the Bay of Bengal near Orissa coast, on 22-09-2007 and took a north northwesterly course till it reached over Uttar Pradesh on 25-09-2007 and dissipated. The rainfall activity during the month remained confined to Kashmir & north Punjab. One rainfall spell was recorded during the month of September 2007.



5.2 FIRST RAINFALL SPELL OF SEPTEMBER 2007 FROM 05-09-2007 TO 07-09-2007

This wet spell was mainly caused due to the effect of incursion of monsoon currents from the Arabian Sea and the passing of westerly wave over northern parts of the country. Light to moderate rain falls was observed over Kashmir along with northern & northeastern Punjab. Significant accumulated rainfall of the spell is given below: -

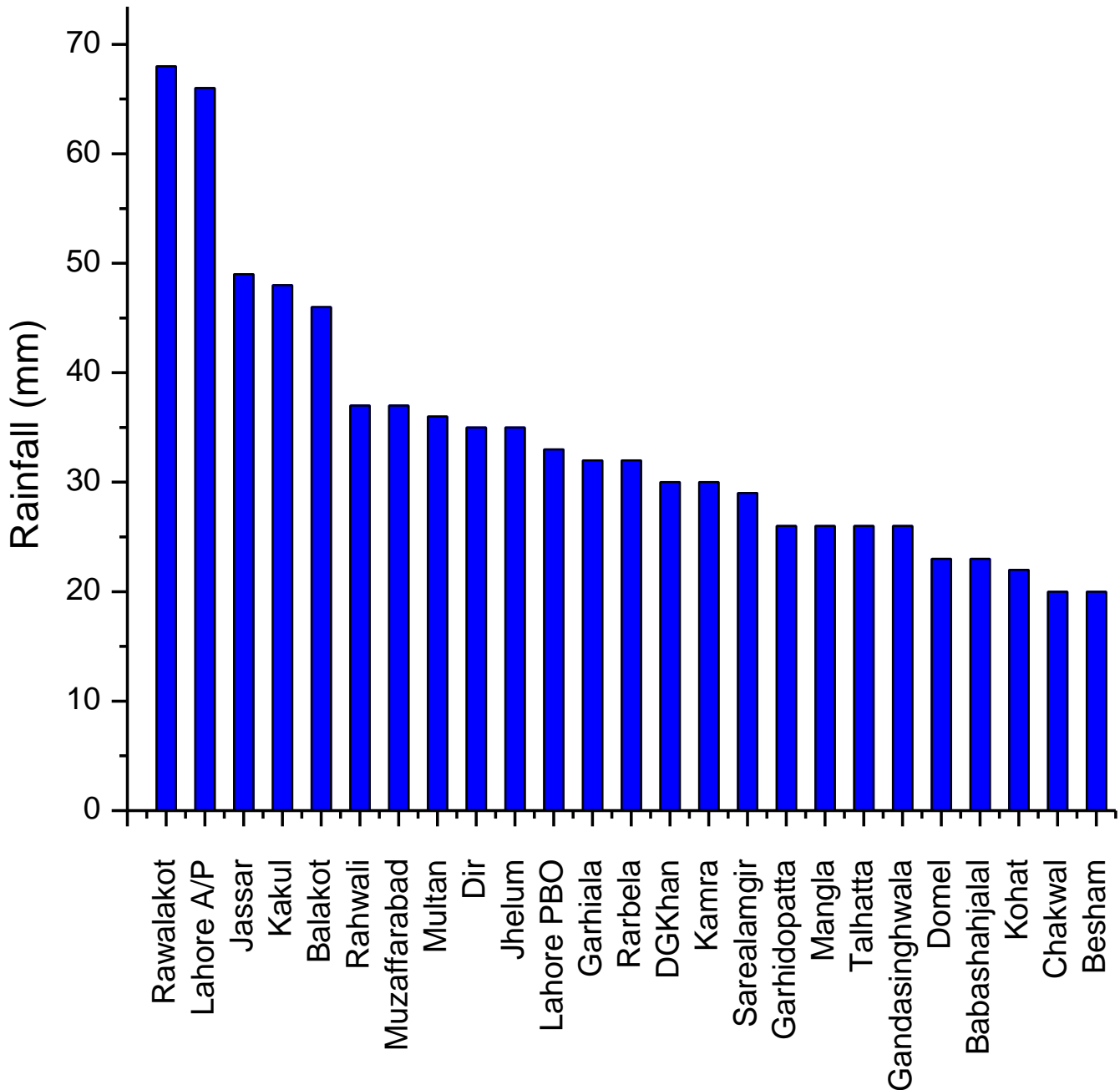


Figure 33: Wet Spell of September from 05-09-2007 to 07-09-2007



5.3 RIVER POSITION

All the major rivers and nullahs remained their normal flow conditions at all the sites except one low flood peak in river Indus which was recorded at Chashma.

