

**GOVERNMENT OF PAKISTAN
MINISTRY OF WATER & POWER**

**ANNUAL FLOOD REPORT
2014**



**OFFICE OF THE CHIEF ENGINEERING ADVISOR &
CHAIRMAN FEDERAL FLOOD COMMISSION
ISLAMABAD**

ANNUAL FLOOD REPORT-2014



Breaching Section activated at Head Muhammad Wala Bridge (Multan)



District Jhang (Punjab)



District Sialkot (Punjab)



District Chiniot (Punjab)



2014 landslides in Skardu (Gilgit-Baltistan)



District Muzaffarabad (AJ&K)

**OFFICE OF THE CHIEF ENGINEERING ADVISOR/CHAIRMAN
FEDERAL FLOOD COMMISSION ISLAMABAD**

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FOREWARD

In Pakistan, floods are generally caused by the heavy concentrated rainfall in the catchment areas of major and other rivers during monsoon season, which are often augmented by snowmelt. Flood damages are caused mainly due to riverine flooding in major rivers and flash floods in secondary and tertiary rivers including hill torrents, besides, coastal & urban flooding. Pakistan had faced floods of various magnitudes since 1950 to 2014 resulting into affliction of vast areas of the four provinces including Gilgit-Baltistan, FATA and Azad Jammu & Kashmir. The country has suffered a cumulative financial loss of more than US\$ 38.00 billion during the past 67 years (1947 to 2013). Around 11,939 people lost their lives, some 192,596 villages damaged/destroyed and a total area of 613,721 Km² was affected due to 22 major flood events (**Table-I**). The 2010 flood was most devastating in nature, which caused 1985 deaths, affected about 20 million population and inundated land area of around 160,000 Km². The recent floods of 2014, affected around 2.600 million population, cropped area of about 2.415 million acres, 4,065 villages (damaging 107,102 houses) and claiming about 367 lives.

The impact of global climate change owing to remarkable increase in frequency of occurrence of floods and variation in monsoon behavior in the country. The past five consecutive flood events in the country indicate that flood has now become an annual feature in Pakistan. In order to reduce the increasing threat of flood events, there is a dire need to opt modern techniques and integrated approach for better flood management by improving the functioning of the river basin as a whole, recognizing that floods have beneficial impacts and can never be fully controlled. Such an approach seeks to maximize the net benefits from the use of floodplains and to minimize loss of life, subordinating flood loss reduction to the overall goal of maximizing the efficient use of the floodplain.

Keeping in view the future challenges, Federal Flood Commission had started working on formulation of National Flood Protection Plan-IV (2015-25). For that purpose consultants were engaged in May 2013 through World Bank funded Water Sector Capacity Building Project for preparation of NFPP-IV. The draft National Flood Protection Plan-IV prepared by the consultants is under review with concerned organizations. The Plan is likely to be finalized by mid April 2015. Actual implementation has been planned during the next ten years i.e. (2015-16) to (2024-25), subject to timely approval of plan by the Government of Pakistan and provision of adequate funds for construction of various interventions proposed in the NFPP-IV in coming years.

EXECUTIVE SUMMARY

The frequency of occurrence of floods in the region in general and Pakistan in particular has considerably increased since past several years, because of global warming and rapid climate change. That is why Pakistan has faced consecutive flood events during the past five years i.e. 2010, 2011, 2012, 2013 & 2014. The riverine/ flash floods and urban flooding were caused by torrential rains during the monsoon season and destroyed hundred thousands of houses and flooded millions acres of agricultural land, killing thousands of people, besides damage to other public & private infrastructure.

In Pakistan, floods are generally caused by the heavy concentrated rainfall, which are sometimes augmented by snowmelt and generate exceptionally high flood flows in major and other rivers flowing across the country. The torrential rains are caused due to monsoon currents originating from Bay of Bengal and resultant depressions (strong weather system) often cause heavy downpour in the catchment areas of major and other rivers including hill torrents, which is sometime augmented by the Westerly Wave from Mediterranean Sea.

Pakistan has suffered a cumulative financial loss of more than US\$ 38.055 billion during the past 67 years. Around 11,939 people lost their lives, some 192,596 villages damaged/destroyed and a total area of 613,721 Sq.km was affected due to 22 major flood events. The 2010 floods were worst flooding in the past about 80 years in the region (**Table-I**).

Prior to 1976, the Provincial Governments were responsible for the planning and execution of flood protection works. Heavy losses sustained to the economy during disastrous floods of 1973 & 1976 were discussed in the Inter-Provincial Conference and subsequently in January 1977, it was decided by the Federal Government to establish an organization at the Federal Government level for Integrated Flood Management on country wide basis. Accordingly Federal Flood Commission (FFC) was established on 4th January 1977 with charter of functions given as under;

- i. Preparation of National Flood Protection Plans (NFPPs);
- ii. Approval of flood control schemes prepared by Provincial Governments and concerned Federal Agencies;
- iii. Review of flood damages to flood protection infrastructure and review of plans for restoration and reconstruction works;
- iv. Measures for improvements in Flood Forecasting and Warning System;
- v. Standardization of designs and specifications for Flood Protection Works;
- vi. Evaluation and monitoring relating to progress of implementation of the National Flood Protection Plans (NFPPs);
- vii. Preparation of a research programme for Flood Control and Protection; and
- viii. Recommendations regarding principles of regulation of reservoirs for flood control.

Since its establishment, FFC has so far prepared and executed three National Flood Protection Plans i.e. National Flood Protection Plan-I (1978-88), National Flood Protection Plan-II (1988-1998) & National Flood Protection Plan-III (1998-2008) through Provincial Irrigation Departments and Federal Line Agencies. A total investment of Rs 17.00 billion has been made on construction/strengthening of 1400 sub-projects i.e. flood protection

infrastructure, besides, upgradation of country's existing Flood Forecasting & Warning System during the past 37 years (**Table-3**).

Keeping in view the level of investments made under the three National Flood Protection Plans (NFPP-I,II&III) and needs of the provinces & Federally Administered Areas (Gilgit-Baltistan, FATA & AJK), the National Flood Protection Plan-IV was prepared and submitted to Ministry of Water and Power in November 2006, for approval of the Competent Authority. The same could not be approved at that time due to low priority given to Flood Sector as result of drought like conditions over the country. Due to large scale damages as result of 2010 floods followed by 2011 & 2012-floods/rains, the need for investment in flood sector has gained importance. Federal Flood Commission started working on formulation of National Flood Protection Plan-IV (2015-25). For that purpose consultants were engaged in May 2013 through Water Sector Capacity Building Project for preparation of NFPP-IV. The draft National Flood Protection Plan-IV prepared by the consultants is under review of stakeholders. It is likely to be finalized by mid April 2015. Actual implementation is planned to be carried out during the next ten years i.e. {(2015-16) – (2024-25)} subject to the approval of plan by the Government of Pakistan and provision of adequate funds for construction of various interventions proposed in the NFPP-IV.

2014-Floods

As a result of torrential rains during the first week of September 2014 over the northern and central parts of Punjab Province (Lahore, Gujranwala, Rawalpindi & Faisalabad & Sargodha Divisions) and adjoining areas, besides, upper catchments of River Jhelum & Chenab including AJ&K caused severe urban and riverine flooding in the region. The heavy downpour in the upper catchments of River Jhelum & Chenab generated Exceptionally High Flood flows in both the rivers. The inflows in River Jhelum at Mangla Reservoir started increasing early morning of 4th September 2014, when the water level in reservoir was 1228.00 feet. The inflow gradually increased from 200,000 cusecs on 4th September at 0100 hours to 634,000 cusecs on 5th September 2014 at 1300 hours. The outflow during the period (4th September 0100 hours to 5th September 1300 hours) kept as per IRSA's INDENT (15,000 cusecs), and major chunk of inflow stored in reservoir. As result, water level in reservoir raised from 1228.00 feet to 1240.11 feet against the Maximum Conservation Level of 1242.00 feet. After issuance of necessary warnings to the Districts Administrations located in the downstream areas, the outflow was gradually increased from 34,000 Cusecs (5th September 2014 at 1200 hours) to 499,000 cusecs (5th September 2014 at 2200 hours), which affected the population, standing crops and private as well as public infrastructure located along the banks of the river Jhelum in District Jhelum & Mandibahauddin.

The inflow in River Chenab at Marala started increasing on 4th September (2000 hours). The first peak of 485,000 cusecs was safely passed on 5th September 2014 (0700 hours), whereas the 2nd peak of 862,000 cusecs (Exceptionally High Flood) was received on 6th September, 2014 at 0600 hours. Simultaneously, the tributaries of river Chenab (local nullahs) supplemented the flood flows in River Chenab downstream Marala Barrage, hence, flood peak of 947,000 cusecs was recorded at Khanki & 904,000 cusecs at Qadirabad Barrage on 7.9.2014. The flood peak of around 703,000 cusecs was recorded at Trimmu Barrage on 10.9.2014. Due to inadequate discharge capacity, the designated breaching sections of Khanki & Trimmu Barrage were operated, which inundated vast area and caused severe damaged to population and standing crops, besides, other private and public infrastructure. 2014-rains/floods affected population of about 2.600 million (4,065 villages), cropped area of about 2.415 million acres, claiming 367 lives and damaging 107,102 houses.