CHASHMA Inflow September, 2007

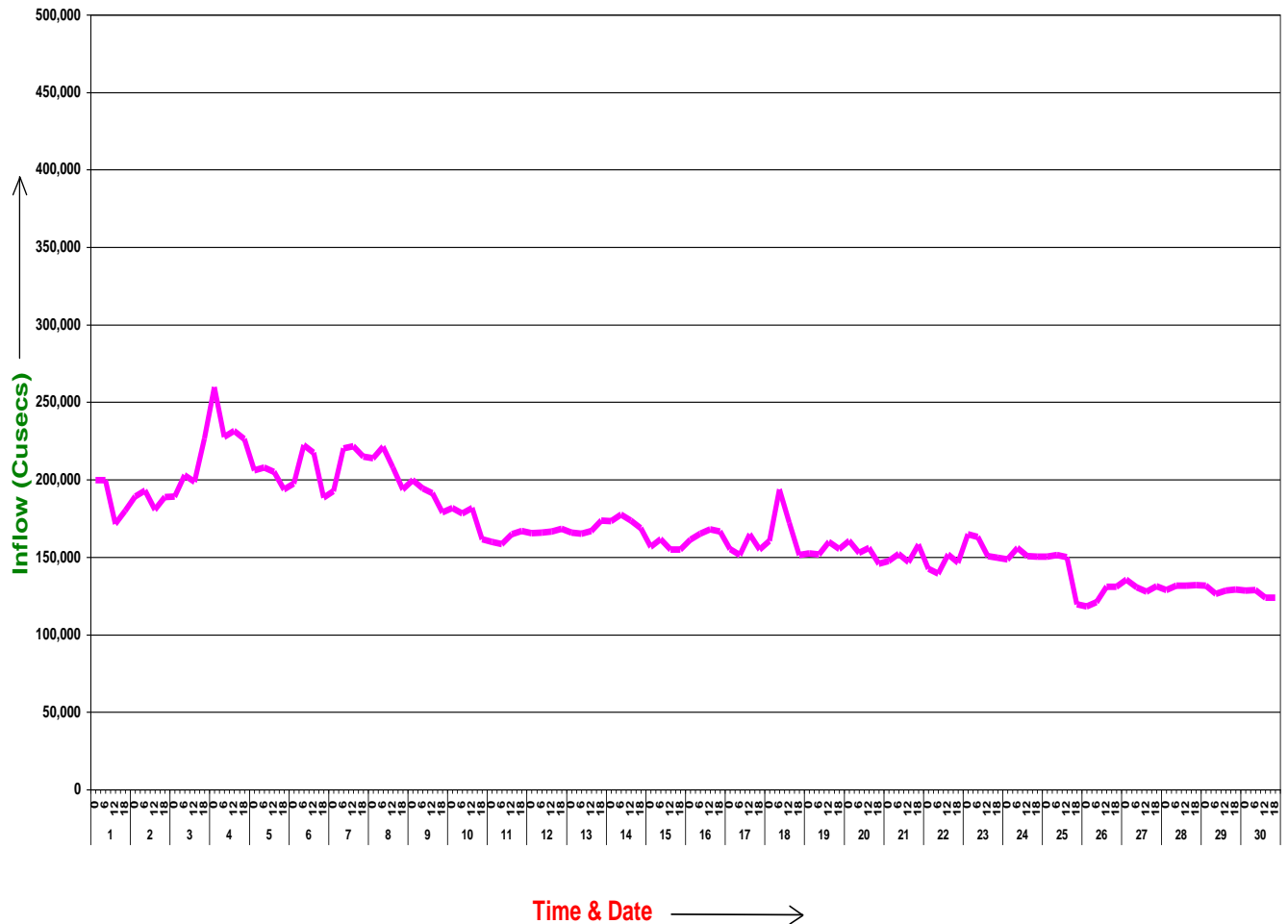


Figure 34: Hydrograph of Chashma inflow for the month of September, 2007



5.4 RAINFALL PATTERN FOR THE MONTH OF SEPTEMBER 2007.

The only one rainfall maxima during the month of September 2007, exceeding 200 mm, occurred over north Punjab near Islamabad.

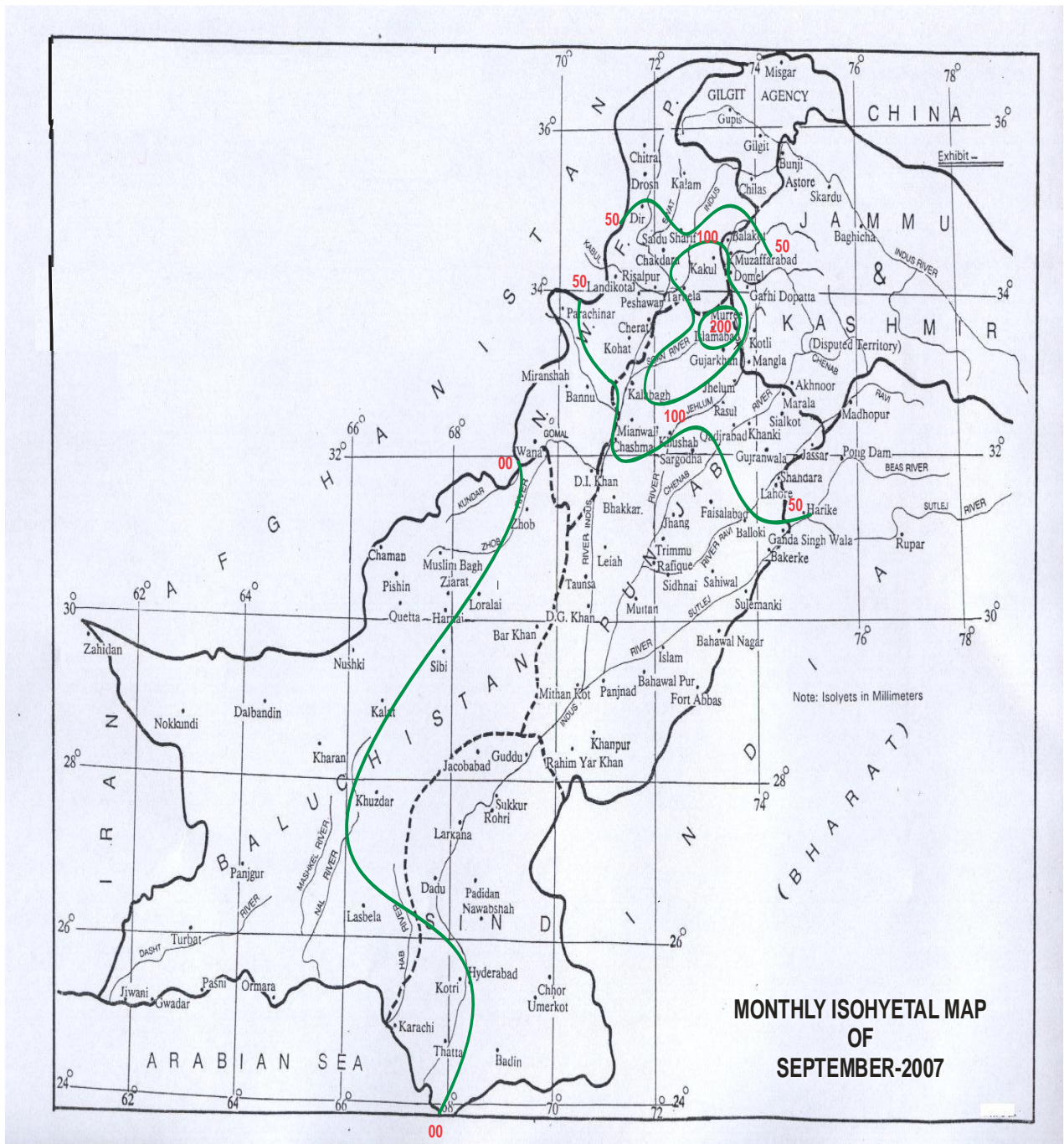


Figure 35: Isohyetal map for the month of September, 2007



6. SEASONAL ISOHYETAL PATTERN FROM JULY TO SEPTEMBER 2007

The main belt of maximum precipitation can be seen along the sub mountain areas of Punjab, some parts of Kashmir. One rainfall maximum exceeding 1100 mm, which took place during the monsoon season is located in north Punjab around Islamabad. Two lesser rainfall maximum exceeding 200 mm one is located over northeastern Balochistan around Barkhan and second over southwest Sindh around Karachi.