Way Forward

The past five consecutive years of flooding in Pakistan is the impact of global climate change owing to remarkable increase in frequency of occurrence of floods and variation in monsoon behaviour in the country. It is therefore very essential to chalk out Plan on country wide basis for short-term as well as long-term measures for better flood management in coming years. The Post Flood meeting of Federal Flood Commission was held on 10th November 2014, wherein the following preventative measures were recommended to be under taken before start of monsoon season 2015;

- (i) Irrigation Department, Government of the Punjab to expedite action on restoration and strengthening/rehabilitation of Irrigation, Drainage & Flood Protection Infrastructure damaged during Flood Season 2014. The exercise should be carried out on fast track basis, so as to complete the task well before the start of monsoon season 2015.
- (ii) Provincial Irrigation Departments (PIDs) to move on fast track for immediate restoration of balance restoration/rehabilitation works related to irrigation, drainage & flood protection infrastructure damaged during 2010, 2011, 2012 & 2013 floods before start of monsoon season 2015.
- (iii) PIDs to carry out field inspection of all flood protection infrastructure alongwith concerned Corps of Engineers, Pak. Army on war footing basis, so as to complete the task before 31st March 2015. Proposals for strengthening of all weak/damaged sections (urgent nature O&M Works) may be processed for approval of concerned fora. Simultaneously, matter may be taken up with Provincial Government for getting requisite funds. The entire exercise may be completed well before 30th June 2015.
- (iv) PMD/Flood Forecasting Division, WAPDA (H &WM Wing) & PCIW to thoroughly check their Flood Forecasting & Warning System equipment. All urgent nature repair/replacement works (O&M works) may be done before 30th June 2015.
- (v) PIDs in collaboration with Districts Administrations should make utmost efforts to remove encroachments from flood plains. The compliance report in this respect may be submitted to all concerned including FFC before 30th June 2015.
- (vi) PID, Punjab to pursue the case with IRI, Lahore for early completion of Model Study of the Project “Increasing the discharge capacity of Shahdara Railway Bridge on River Ravi” and submission of PC-I (long-term measures) to FFC for further processing. Simultaneously, necessary precautionary measures (*short-term measures*) may be undertaken for safe passage of monsoon season 2015.
- (vii) The designated breaching sections operated during Flood Season 2014 may be restored and strengthened by the respective organizations (PID, Punjab, NHA & Pak. Railway). The allied structures of Barrages/Bridges and connected flood embankments may be strengthened on the basis of new bench marks. The encroachments in the escape channels may also be removed with the help of District Administration.
- (viii) NHA & Pak. Railway to carry out survey of their existing Bridges to assess the damages occurred to bridges and their allied components during 2014-Flood Season. The choked sections of the bridges as observed during the 2010 & 2014 floods i.e.

Kabul & Jindi Rivers Bridges on Motorway M-I, Revaz & Shershah Railway Bridges, Head Muhammad Wala Bridge on River Chenab etc. may be cleared in order to restore the discharge capacity of those structures before start of monsoon season 2015.

- (ix) Provincial Irrigation Departments & Federal Line Agencies to strictly follow the approved schedule for Normal/Emergent Flood Programme so that urgent nature flood protection schemes taken up under PSDP (2014-15) could be completed by/before 30th June 2015.
- (x) WASA Rawalpindi to complete the balance re-sectioning/de-silting work (Long-Term Plan) of Lai Nullah before 30th June 2015.
- (xi) The coordination among flood management related organizations, especially during monsoon season needs to be further improved.
- (xii) Work on formulation of NFFP-IV (2015-25) may be accelerated for early finalization and approval by concerned authorities, so that work on proposed interventions could be started as per schedule given in the said plan.
- (xiii) Allocation of adequate funds under PSDP each year for timely completion of interventions proposed under NFPP-IV.

ACKNOWLEDGEMENT

The preparation of Annual Flood Report of Federal Flood Commission commenced from 1998 with a view to compile essential information on yearly basis for documentation of the yearly flood events, flood flow data, lessons learnt from those yearly events and for exploring the needs for future protective measures.

The 2014 Annual Flood Report contains inter-alia, information about historical floods in Pakistan, flood management works, functions of FFC & other related Provincial and Federal Government organizations, flood warning dissemination system and flood preparedness activities carried out during the flood season. The report also focuses on riverine and flash floods including urban flooding during monsoon season 2014, which caused considerable damages to private and infrastructure in Punjab, Gilgit-Baltistan & AJK including some parts of Sindh & Khyber Pakhtunkhwa.

Services of following officers are greatly acknowledged who contributed in a dedicated manner for the preparation of 2014-Annual Flood Report of Federal Flood Commission:

Sr. No.	Name	Designation	Role
1.	Mr. Asjad Imtiaz Ali	Chief Engineering Advisor/Chairman Federal Flood Commission	Supervisory
2.	Mr. Alamgir Khan	Chief Engineer (Floods)	Contributory
3.	Mr. Ashok Kumar	Superintending Engineering (Floods)	Contributory
4.	Mr. Zafar Iqbal	Senior Engineer (Floods)	Contributory
5.	Mr. Muhammad Mazhar Iqbal	Assistant Engineer (Floods)	Contributory
6.	Mr. Sibte Hassan	Assistant Engineer (Floods)	Contributory
7.	Mr. Yawar Rasheed	Assistant Engineer (Floods)	Contributory

**FLOODS
IN
GENERAL PERSPECTIVE**

1. FLOODS IN GENERAL PERSPECTIVE

1.1 Flood Problem in Perspective

Pakistan is a country with diverse type of land and fluctuating pattern of climate. Climate is usually considered hot and dry in Pakistan but it has shown significant obvious variations in last few years. Many districts and urban centers lying nearby to rivers are ever on a great risk to confront with different flood types i.e. riverine flood, flash flood and urban floods particularly in Punjab & Sindh provinces. Floods constitute one of the world's most serious environmental hazards. Four thousand years of recorded history tells of man's repeated failure to evade the destructiveness of floods. In spite of many years of experience and highly developed scientific techniques, floods even now continue to play havoc almost in every part of this planet.

Losses from floods annually destroy about million acres of crops land and affect hundred thousands of people with a monetary loss in billion of rupees. Major direct flood damages in Pakistan are to agricultural crops, urban and rural abadies, besides, other private & public utilities. It is generally recognized that complete prevention from floods is humanly impossible, but protection from flood is feasible and is a vital necessity. By proper planning, means can be devised to harness the fury of floods to safeguard human life and property. Devoid their destructive power, floods can be used in the service and the welfare of a community.

1.2 Floods in Pakistan

The floods in rivers are generally caused by heavy concentrated rainfall in the catchments, during the monsoon season, which is sometimes augmented by snow melt flows. Monsoon currents originating in the Bay of Bengal and resultant depressions often result in heavy downpour in the Himalayan foothills, which occasionally generate destructive floods in the main rivers and their major tributaries. Sometimes exceptionally high flood flows in major rivers are generated due to formation of temporary natural dams by landslide or glacier movement and their subsequent collapse.

Flooding of the Indus River and its tributaries represents the greatest hazard in Pakistan. Floods occur normally in summer season (July - October). Therefore, damages to agriculture are mainly to the standing Kharif crops. However, in some cases the inundated lands do not dry up in time and ultimately affecting sowing Rabi crops.

The major rivers (Indus, Jhelum, Chenab, Ravi, Sutlej) and secondary rivers (Kabul, Swat etc.) cause flood losses by inundating low lying areas round the rivers bed by damaging irrigation and communication network, besides, land erosion along the rivers banks. In the upper part of the Indus Basin (Punjab & Khyber Pakhtunkhwa), floodwater spilling over the high banks of the rivers generally returns to the river. However, in the lower parts of the country (Sindh province), the River Indus is flowing at ridge i.e. higher elevation than adjoining lands, hence, spill flood water do not return to the main river channel. This largely extends the extent and period of inundation resulting in more damages to abadies, standing crops and other private as well as public infrastructure. For that purpose flood

embankments have been constructed on either side almost in the entire length of River Indus in the Sindh Province and many vulnerable locations in the upper parts of the country. However, breaches are occurred sometimes in the flood embankments/River Training Works or overtopped, when the rivers attain the Exceptionally High Flood Level *{LMB Taunsa Barrage in Punjab & Tori Bund Complex in Sindh Province events during 2010-Monsoon Season}*. Such breaches often cause greater damages than would have occurred without the bunds because of their unexpected nature and intensification of land use following the provision of flood protection.

None of the Barrages/Headworks except Taunsa has been remodeled during past 63 years. These are aged structures and do not have enough capacity to withstand floods of 2010 magnitude. During exceptionally high floods stage these results in afflux on the upstream side, which sometimes results in breaches in the flood embankments. At times, the flood embankments have to be breached at predetermined locations to save the main structures *(RMB Jinnah Barrage was operated during Monsoon Season 2010)*.

1.3 Flood Control Objective & Need

Flood management planning in Pakistan is being carried out to essentially cover the following three specific objectives:

- i. To reduce or eliminate damages to existing properties;
- ii. To prevent future increase in damages; and
- iii. To mitigate the residual hazards.

In Pakistan, flood control planning is a complex problem and calls for great ingenuity and experience on the part of the planners. The nature of flood problems varies in each of the four provinces and federally administered areas due to varying physiographic, climatic, demographic, and socio-economic conditions. Even the characteristics of catchment areas of various rivers differ from each other. Flood problems relating to various provinces are given as under:

PUNJAB

In Punjab, the flood protection marginal bunds have been generally constructed either to protect Headworks and other irrigation structures, or to safeguard certain towns, villages & adjoining agricultural lands. Due to general topography of the area sloping towards the south-west, pre-determined breaching sections have been provided in the right marginal bunds for operation for safety of Headworks/ barrages in case of exceptional high flood flows i.e. likely to exceed the designed level. In order to protect areas from erosion, spurs have been constructed in critical reaches. These spurs have protected vast areas and in some cases even large tracks of eroded lands have been reclaimed.

SINDH

The Indus River flows on a ridge in Sindh Province and generally, surrounding areas (outside the flood embankments) are lower than the river bed; hence, water once leaving

the Indus River does not return back to the main channel. Escaped water thus causes greater damage to widespread areas, and it persists for a longer period even after flood peaks are over (*Refer Tori Bund, Mulchand Shah (M.S) Bund breaches during 2010-Monsoon Season*). Moreover, Sindh is situated on a receiving end of drainage of all the rivers and if flood protection measures adopted in the upper reaches are not properly planned, severe damages are likely to occur in the Province. In most of the reaches, a double line of flood embankments has been constructed on both sides of the river from Guddu to few kilometers short of Arabian Sea. These flood embankments have been further compartmentalized to contain widespread inundation.

KHYBER PAKHTUNKHWA

In Khyber Pakhtunkhwa, the floods are mainly due to flash flood flows in secondary rivers (Kabul, Swat, Panjkora, Kurram etc.) and major hill torrents/flood flow generating nullahs having steep bed slopes, which greatly increase flood velocity and severely erode the banks. In Khyber Pakhtunkhwa, mostly short spurs have been constructed to save the areas from erosion. A battery of about 40 spurs having considerable shank length and a Marginal Bund have been constructed along the right bank of Indus River “Chashma Barrage – Ramak Reach” for protection of D.I. Khan City and adjoining area from devastating flood flows of Indus River. A large number of spurs and flood embankments in critical locations have also been constructed along Kabul, Swat, Panjkora, Kurram rivers and other flood flows generating nullahs/hill torrents.

BALUCHISTAN

Due to peculiar physiographic and climatic characterizes in Balochistan, mostly the flood protection walls/embankments & short spurs have been constructed for protection of orchards, agricultural lands and abadies. Some bunds have also been constructed to serve as a flood diversion measures. The bed slopes of rivers and nullahs in Balochistan are very steep, hence, generate flash flood flows with high velocity causing banks erosion and inundations of low lying area along the banks of rivers and their tributaries.

GILGIT-BALTISTAN, FATA & AJK

The bed slopes of rivers and nullahs in Gilgit-Baltistan, FATA and AJ&K are very steep. The flash flood flows generated in main rivers and their tributaries cause severe banks erosion. Flood Protection walls and short spurs in PCC & gabion crates are constructed to check the spill action and banks erosion. The main purpose of such interventions is to provide protection to abadies, agricultural lands and other private and infrastructure.

1.4 WATER RESOURCES IN PAKISTAN

Five main rivers, namely, the Indus, Jhelum, Chenab, Ravi and Sutlej and their tributaries flow through the country's plains. The Indus, Jhelum and Chenab are known as the **Western Rivers** and Ravi, Beas, and Sutlej known as the **Eastern Rivers**. These rivers supply water to the entire Indus Basin Irrigation System. The rivers have their origin in the

higher altitudes and derive their flows mainly from snowmelt and monsoon rains. The catchment area of Indus is most unique in the sense that it contains seven (7) of the world's highest-ranking peaks, after Mount Everest. These include **K-2 (28,253 feet)**, **Nanga Parbat (26,660 feet)**, **Rakaposhi (25,552 feet)** etc. Likewise, barring the polar areas, seven (7) glaciers situated in the Indus catchment, **namely Siachin, Hispar, Biafo, Batura, Baltoro, Barpu and Hopper** are amongst the largest in the world.

1.5 IRRIGATION NETWORK OF PAKISTAN

The Irrigation System of Pakistan is the largest integrated irrigation network in the world, serving around 45 million acres of contiguous cultivated land. The system is fed by the waters of the Indus River and its tributaries. The irrigation network of Pakistan mainly comprises of 3 major reservoirs (Tarbela, Mangla & Chashma), 19 Barrages, 12 inter-river link canals, 45 independent irrigation canal commands and 143 medium dams (having height 15 meters and above).

The major storage reservoirs include Tarbela (*existing Live Storage Capacity = 6.557 MAF against original storage capacity of 9.70 MAF*), Chashma (*existing Live Storage Capacity = 0.263 MAF against original storage capacity of 0.70 MAF*) on River Indus and Mangla with existing Live Storage Capacity = 7.392 MAF (*this includes the additional storage capacity of 2.88 MAF after Mangla Dam Raising allowing Maximum Conservation Level of 1242 feet*) against original storage capacity of 5.34 MAF on River Jhelum. The schematic diagram of Indus Basin Irrigation System is given at **Figure-1**.

Diversion of river waters into off-taking canals is made through Barrages, which are gated diversion weirs. The main canals in turn deliver water to branch canals, distributaries and minors. The watercourses get their share of water through outlets in the irrigation channels. Distribution of water from a watercourse is made through a time-schedule called "Warabandi".

According to IRSA record, the average annual surface water availability from Western and Eastern Rivers is 148.18 MAF (*Western Rivers: 141.08 MAF & Eastern Rivers: 7.10 MAF*), whereas the maximum inflows recorded was 183.45 MAF (in year 1978-79) and minimum inflows were 99.05 MAF (in year 200102) during the post Tarbela period (*1976-77 to 2013-14*). *The Provincial utilization was 96.91 MAF, System losses were 17.93 MAF and Escapages downstream Kotri Barrage were 29.89 MAF.*

1.6 FLOOD PROTECTION FACILITIES IN PAKISTAN

The existing flood management strategy includes flood flows regulation by three major reservoirs (Tarbela, Chashma on Indus & Mangla on Jhelum), protection of important private & public infrastructure, urban/rural abadies and adjoining agricultural lands located along the rivers banks by flood embankments and spurs & other interventions, besides, Flood Forecasting & Early Warning System, Rescue & Relief measures in case of flooding situation. The Provincial Irrigation Departments (PIDs) maintain about 6,807 km

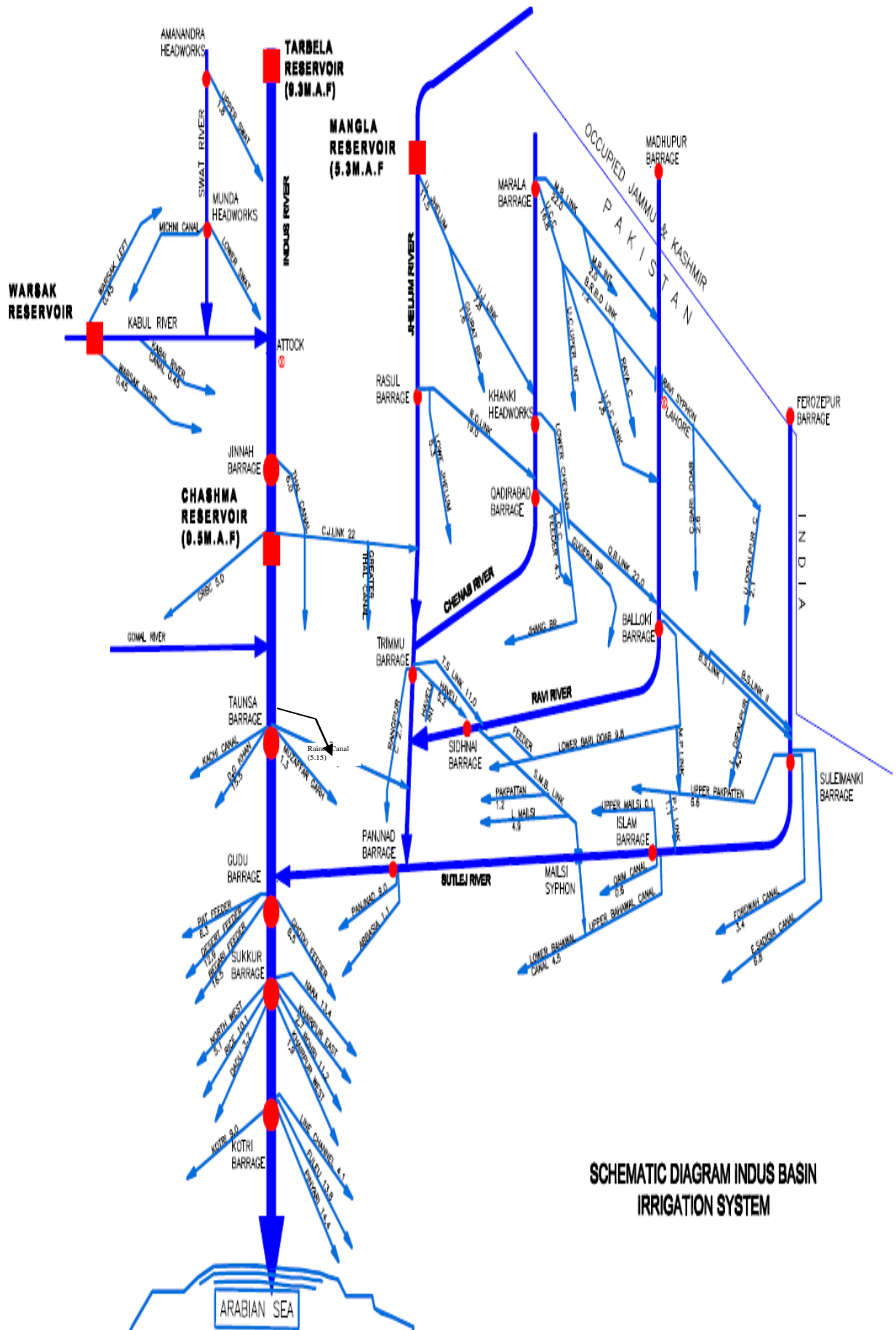
of flood protection embankments and around 1410 spurs along main and other rivers. Province-wise break up of existing flood protection facilities is given in **Table-1**.

TABLE-1

EXISTING FLOOD PROTECTION INFRASTRUCTURE*

Name of Province	Embankments (K.M)	Spurs (No.)
Punjab	3,334	496
Sindh	2,424	46
Khyber Pakhtunkhwa	352	186
Balochistan	697	682
Total	6,807	1,410

** The inventory is being updated*



SCHEMATIC DIAGRAM INDUS BASIN IRRIGATION SYSTEM

Figure 1: Schematic Diagram of Indus Basin Irrigation System

1.7 IMPACT OF GLOBAL WARMING & CLIMATE CHANGE ON FLOOD MANAGEMENT

Pakistan economy has faced significant losses due to environment damages and degradations. Besides many other challenges, climate change is emerging as perhaps the greatest environmental challenge for Pakistan causing floods, droughts and increasing hunger, poverty, displacement, soil degradation, desertification and deforestation. Global warming causes climate change, which is a serious issue for the world. It is a serious threat to the third world as its impacts will not be felt equally across our planet. Developing countries including Pakistan are much more vulnerable to the impacts of climate change. The melting rate of glaciers in South Asia has increased, which may cause floods in Pakistan and surrounding countries in the coming years.

There is strong need to educate people about these natural disasters that why these disasters are becoming more frequent in the region including Pakistan. Pakistan is a resource constraint country with a fast growing population, low natural resource development based and unfavorable local socio-cultural conditions, and climate change is an additional stress for the country. Educating masses about natural disasters and building up their preparedness at educational institutions can be of great help to minimize the damages of disasters. Media can play its due role in this regard as without its support, awareness cannot be boosted. Areas vulnerable to climate change-induced natural disasters must have a adequate flood protection facilities, besides, reliable Medium Range Weather/Flood Forecasting & Warning System in place.