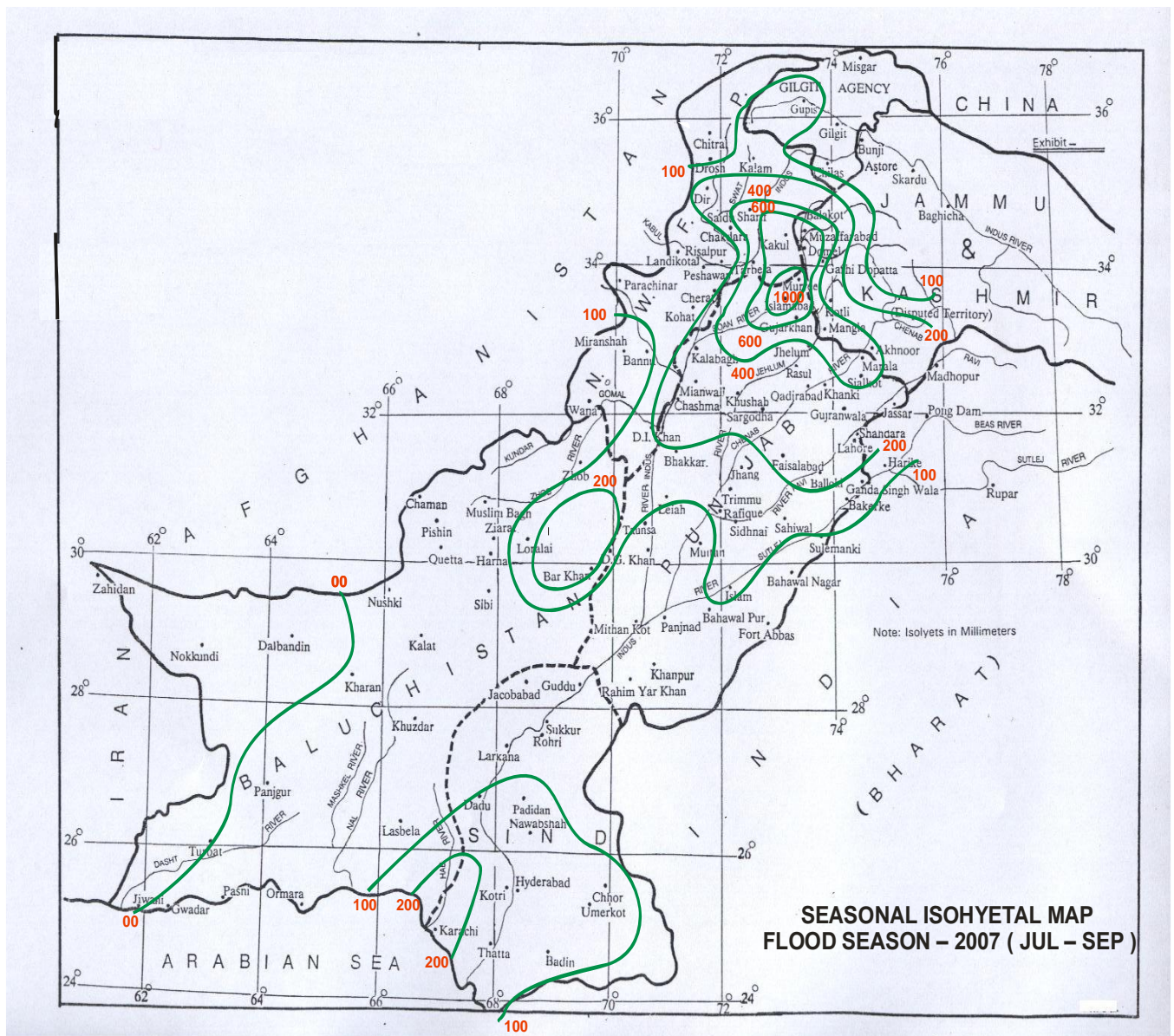


Figure 36: Isohyetal map for the month of July-September, 2007



7. SEASONAL ISOPERCENTAL OF NORMAL PRECIPITATION FROM JULY TO SEPTEMBER 2007.

The seasonal precipitation isopercental pattern indicates that the most parts of the country received below normal rainfall. However Southwestern Sindh, coastal parts of Balochistan, some parts of southern Punjab, northern areas (Gilgit and Gupis) and northern Punjab received above normal rain fall.

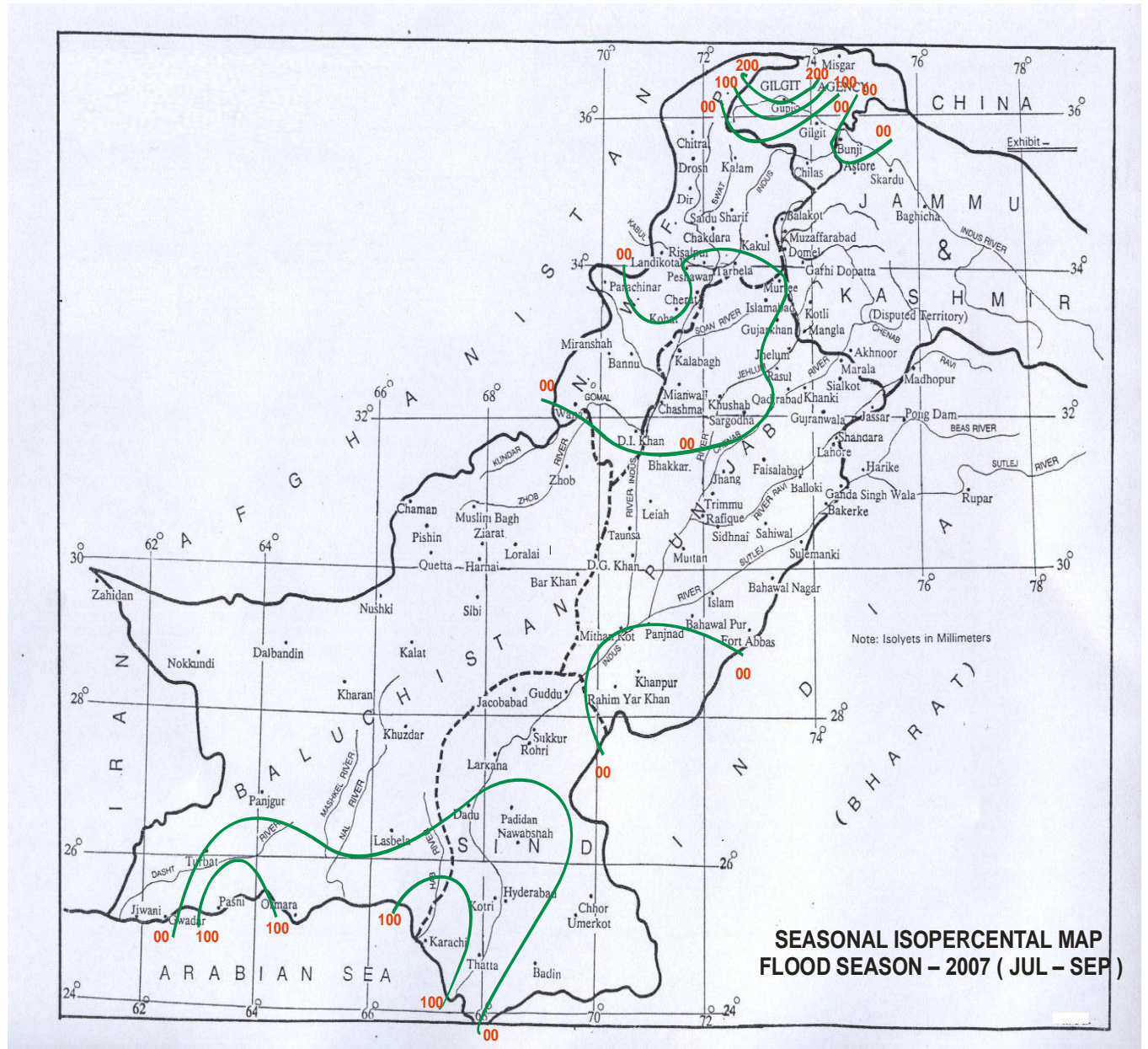


Figure 37: Isopercental map for the month of July-September, 2007



FLOOD LIMITS

RIVER	SITE	DESIGN CAPACITY	LOW	MED	HIGH	VERY HIGH	EXCEPTION ALLY 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
JHELMUM	KOTRI	8.5	2.0	3.0	4.5	6.5	8.0
	KOHALA	-	1.0	1.5	2.0	3.0	4.0
	MANGLA	10.6	0.75	1.1	1.5	2.25	3.0
CHENAB	RASUL	8.5	0.75	1.1	1.5	2.25	3.0
	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
RAVI	PANJNAD	7.0	1.5	2.0	3.0	4.5	6.0
	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
SUTLEJ	SIDHNAI	1.5	0.3	0.46	0.6	0.9	1.3
	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