1.8 HISTORICAL FLOOD EVENTS IN PAKISTAN

Since its creation, Pakistan has faced 22 severe flood event i.e. 1950, 1955, 1956, 1957, 1959, 1973, 1975, 1976, 1977, 1978, 19981, 1983, 1984, 1988, 1992, 1994, 1995, 2010, 2011, 2012, 2013 & 2014, the 2010 floods were worst ever in the country. The floods of various magnitudes since 1950 to 2013 affected vast areas in the four provinces including Gilgit-Baltistan, FATA & Azad Jammu & Kashmir.

Flood damages are caused mainly due to riverine flooding in main rivers and flash floods in Secondary & Tertiary Rivers/Hill Torrents, Coastal flooding due to Cyclone & urban flooding due to torrential rains and inadequate storm drainage facilities, besides, GLOFs. The unprecedented floods of 2010 were the worst floods in history of the country in which about 1985 people lost their lives, 1,608,184 houses were damaged/ destroyed, 17,553 villages were affected and total area of 160,000 Km² was affected.

Owing to adverse impacts of climate change, in the recent years, vulnerabilities of communities to coastal & urban flooding have also increased. The Sindh province, particularly southeastern parts of the province was severely affected due to unprecedented rains and inadequate drainage facilities during Monsoon Season-2011. The torrential rains during 2012 rains/floods affected Southern Punjab, Sindh & Balochistan provinces. About 571 people lost their lives, 636,438 houses were damaged/ destroyed, 14,159 villages were affected and a total area of 4,746 Sq.km was affected.

2014-FLOODS

The recent floods of 2014, affected cropped area of about 2.415 million acres (9,779 square kilometers) affecting 4,065 villages, claiming about 367 lives, fully damaging 107,102 houses and population of about 2.600 million has been affected. The historical flood events experienced in the past and their damages are given in the **Table-2**.

TABLE-2

HISTORICAL FLOOD EVENTS EXPERIENCED IN PAKISTAN

Sr. No.	Year	Direct losses (US\$ million) @ 1US\$= PKR 86	Lost lives (No)	Affected villages (No)	Flooded area (Sq-km)
1	1950	488	2,190	10,000	17,920
2	1955	378	679	6,945	20,480
3	1956	318	160	11,609	74,406
4	1957	301	83	4,498	16,003
5	1959	234	88	3,902	10,424
6	1973	5134	474	9,719	41,472
7	1975	684	126	8,628	34,931
8	1976	3485	425	18,390	81,920
9	1977	338	848	2,185	4,657
10	1978	2227	393	9,199	30,597
11	1981	299	82	2,071	4,191
12	1983	135	39	643	1,882
13	1984	75	42	251	1,093
14	1988	858	508	100	6,144
15	1992	3010	1,008	13,208	38,758
16	1994	843	431	1,622	5,568
17	1995	376	591	6,852	16,686
18	2010	10,000 @ 1US\$= PKR 86	1,985	17,553	160,000
19	2011	3730* @ 1US\$= PKR 94	516	38,700	27,581
20	2012	2640** @ 1US\$= PKR 95	571	14,159	4,746
21	2013	2,000^ @ 1US\$= PKR 98	333	8,297	4,483
22	2014	500^^ @ 1US\$= PKR 100.89	367	4,065	9,779
Total		38,055	11,939	192,596	613,721

* Economic Survey of Pakistan 2011-12

** NDMA (article at <http://www.claimsjournal.com/news/international/2012/10/05/214891.htm>)

^ Thomson Reuters Foundation (article at <http://www.trust.org/item/20130909134725-rm708/>)(Agriculture sector)

^^ Daily Times article "Economic losses due to recent floods in Pakistan" published on January 24, 2015

1.9 INTEGRATED APPROACH IN FLOOD MANAGEMENT

Integrated Flood Management (IFM) integrates land and water resources development in a River Basin, within the context of Integrated Water Resources Management, with a view to maximizing the efficient use of floodplains and to minimizing loss of life and property. Integrated Flood Management, like Integrated Water Resources Management, should encourage the participation of users, planners and policymakers at all levels. The approach should be open, transparent, inclusive and communicative; should require the decentralization of decision making; and should include public consultation and the involvement of stakeholders in planning and implementation.

The management of floods as problems in isolation almost necessarily results in a piecemeal, localized approach. Integrated Flood Management calls for a paradigm shift from the traditional fragmented approach, and encourages the efficient use of the resources of the river basin as a whole, employing strategies to maintain or augment the productivity of flood plains, while at the same time providing protective measures against the losses due to flooding. Sustainable development through Integrated Water Resources Management aims at the sustained improvement in the living conditions of all citizens in an environment characterized by equity, security and freedom of choice. Integrated Water Resources Management necessitates the integration both of natural and human systems, besides, land and water management.

Both population growth and economic growth exert considerable pressure on the natural resources of a system. Increased population pressure and enhanced economic activities in flood plains, such as the construction of buildings and infrastructure, further increase the risk of flooding. Flood plains provide excellent and technically easy livelihood opportunities in many cases. In developing countries with primarily agricultural economies, food security is synonymous with livelihood security.

The ecosystem approach is a strategy for the integrated management of land, water and living resources, a strategy that promotes conservation and sustainable use in an equitable manner. Both Integrated Water Resources Management (IWRM) and Integrated Flood Management (IFM) encompass the main principles of the ecosystem approach by considering the entire basin ecosystem as a unit and by accounting for the effects of economic interventions in the basin as whole. Environmental sustainability of the flood management options is one of the prerequisites in IFM.

Sustainable and effective management of water resources demands a holistic approach, linking social and economic development with the protection of natural ecosystems and providing appropriate management links between land and water uses. Therefore, water related disasters i.e. floods & droughts, as they play an important role in determining sustainable development, need to be integrated into water resources management.

A holistic approach to emergency planning and management is preferable to a hazard-specific approach and IFM should be part of a wider risk management system. This approach fosters structured information exchange and the formation of effective organizations relationships. In integrated flood management planning, achieving the common goal of sustainable development requires that the decision making processes of any number of separate development authorities be coordinated. Every decision that influences the hydrological response of the basin must take into account every other similar decision.

Adaptive management offers a robust but flexible approach to dealing with scientific uncertainties, wherein decisions are made as part of an ongoing science-based process. It involves planning, acting, monitoring and evaluating applied strategies and modifying management policies, strategies and practices as new knowledge becomes available. Adaptive management explicitly defines the expected outcomes; specifies the methods to measure performance; collects and analyses information so as to compare expectations with actual outcomes; learns from the comparisons and changes actions and plans accordingly. Water will be the primary medium through which the expected effects of climate change will materialize. Climate change and increased climate variability will affect flood processes in several ways simultaneously. Sea level rise will place coastal communities at higher flood risk and changing precipitation patterns will lead to an increased occurrence of flash floods and, in some regions, riverine floods. Integrated Flood Management takes account of those expected effects, and is therefore an autonomous adaptation strategy to climate variability and change.

The recurrence of the extreme precipitation anomalies that result in floods or droughts is a normal component of natural climate variability. The adverse effects of floods and droughts often entail far-reaching socio-economic and environmental implications, and may include loss of life and property; mass migration of people and animals; environmental degradation; and shortages of food, energy, water and other basic needs. The degree of vulnerability to such natural hazards is high in developing countries where necessity tends to force the poor to occupy the most vulnerable areas. The vulnerability of developed countries increases with economic growth and the accumulation of property in flood-prone areas and in highly urbanized settings.

Flood Management is an integral part of IWRM and describes the interplay between floods and the development process. It takes a look at traditional flood management practices; identifies the major challenges for flood managers and decision-makers dealing with sustainable development; and describes the basic tenets and requirements of IFM.

Integrated Flood Management is not universally applicable, but rather requires adaptation to specific situations, varying according to the nature of the floods, the flooding problem, the socio-economic conditions and the level of risk a society is prepared to take (or is forced to take) in order to achieve its development objectives. Similarly, the application of IFM at different administrative levels or geographic scales (national or transnational basins, for example) implies differentiated approaches to the process and to policy design.

1.10 FLOODS AND THE DEVELOPMENT PROCESS

Societies, communities and households seek to make the best use of the natural resources and assets available to them in order to improve their standard of life. They are all subject, however, to a variety of natural and man-made disturbances such as floods, droughts and other natural hazards, economic recessions and civil strife. These disturbances adversely affect personal assets and the multipliers of community well-being, such as job availability, the natural resource base and social networks, all of which contribute to the capacity to increase personal incomes. Unequal opportunities with respect to access to resources and information, and unequal power to participate in the planning and implementation of development policies mean that these disturbances have varying effects on different societies and on different groups within societies.

Natural disasters cause much misery, especially in developing countries where they cause great stress among low-income economies. Approximately 70 % of all global disasters are linked to hydro-meteorological events. Flooding poses one of the greatest natural risks to

sustainable development. Flood losses reduce the asset base of households, communities and societies through the destruction of standing crops, dwellings, infrastructure, machinery and buildings, quite apart from the tragic loss of life. In some cases, the effect of extreme flooding is dramatic, not only at the individual household level, but in the country as a whole.

Although living on a floodplain exposes its occupants to flooding, it also offers enormous advantages. The deep fertile alluvial soil of floodplains – the result of eon of flooding is ideal for higher crop yields and the location provides good market access. Floodplains typically support high population densities, such as riverine area along both sides of Indus River and its major tributaries. This high productivity contributes considerably to regional food security.

The balancing of development needs and risks is essential. The evidence worldwide is that people will not, and in certain circumstances, cannot abandon flood-prone areas. There is a need, therefore, to find ways of making life sustainable in the floodplains. The best approach is to manage floods in an integrated manner.

1.11 TRADITIONAL FLOOD MANAGEMENT OPTIONS

The traditional management response to severe floods was typically an adhoc reaction – quick implementation of a project that considered both the problem and its solution to be self-evident, and that gave no thought to the consequences of flood risks for upstream and downstream areas. Thus, flood management practices have largely focused on mitigating floods intensity and reducing their localized damages to private and public property. Traditional flood management has employed both structural and non-structural interventions, besides, physical and institutional interventions. These interventions were employed prior, during and after flooding and have often overlapped. The traditional flood management interventions are listed below;

- *Source control to reduce runoff:
Permeable pavements, a forestation artificial recharge;*
- *Storage of runoff:
Detention Basins, reservoirs etc.;*
- *Capacity enhancement of Headwork/Barrages across rivers:
Remodeling of Barrages/Headworks, provision of Bypass/Escape channels etc.;*
- *Separation of rivers and populations:
Land-use control, flood plan mapping & zoning, removal of illegal encroachments, construction of flood protection infrastructure.*
- *Emergency management during floods (flood forecasting & warnings, flood fighting works i.e. raising/strengthening flood embankments, evacuation of flood affectees from dangers zone and their temporary settlement at safe places; and*
- *Flood recovery:
Compensation of flood affectees and restoration of damaged public infrastructure.*

Surface water storages (large, medium & small dams), flood embankments and flood flows retention basins, is a traditional approach to attenuating flood peaks. Water storage attenuate floods by slowing the rate of rising waters, by enhancing the time it takes for the waters to attain high level and evade the synchronization of flood peaks, hence, lowering the peak level in the downstream areas. Such storages reservoirs serve multiple purposes

i.e. storage of water mainly for irrigation water supplies, hydropower generation including flood management. Storage Reservoirs have to be used in an appropriate combination with other structural and non-structural measures.

Seemingly self-evident, but regularly overlooked in practice, is the need to make flood management a part not only of the planning and design, but also of the operation of reservoirs. Releases of surplus water from reservoirs at the time, when rivers in the downstream areas experiencing high flood flows can create risks, therefore, careful operation of reservoirs can minimize the loss of human life and damages to property due to properly managed releases. In this context transboundary cooperation is indispensable.

Flood embankments are most likely to be appropriate for floodplains that are already intensely used, in the process of urbanization, or where the residual risks of intense floodplain use may be easier to handle than the risks in other areas i.e. (from landslides or other disturbances).

Land-use control is generally adopted where intensive development on a particular floodplain is undesirable. Providing incentives for development to be undertaken elsewhere may be more effective than simply trying to stop development on the floodplain. Where land is under development pressure, however, especially from informal development, land-use control is less likely to be effective. Flood protection or construction of houses at high elevation is most appropriate where development intensities are low and properties are scattered, or where the warnings times are short. In areas prone to frequent flooding, protection of the infrastructure and the communication links from floods can reduce the debilitating impacts of flood on the economy.

Flood Forecasting & issuance of timely warnings are complementary to all forms of intervention. A combination of timely, clear & accurate warning messages with a high level of community awareness gives the best level of preparedness for self-reliant action during floods. Public education programme/awareness campaign is crucial to the success of warnings intended to preclude a hazard from turning into a disaster.

Evacuation is an essential constituent of emergency planning, and evacuation routes may be upward into a flood refuge at a higher elevation or outward, depending upon the local circumstances. Outward evacuations are generally necessary where the depths of water are significant, where flood velocities are high and where the buildings are vulnerable. Successful evacuations require planning and awareness among the population of what to do in a flood emergency. Active community participation in the planning stage and regular exercises to assess the viability of the system help ensure that evacuations are effective. The provision of basic amenities such as water supply, sanitation and security in areas where affectees gather is particularly important in establishing a viable evacuation system.

1.12 THE CHALLENGES OF FLOOD MANAGEMENT

Both population & economic growths exert considerable pressure on the natural resources of a system. Increased population pressure and enhanced economic activities in floodplains, such as the construction of buildings and infrastructure, further increase the risk of flooding. Floodplains provide excellent, technically easy livelihood opportunities in many cases. In developing countries with primarily agricultural economies, food security is synonymous with livelihood security. Floodplains contribute substantially to the food production that provides nutrition for the people of these countries. While it can be argued that virtual water trade and by inference reduced dependence on flood prone and

water scarce areas could address the issue of food security, it would not address the issue of livelihood security. The competition for access to limited land resources can jeopardize the weaker areas of the population who largely occupy the floodplains, policy measures must be assessed for their overall effect on the livelihood opportunities of populations at risk.

1.13 RAPID URBANIZATION

When there are increases in population in rural areas, it is often difficult for the standard of living to improve beyond basic sustenance. Farm living is dependent on environmental conditions that are often difficult to predict, and in times of drought, flood or crop failure, survival becomes extremely problematic. Under these conditions, people move from rural environments into cities to seek economic opportunities and better access to basic services. Climate change is likely to accelerate the migration patterns into urban areas by altering the livelihood basis from both fishing and farming, and by increasing the occurrence and intensifying the effects of natural hazards.

According to 2014 Revision of World Urbanization Prospects, generally more people live in urban areas than in rural areas, with 54% of the world's population residing in urban areas in 2014. In 1950, 30% of the world's population was urban, and by 2050, 66% of the world's population is projected to be urban. Most of this urbanization will take place in developing countries where the growth is level in planned urbanization causes changes in the hydrological response of watersheds and affects and forms, water quality and habitat. Population growth and migration towards unplanned urban settlements in the floodplains of developing countries increase the vulnerability of the poorest sectors of society to flooding. These sectors of society also suffer from a lack of health and sanitation facilities and are thus most vulnerable to disasters and post disaster consequences. Flood Management policies must consider the needs of these societies.

1.14 CLIMATE VARIABILITY AND CHANGE

A variety of climate and non-climate parameters influence flood processes. Apart from the antecedent basin conditions, flood magnitudes depend on precipitation intensity, depth, timing, and spatial distribution. Temperature and wind affect snowmelt, which in turn affects flood magnitudes. The projected effects of global warming include changes in atmospheric and oceanic circulation, and many subsystems of the global water cycle are likely to intensify, leading to altered patterns of precipitation and runoff. Various climate model simulations show complex patterns of precipitation change, with some regions receiving less and others receiving more precipitation than they do now.

The likely increase in the intensity of tropical cyclones implies a corresponding increase in the intensity of precipitation events. Similar patterns are also likely in high latitude areas that are expected to experience an increase in mean precipitation. Most tropical and middle and high latitude areas are expected to experience a greater increase in extreme precipitation than in mean precipitation. These heavy precipitation events are likely to increase in magnitude and frequency, resulting in an increase in the frequency of major floods. Climate change poses a major conceptual challenge as it shakes the foundation of the normal assumption that the long term historical hydrological conditions will continue into the future. At the same time the future development path and the consequent impacts on climate change can at best be projected in terms of different development scenarios. Tackling climate change requires leadership, vision, capacity, and resources beyond our experiences to date.

FEDERAL FLOOD COMMISSION

2. FEDERAL FLOOD COMMISSION

2.1 Historic Background

Prior to 1976, the Provincial Governments were responsible for the planning and execution of flood protection works. Disastrous floods of 1973 & 1976 caused heavy loss of life and property and it was felt that the existing flood protection facilities and planning were inadequate to provide effective protective measures for the country. Heavy losses to the economy due to floods were discussed in the Inter-Provincial Conference held in January 1977 wherein it was decided to establish Federal Flood Commission (FFC) for integrated flood management on country wide-basis.

2.2 Functions of Federal Flood Commission

The functions under the charter of duties of FFC, as given in para-2 of Resolution, dated 4th January, 1977, are as under:

- i. Preparation of National Flood Protection Plans (NFPPs);
- ii. Approval of flood control schemes prepared by Provincial Governments and concerned Federal Agencies;
- iii. Review of flood damages to flood protection infrastructure and review of plans for restoration and reconstruction works;
- iv. Measures for improvements in Flood Forecasting and Warning System;
- v. Standardization of designs and specifications for Flood Protection Works;
- vi. Evaluation and monitoring relating to progress of implementation of the National Flood Protection Plans (NFPPs);
- vii. Preparation of a research programme for Flood Control and Protection; and
- viii. Recommendations regarding principles of regulation of reservoirs for flood control.

The Provincial governments and Federal Line Agencies undertake the flood protection schemes proposed under the National Flood Protection Plans (NFPPs). The Federal Government, however, provides the resources for meeting the capital costs of projects under NFPPs.

2.3 Achievements of FFC

Since its establishment in 1977, FFC has so far executed three 10-Years National Flood Protection Plans covering periods from 1978-1988 (NFPP-I), 1988-1998 (NFPP-II) and 1998-2008 (NFPP-III). Brief details of projects executed under the three 10-Years Plans are given as under:

National Flood Protection Plan-I (1978-88):

Details of flood protection schemes executed under **National Flood Protection Plan-I (NFPP-I)** through various programme/projects are given as under;

Normal/ Emergent Flood Programme:

- Expenditure incurred: Rs 1,729.75 million
- No. of flood protection schemes completed in the four Provinces, AJ&K, FATA & NA (now G-B): 311
- Source of Funding: 100% by GOP

Under NFPP-I, emphasis was mainly given on the implementation of structural measures (construction of flood protection structures). Pakistan Meteorological Department (PMD) and WAPDA carried out only maintenance works related to Flood Forecasting & Warning System equipments.

National Flood Protection Plan-II (NFPP-II) (1988-98):

Details of flood protection schemes/activities carried out through various programme/projects are given as under;

Normal/ Emergent Flood Programme:

- Expenditure incurred Rs 805.33 million
- No. of Schemes executed 170
- Source of funding 100% by GOP

Flood Protection Sector Project-I (FPSP-I):

- Expenditure incurred Rs 4,735.29 million
- No. of flood protection schemes executed 256
- Co-financed by GOP & ADB ADB= 80%
GOP = 20%

Under NFPP-II, the following activities were undertaken for improvement of Country's existing Flood Forecasting & Warning System through Flood Sector Protection Project (FPSP-I), which was jointly funded by ADB and GOP.