8. FLOOD FORECAST EVALUATION FOR 2007.

The Flood Forecasting evaluation for 2005 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	30-06-2007	49645	L	45-60	100%
2	Chenab	Marala	29-06-2007	115961	L	100R180	100%
3	Chenab	Khanki	29-06-2007	105363	L	60R150	100%
4	Chenab	Qadirabad	29-06-2007	112442	L	50R150	100%
5	Jhelum	Mangla	30-06-2007	79800	L	40-60	75%
6	Indus	Tarbela	30-06-2007	355000	L	350-375	100%
7	Indus	Kalabagh	25-06-2007	254168	L	220-245	96%
8	Indus	Kalabagh	29-06-2007	256807	L	230-260	100%
9	Indus	Chashma	28-06-2007	265420	L	240-260	98%
10	Indus	Chashma	29-06-2007	316021	L	230-260	82%
11	Indus	Chashma	30-06-2007	323212	L	300-330	100%
12	Ravi	Balloki	02-07-2007	64145	L	50-65	100%
13	Ravi	Balloki	15-07-2007	46080	L	40-45	99%
14	Ravi	Balloki	26-07-2007	45915	L	45-50	100%
15	Indus	Kalabagh	03-07-2007	250722	L	230-250	100%
16	Indus	Kalabagh	09-07-2007	257009	L	220R300	100%
17	Indus	Kalabagh	15-07-2007	267807	L	240-270	100%
18	Indus	Kalabagh	25-07-2007	256509	L	240-265	100%
19	Indus	Chashma	01-07-2007	265106	L	260-285	100%
20	Indus	Chashma	10-07-2007	294862	L	250-280	95%
21	Indus	Chashma	15-07-2007	280068	L	260-290	100%
22	Indus	Chashma	23-07-2007	263981	L	200-230	87%
23	Indus	Chashma	26-07-2007	303538	L	240-265	87%
24	Indus	Taunsa	02-07-2007	297916	L	300F270	100%
25	Indus	Taunsa	13-07-2007	257138	L	235-255	99%
26	Indus	Taunsa	18-07-2007	267686	L	240-270	100%
27	Indus	Guddu	07-07-2007	266625	L	240-265	99%
28	Indus	Guddu	16-07-2007	244459	L	245-260	99%
29	Indus	Guddu	31-07-2007	218239	L	210-225	100%
30	Indus	Sukkur	08-07-2007	215040	L	210-225	100%
31	Ravi	Balloki	16-08-2007	51995	L	48-53	100%
32	Ravi	Balloki	23-08-2007	55145	L	45-50	91%
33	Chenab	Marala	12-08-2007	146518	L	150R300	96%
34	Chenab	Marala	14-08-2007	130857	L	90-120	92%
35	Chenab	Khanki	12-08-2007	124336	L	150R270	83%
36	Chenab	Khanki	14-08-2007	150793	M	60-90	60%
37	Chenab	Qadirabad	12-08-2007	129551	L	150R250	87%
38	Chenab	Qadirabad	15-08-2007	103578	L	155R175F80	100%
39	Jhelum	Mangla	14-08-2007	99800	L	40-70	70%
40	Indus	Tarbela	15-08-2007	284000	L	260-280	98%

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41	Indus	Kalabagh	03-08-2007	256509	L	230-260	100%
42	Indus	Kalabagh	16-08-2007	367912	L	330-360	98%
43	Indus	Chashma	04-08-2007	277074	L	210-250	90%
44	Indus	Chashma	15-08-2007	405401	M	335-370	91%
45	Indus	Taunsa	18-08-2007	353970	L	350-380	100%
46	Indus	Guddu	09-08-2007	215460	L	215-230	100%
47	Indus	Guddu	22-08-2007	347407	L	345-360	100%
48	Indus	Sukkur	24-08-2007	303610	L	300-330	100%
49	Indus	Chashma	03-09-2007	259562	L	210-220	85%

MEAN PERCENTAGE ACCURACY = 95%