- Procurement & installation of Meteor-burst Telecommunication System (Phase-I) including one Master Station and 24 remote sensing stations.
- Installation of 10-CM Quantitative Precipitation Measurement (QPM) Weather Radar at Flood Forecasting Division (FFD) Lahore.
- Pre-feasibilities studies for four Barrages i.e. Sulemanki, Baloki, Trimmu & Panjnad for increasing their design discharge capacity to carry increased flood flows in view of 1992 floods.
- Preparation of Flood Plain Maps of Indus River (5-Reaches i.e. Chashma-Taunsa, Taunsa-Guddu, Guddu-Sukkur, Sukkur-Kotri & Kotri-Seas Reach).

Prime Minister's River Management Programme 1994-1996

- Expenditure incurred Rs. 613.386 million
- No. of schemes executed 10

- Source of Funding 100% by GOP

1988-Flood Damage Restoration Project

- Expenditure incurred Rs. 1,874 million
- No. of structures restored 2,028
- Source of Funding 90% by IDA & ADB,
10% by GOP

1992-Flood Damage Restoration Project

- Expenditure incurred Rs. 6,888.36 million
- No. of structures restored 1,980
- Source of Funding 80% by IDA, ADB & KfW
20% by GOP

National Flood Protection Plan-III (NFPP-III) (1998-2008):

Details of flood protection schemes carried out through various programme/projects are given as under;

Normal/Emergent Flood Programme:

- Expenditure incurred Rs 4,192.35 million
- No. of flood protection schemes executed in four Provinces, AJ&K, FATA, ICT and Northern Areas (Now Gilgit-Baltistan) 362
- Source of Funding 100% by GOP

Special Grant through President/Chief Executive Directive (2000-2002)

- Expenditure incurred Rs. 92.035 million
- No. of schemes executed 21
- Source of Funding 100% by GOP

Flood Protection Sector Project-II (FPSP-II):

- Expenditure incurred Rs 4,165 million
- No. of Flood Protection Schemes executed 101
- Source of Funding 80% by ADB,
20% by GOP
- Flood Forecasting & Warning System Rs 432.123 million

The major activities undertaken for improvement and upgradation of country's existing Flood Forecasting & Warning System include;

- Procurement & installation of 24 No. HF-Radio Sets.

- Procurement & installation of 20 additional remote sensing stations under existing Meteor-burst Telecommunication System (Phase-II);
- Upgradation of 10 CM Quantitative Precipitation Measurement Weather Radar procured under FPSP-I in the premises of FFD, Lahore;
- Upgradation of 5.36 CM Sialkot Weather Radar into 10 CM Quantitative Precipitation Measurement Weather Radar;
- Procurement & installation of a 10 CM Quantitative Precipitation Measurement Weather Radar at Mangla;
- Development of initial/1st version of Computer Based Flood Early Warning System (FEWS) through NESPAK, PMD & Delft Hydraulics;
- Expansion of Flood Plain Mapping activity covering major tributaries of River Indus i.e. Rivers Jhelum, Chenab, Ravi & Sutlej.
- Bathymetric Survey & flow measurements of Indus River and its major tributaries (*Sutlej, Ravi, Chenab & Jhelum*) for improvements in discharge rating curves & to collect data for FEWS Model & Flood Plain Mapping activities.

Establishment of Flood Forecasting & Warning System for Lai Nullah Basin (Islamabad & Rawalpindi):

- Expenditure incurred: Rs 348 million
- Source of Funding;
 - *Japanese Grand –in-Aid* Rs 337 million
 - *GOP share* Rs 11.00 million
- Facilities provided include:
 - Two No. Telemetry rainfall gauging stations at Golra, Islamabad and Bokra, Islamabad;
 - Two No. water level gauging stations at Kattarian Bridge, Rawalpindi and Gawalmandi Bridge, Rawalpindi;
 - Master control station in PMD, Islamabad;
 - Two monitoring stations at FFC and TMA/Rescue-1122-Rawalpindi respectively;
 - Executive Warning Control room in Rawalpindi Fire Brigade , and
 - Nine (9) No. warning posts at various locations.

2.4 National Flood Protection Plan -IV

After experiencing 2010 floods in country, the need for investment in flood sector has gained importance. Federal Flood Commission initiated working on formulation of

National Flood Protection Plan-IV on fast track basis and consultants were engaged in May 2013 through World Bank funded Water Sector Capacity Building Project (WCAP) for preparation of NFPP-IV. The draft National Flood Protection Plan –IV has been submitted by the consultants, which is under of stakeholders. The plan is likely to be finalized by mid April 2015. Actual implementation has been planned to be carried out during the next ten years i.e. from (2015-16) to (2024-25), subject to timely approval of plan by the Government of Pakistan and provision of adequate funds as per financial plan for construction of various interventions proposed in the NFPP-IV.

Presently, the urgent nature flood protection works being proposed by the Provincial Irrigation Departments and Federal Line Agencies are executed through GOP funded Normal/Emergent Flood Programme. However, due to inadequate budget allocation under PSDP each year (*minimal as compared to the Provinces & Federal Line Agencies demands*) for Normal/Emergent Flood Programme, some urgent nature flood protection schemes remain un-attended. The budget demand by the Provinces and Federal Line Agencies, budget allocated and actually released during the past five years {(2009-10) to 2013-14)} to PIDs & Federal Line Agencies is given in **Table-3**.

TABLE-3

**BUDGET DEMAND BY THE PROVINCES & FEDERAL LINE AGENCIES,
BUDGET ALLOCATED & RELEASED DURING PAST YEARS**

(Rs. Million)

Sr. No.	Financial Year	Funds demanded	Budget Allocation under PSDP		Funds Released
			Original	Revised	
1	2009-10	3,500.000	1,000.000	575.110	78.358
2	2010-11	3,500.000	740.798	735.798	276.714
3	2011-12	4,000.000	894.000	844.194	567.095
4	2012-13	4,000.000	900.000	900.000	419.325
5	2013-14	4,500.000	1,000.000	1,000.000	855.533
	Total	19,500.000	4,534.800	4,055.100	2,197.025

2.5 Normal/Emergent Flood Programme (2014-15)

Federal Flood Commission is presently coordinating implementation of Normal/ Emergent Flood Programme, which was started in (1978-79). It is a yearly program in which Provincial Irrigation Departments and Federal Line Agencies submit their schemes (based upon their shares) each year, which are processed by FFC for technical clearance of Scrutinizing Committee of FFC and approval of DDWP/CDWP. The award of contract, execution and disbursement is the exclusive responsibility of Provincial Irrigation Departments and Federal Line Agencies. The flood protection schemes are processed for approval and implementation before 30th June each year subject to in-time approval and release of funds by Planning Commission/Finance Division to the Line Agencies.

An amount of Rs. 1000.00 million has been allocated under PSDP (2014-15) for Normal/Emergent Flood programme. Out of which Rs. 341.477 million were released by Ministry of Water & Power/Planning Commission upto 31.12.2014. Overall 68 No. flood protection schemes costing Rs. 3681.725 million were taken up under PSDP (2014-15) for implementation under Normal/ Emergent Flood Programme, which includes 13 No. ongoing schemes, which could not be completed last year due to funding constraints. Detailed list of schemes is attached as **Appendix-I**.

2.6 Summary of GOP Investment on Flood Protection Works

The summary of federal investment on flood protection works since 1978 to June 2014 is given in **Table-4**.

TABLE 4

SUMMARY OF FEDERAL INVESTMENT ON FLOOD PROTECTION WORKS

Sr. No.	Flood Plans/ Programs	Location	No. of schemes	Expenditure (Rs Million)
1.	NFPP-I (1978-88)			
	Normal Annual Development Programme	Countrywide	311	1,729.75
2.	NFPP-II (1988-98)			
i.	Normal/Emergent Flood Programme	Countrywide	170	805.33
ii.	First Flood Protection Sector Project (FPSP-I)	Four Provinces	256	4,735.29
iii.	Prime Minister's River Management Programme (1994-96)	Punjab, Khyber Pakhtunkhwa & Balochistan	10	613.386
3.	NFPP-III (1998-2008)			
i.	Normal/Emergent Flood Programme	Countrywide	362	4,192.35
ii.	Second Flood Protection Sector Project FPSP-II (1998-2007)	Four Provinces	101	4,165.00
iii.	Special Grant through President/ Chief Executive Directive (2000-2002)	Gilgit-Baltistan	21	92.035
iv.	Lai Nullah Flood Forecasting & Warning System <i>through Japanese Grant</i>	District Rawalpindi & ICT	1	348.00
v.	Normal/Emergent Flood Programme (2008-14)	All over the country	174	2498.00
	Sub Total-I (NFPP-I,II &III)		1,406	19,179.00
4.	Flood Damage Restoration Projects			
i.	1988-Flood Damage Restoration Project	Four Provinces	2,028	1,874.00
ii.	1992-Flood Damage Restoration Project	Countrywide	1,980	6,888.36
	Sub Total-II		4,008	8,762.36
	Grand Total		5,414	27,941.72

FLOOD MANAGEMENT MECHANISM

3. FLOOD MANAGEMENT MECHANISM

3.1 Organizations involved and responsibilities

Flood management is a multifunctional process involving a number of organizations. The Government Organizations, which play major role in the flood management are the Provincial Irrigation Departments (PIDs), GB-PWD, Irrigation Directorate FATA, Irrigation & Small Dams Organization, Government of AJ&K, PMD/Flood Forecasting Division, Lahore WAPDA, PCIW, Federal Flood Commission, NDMA, Provincial Relief Organizations, Pak Army, Emergency Relief Cell (ERC), Cabinet Division, NHA, Pakistan Railways, Provincial Disaster Management Authorities, GB-DMA, FDMA, SDMA & DDMAs/ District Administration. Functions of these organizations are briefly described hereinafter;

3.1.1 Provincial Irrigation Departments:

The Provincial Irrigation Departments (PIDs) play a front line role in flood management, fighting and mitigation. Major flood related functions include:

- i. Operation and maintenance of Barrages and measurement of discharges at specific sites (Barrages/Headworks) on rivers, Irrigation & Drains Networks, besides, flood management facilities;
- ii. Planning, design, construction and maintenance of Irrigation, Drainage & Flood Protection & River Training Works;
- iii. Collection and transmission of Rivers flows data to FFD, Lahore, FFC and other concerned organizations for flood management activities;
- iv. Establishment & Operation of Flood Warning Centre during the monsoon season each year for sharing flood flows data and other information, besides, timely dissemination of the flood forecasts/warnings to concerned quarters;
- v. Preparation & implementation of the Flood Fighting Plans during monsoon season every year.

3.1.2 WAPDA

WAPDA is actively involved in the flood forecasting process as it provides water levels of major reservoirs (Tarbela, Chashma & Mangla), river flows and rainfall data collected through Flood Telemetric System/Gauged sites in the catchment areas of major rivers. The system is supplemented by Meteor-burst communication system. WAPDA supports another hydrometric data measurement and transmission system through its Surface Water Hydrology Project.

WAPDA's Flood Telemetric Network is directly linked with FFD, Lahore. WAPDA provides hydrometric flood data and water levels, inflows/ outflows of Tarbela, Chashma and Mangla reservoirs to FFD, Lahore, FFC and other concerned organizations. Coordination between FFD Lahore and WAPDA has considerably improved after the 1992-flood disaster. Regular meetings in the office of General Manager (Planning & Design) are held during flood season and necessary instructions are issued to Tarbela and Mangla Dam Flood Management Committees.

3.1.3 Provincial Relief Organizations/ Provincial Disaster Management Authorities:

Ultimate aim of flood warnings is to reduce the loss of life and damages to property of the community living in the flood prone/high risk areas. Provincial Relief Organizations (*now Provincial Disaster Management Authorities*) are responsible for disaster preparedness, preparation of emergency response plan, rescue and relief measures and rehabilitation plan and its approval from Provincial Government before implementation; examine the vulnerability of various parts of the province to different disasters and specify prevention or mitigation measures; lay down guidelines for preparation of disaster management plans by the Provincial Department and District Authorities; evaluate preparedness at governmental levels to respond to disaster and enhance preparedness; coordinate response in the event of disaster; give directions to DDMA's regarding actions to be taken in response to disaster; and promote general education, awareness and community training etc. pertaining to all disasters including floods. Relief functions at the District and Tehsil/Union Council level are now performed through the District Disaster Management Authorities, who coordinate with the concerned departments to carry out the disaster management functions at the District level.

3.1.4 Pak Army:

Pak Army's Corps of Engineers under the command and control of Engineer-in-Chief (*E-N-C*) provide necessary help to the civil authorities to carry out rescue and relief operations during floods. Provincial Governments facilitate Pak Army in providing necessary logistic support/equipment (boats, life jackets, vehicles, tents etc.) for such operations.

Pakistan Army's flood related functions encompass all the three phases of flood operations from the pre-flood to post flood phases including the important flood phase. Pre-flood phase is the flood preparatory phase during which the adequacy and serviceability of the flood fighting equipment is ensured. Pre-flood meeting are also held at the Corps Head Quarters and Engineer Directorate, GHQ in order to review the arrangements of PIDs, PDMA's & Federal Line Agencies for handling flood situation.

Pre-flood inspections of the flood protection structures are carried out by the respective Commander Corps of Engineers alongwith concerned officers of Provincial Irrigation Departments for their respective areas to ensure that the flood protection structures (Bunds, Barrages, Spurs etc.) are in satisfactory state of maintenance. Deficiencies, if any, are brought to the notice of PIDs. Availability of sufficient stock of explosives is ensured at pre-determined breaching sections to activate the pre-determined breaching sections, whenever required.

An officer of the 4 Corps Engineers is placed on duty in the Flood Warning Centre, Lahore, to keep a close watch on the flood situation. All flood forecasts and warnings are communicated to the CC Engineers 4 Corps in time, which are transmitted to the D.G. Engineers and all other CC of the Engineers. In the event of floods, units of the Pak Army move out to their respective areas of responsibility and carry out the relief and rescue operations in coordination with the respective civil administration. A post flood meeting is held under the Chairmanship of Engineer-in-Chief/ D.G. Engineers to discuss the performance of all the flood management related agencies with the view to bring about the necessary improvement in future.

3.1.5 Pakistan Commissioner for Indus Waters (PCIW)

Pakistan has a unique flood-forecasting problem in the sense that major part of the flood generating in upper catchments of Rivers Sutlej, Ravi, Jhelum and Chenab lie across the border in India/ held Kashmir. A number of water storage reservoirs have been constructed over Eastern Rivers (Ravi & Sutlej) across the border. As a result, the free flood flow conditions are disrupted making the operation of the rainfall/runoff model extremely difficult. The situation underlines the need for the acquisition of rivers flow data from across the border in respect of important sites over the rivers in India/held Kashmir. Consequently, an agreement had been signed between the two countries in 1989 through their respective Commissioners for Indus Waters, which includes provision/ sharing rivers flows data with India such rivers flow and rain data as is considered important for flood forecasting in Pakistan. A number of river flow stations are specified for this purpose.

The Pakistan Commissioner for Indus Waters receives the Chenab River and Eastern Rivers (Ravi & Sutlej) data normally once in a day. The data is then passed on to the FFD, Lahore for preparation and issuance of Flood forecast to concerned organizations. Frequency of data reception is increased to six hourly and even to hourly in case of severe flood situation. Pakistan Commissioner for Indus Waters is thus responsible to provide to FFD, Lahore, the much-needed data obtained from India for use in the flood forecasting models to ensure accurate forecasts for Rivers Sutlej, Ravi, Jhelum & Chenab. Pakistan Commissioner for Indus Waters is the only forum through which any clarification or further information can be obtained from India with regard to flood flows data of Chenab & Eastern River (Ravi & Sutlej).

3.1.6 Emergency Relief Cell (ERC), Cabinet Division

Emergency Relief Cell (ERC) exists under the Cabinet Division and is controlled by the Cabinet Division. The Cell is headed by the Director General. The main functions of the Emergency Relief Cell include:

- Planning and assessment of relief requirements for major disasters;
- Stock piling of basic need items during emergency such as dry ration, tents, blankets etc;
- Establishing emergency fund upon declaration of any part of the country as calamity affected; and
- Maintaining contact with NDMA, UNO and its related organizations, besides other international aid giving agencies.

3.1.7 Role of Federal Flood Commission in Flood Management/Mitigation

Before Monsoon Season

- FFC chalks out pre-emptive measures for safe passage of monsoon season, which are circulated amongst all stakeholders. Action taken on 1st March 2014.
- Monitoring and coordination the desilting work in critical reaches of Lai Nullah each year. The task was completed by WASA Rawalpindi before 30th June 2014;

- FFC organizes Pre-flood meeting to review progress on the pre-emptive measures and necessary instructions issued to flood management organizations. The meeting was organized on 7th May 2014.
- Federal Flood Commission participated in Pre-Flood Conference of Pak. Army held on 14th May 2014 in Engineer Directorate, GHQ Rawalpindi;
- Federal Flood Commission attended the Pre-flood Conference of NDMA held on 30th June & 1st July 2014;
- The annual meeting of Federal Flood Commission was organized on 23rd July 2014 under the chairmanship of Honourable Federal Minister for Water & Power to review the status of preparedness of flood management related organizations.

During Monsoon Season

- High Level Flood Management Committee having representation from FFC, NDMA, Engineers Directorate, GHQ, WAPDA, PMD, PCIW, IRSA & Provincial Irrigation Departments was notified for monsoon season as done in the past. The objectives of Committee are;
- To oversee/watch and ensure proper operation of Tarbela, Chashma and Mangla reservoirs during Monsoon Season,
- Ensure coordination among Flood Forecasting & Management related organizations;
- The Committee shall meet as frequently as needed during Monsoon Season
- FFC issues Daily Flood Situation Report to higher ups and Flood Management related agencies, based on Weather Forecasts/ Advisories and Rainfall & Rivers flow data as received from FFD, Lahore/PMD, WAPDA & PIDs.
- For that purpose Flood Communication Cell established in FFC works on round-the-clock basis during entire Monsoon Season (15th June to 15th October).
- Responsibility for response/ reaction to warnings issued by PMD/FFD, Lahore & FFC rests upon concerned Provincial organizations/District Administrations.

Post Monsoon Season Role of FFC

- FFC prioritize the list of emergent flood protection schemes in consultation with Provincial Irrigation Departments and Federal Line agencies for execution under GOP funded Normal/Emergent Flood Programme (2014-15);
- FFC technically scrutinize the PC-Is of flood projects and submit to Ministry of Water & Power for approval of DDWP/CDWP;
- FFC organized Post-flood meeting on 10th November 2014.
- Monitoring of flood protection schemes by FFC's Teams being executed under Normal/Emergent Flood Programme during their course of execution;

3.1.8 Flood Forecasting Division (FFD), Lahore

FFD, Lahore, the specialized unit of Pakistan Meteorological Department, which plays a pivotal role in the Flood Forecasting & Warning process obtains the hydro-meteorological data from the various National and International sources, which is then analyzed to produce weather & flood forecasts, warnings and disseminated to various Federal/Provincial organizations and electronic/print media through various means and also uploaded on PMD Website.

3.1.9 National Disaster Management Authority (NDMA)

Government of Pakistan had embarked upon establishing appropriate policy to minimize risks and vulnerabilities and passed NDMA ordinance 2006. National Disaster Management Authority (NDMA) has been established to serve as the focal point and coordinating body to facilitate implementation of disaster risk management strategies. This necessitates NDMA to directly interact/communicate with all stakeholders, including Ministries, Divisions, and Departments in relaxation to normal communication channel.

NDMA is an expedient to provide an effective national disaster management system and for matters connected therewith and incidental thereto. As per National Disaster Management Authority Act-2010, the main functions of NDMA are as under:

- i. Act as implementing, coordinating and monitoring body for disaster management;
- ii. Prepare the National Plan to be approved by the National Disaster Management Commission;
- iii. Implement, coordinate and monitor the implementation of the national policy;
- iv. Lay down guidelines for preparing Disaster Management Plans by different ministries or departments and the provincial authorities;
- v. Provide necessary technical assistance to provincial government and provincial authorities for preparing their Disaster Management Plans in accordance with the guidelines laid down by the National Disaster Management Commission;
- vi. Coordinate response in the event of any threatening disaster situation or disaster;
- vii. Lay down guidelines for or give directions to the concerned ministries or provincial governments and provincial authorities regarding measures to be taken by them to response to any threatening disaster situation or disaster;
- viii. For any specific purpose or for general assistance requisition the services of any person and such person shall be co-opted as member and exercise such power as conferred upon him by the authority in writing;
- ix. Promote general education and awareness in relation to disaster management;
- x. Perform such other functions as the National Disaster Management Commission may require performing.

3.2 Flood Warning Dissemination System:

Monsoon Season normally starts in 1st week of July (*sometimes, it starts little early*) and ends in last week of September (*sometimes prolongs upto mid October*). However, the

Flood Warning Centers of all flood management related agencies start functioning from 15th June every year for collecting weather & flood flows data and keep continue upto 15th October. During this period effective interaction and communication between various floods related provincial as well as federal agencies is maintained on round-the-clock basis in order to counter any eventuality due to monsoon rains/floods.

3.3 Pre-Flood Preparedness Meetings:

A number of pre-flood meetings are organized annually by the concerned flood management organizations, i.e. Pak Army, NDMA, and Ministry of Water & Power/FFC to review the status of preparedness and Flood Fighting Plans/arrangements of concerned organizations. The following pre-flood meetings were held during 2014;

- i. Pak Army Pre-Flood Coordination Conference was held on **May 14, 2014** at Engineers Directorate, GHQ Rawalpindi, which was attended by the Commanders of Pak. Army formations, FFC, NDMA, PMD, WAPDA etc. The Flood Preparedness Plans were reviewed;
- ii. The 49th Annual Meeting of Federal Flood Commission was organized on **July 23, 2014** in Ministry of Water & Power, Islamabad, under the Chairmanship of Honourable Federal Minister for Water & Power, to review the status of preparedness of concerned Federal & Provincial Government organizations and arrangements made for safe passage of Flood Season-2014.
- iii. A meeting for review the arrangements of flood management related organizations and also to evaluate progress on decisions taken in 49th Annual Meeting of FFC was arranged on **August 05, 2014** under the Chairmanship of Additional Secretary Ministry of Water & Power, in committee room of office of the Chief Engineering Advisor/ Chairman Federal Flood Commission, Islamabad.
- iv. The Post Flood meeting of Federal Flood Commission was held on November 10, 2014 in the committee room of O/o Chief Engineering Advisor/Chairman Federal Flood Commission, Islamabad under the Chairmanship of Honorable Chief Engineering Advisor/ Chairman FFC, Islamabad.
- v. Pak Army Post-Flood Coordination Conference was also held on **November 11, 2014** at Engineers Directorate, GHQ Rawalpindi, wherein the Commanders of Pak. Army formations, representatives from FFC, NDMA, PMD, and WAPDA etc. participated in order to share their experience of 2014 floods and lessons learnt for better flood management in future.

**PREPAREDNESS/
CONTINGENCY PLANNING
FOR
MONSOON SEASON 2014**

4. PREPAREDNESS & CONTINGENCY PLANNING FOR MONSOON SEASON 2014

The Federal Flood Commission (FFC) mainly plays coordination role among the Provincial as well as Federal Government Organizations dealing with flood management in the country minimizing the damages to human life, agricultural lands and other public and private property by managing the flood water, at the sole responsibility of provincial Irrigation Department, and Federal Line Agencies. However, as per practice, FFC holds meeting prior to start of Monsoon Season (1st July to 15th October) every year, to review the status of preparedness/ flood fighting arrangements made by Federal/Provincial Organizations in case of flood situation during Monsoon season.

4.1 Pre-emptive measures suggested by Federal Flood Commission for Monsoon Season-2014 for better flood management and minimizing flood losses

The Provincial Irrigation Departments of the four provinces and Federal Line Agencies were asked on 1st March 2014 to undertake the following pre-emptive measures well before the start of monsoon season-2014 for better flood management and minimizing flood losses.

- i. Completion of all ongoing flood protection works being executed through Public Sector Development Programme (PSDP) and Provincial Annual Development Programme well before start of Monsoon Season 2014.
- ii. Adequate O&M funds for Flood Protection Infrastructures may be allocated through Provincial Budget. All urgent nature O&M works/ activities of Irrigation, Drainage & Flood Protection Infrastructures may be completed well before the start of monsoon season 2014.
- iii. Pre-flood inspection of all Flood Protection Infrastructures (flood bunds, spurs, Barrages/Head Works and their allied components etc.) may be carried out alongwith concerned Corps of Engineers and critical reaches as identified by the inspection team may be got repaired/strengthened well before start of Flood Season 2014.
- iv. Necessary arrangements of explosive and others material may be made at sites of pre-determined breaching sections. Stone reserve stock/ flood fighting material may also be arranged at all critical reaches of flood embankments (*Flood Protection Infrastructures*).
- v. Flood Fighting Plans may be prepared by the PIDs & Federal Line Agencies at District level keeping in mind lessons learnt during the past four consecutive flood events (2010, 2011, 2012 & 2013) and circulated among concerned organizations.
- vi. The encroachments may be removed flood plains/waterways of main & other rivers including hill torrents and drains network, besides, settlement on flood protection structures well before the start of Monsoon Season-2014.
- vii. The Flood Damages Restoration works related to Irrigation, Drainage & Flood protection Infrastructure including RBOD-I, II & III damaged during 2010, 2011, 2012 & 2013 flood events may be completed on fast track basis before start of monsoon season 2014.
- viii. All essential O&M Civil & E/M works of all Barrages/Head- works may be carried out well before start of monsoon season 2014.

- ix. WAPDA and Pakistan Metrological Department/FFC, Lahore may carry out all essential O&M works of Flood Forecasting and Warning System equipment well in time and ensure that the System is fully functional before start of Monsoon Season 2014.
- x. The links for coordination among flood management related organizations at Federal & Provincial Government level needs to be further improved keeping in mind the experiences of past flood events.
- xi. National Highway authority (NHA) may take necessary measures (*on war footing basis*) at all vulnerable sites i.e. *under construction Sultan Bahoo Bridge, escape channel of Sher Shan Railway Bridge across River Chenab, Jacobabad & Jamali by pass roads etc.* for safe passage of flood flows during Monsoon Season 2014.
- xii. WASA Rawalpindi may carry out desilting work of constricted sections of Lai Nullah well before the start of Monsoon Season 2014. TMA & City District Government may take necessary steps for stoppage of encroachments, dumping solid wastes/garbage & building material in bed of Lai Nullah.

4.2 Preparatory Meeting of Federal Flood Commission

In order to review the status of implementation of above listed pre-emptive measures, first Pre-Flood Meeting of Federal Flood Commission was held on May 07, 2014 under the Chairmanship of Chief Engineering Advisor/ Chairman Federal Flood Commission in office of CEA/CFFC in order to review the status of preemptive measures by the Provinces & Federal Line Agencies for upcoming Monsoon Season 2014. The following directions were issued to PIDs/Federal Line Agencies, WAPDA & PMD etc;

- i. Irrigation Department of the four provinces & Federal Line Agencies will make utmost efforts to speed up physical progress on emergent nature repair/rehabilitation works related to Irrigation, Drainage & Flood Protection Infrastructure, so as to complete the same by/before 15th June 2014. The compliance report would be submitted to Federal Flood Commission soon after completion of the task.
- ii. Irrigation Department, Government of the Punjab, NHA & Pakistan Railway will confirm in written the availability of explosive and others material & earth moving machinery etc. at sites of pre-determined breaching sections before 15th June 2014).
- iii. PIDs & FLAs will arrange stone reserve stock/flood fighting material at all critical reaches of flood embankments as identified during pre-flood inspection. The compliance report would be submitted to FFC before 15th June 2014).
- iv. Provincial Irrigation Departments & Federal Line Agencies will finalize the remaining District/Division-wise Flood Fighting Plans and circulate the same among all concerned organizations before 15th June 2014.
- v. Provincial Irrigation Departments & concerned Federal Line Agencies will ensure removal of encroachments from flood Protection infrastructure and flood plains before start of Monsoon Season 2014 (15th June 2014). The compliance report would be submitted to FFC.
- vi. Provincial Irrigation Department & Federal Line Agencies will ensure completion of all essential damages restoration works related to Irrigation, Drainage & Flood Protection Infrastructure (damaged during the past consecutive four flood events

- i.e.2010 upto 2013) before 15th June 2014 and the compliance report would be submitted to Federal Flood Commission.
- vii. PMD/FFD, Lahore & WAPDA will complete installation of new AWS under ongoing projects/programme including left over maintenance works of Flood Forecasting & Warning System before 15th June 2014.
 - viii. PIDs & Federal Line Agencies will provide rainfall and run-off data of all stations being maintained by PIDs/FLAs regularly to Flood Forecasting Division, Lahore & FFC, especially during monsoon season.
 - ix. District Coordination Officer (DCO) Rawalpindi will direct the concerned quarter for removal of encroachments, solid wastes, building material & garbage from Lai Nullah Waterway. WASA Rawalpindi will also complete desilting work at critical locations. The entire task would be completed before 15th June 2014, so as to ensure smooth passage of flood flows during Monsoon Season 2014.
 - x. PIDs & Federal Line Agencies will strictly follow the implementation schedule duly approved by ECNEC for Normal/Emergent Flood Programme vide order No. ECNEC-75/3/2004 dated 27.07.2004.
 - xi. Provincial Irrigation Departments (PIDs) & Federal Line Agencies will submit scheme-wise physical & financial progress of flood protection schemes being implemented under Normal/Emergent Flood Programme regularly on monthly basis till their completion. The progress report should reach to FFC by/before 5th day of each month.
 - xii. PIDs & Federal Line Agencies will submit to Federal Flood Commission the compliance reports regarding recommendations of FFC's Monitoring Team communicated through Inspection reports without further delay for taking further action in the matter.
 - xiii. Secretary (Administration, Coordination & Infrastructure), FATA Secretariat will arrange joint sites inspection of Director (Irrigation & Hydel Power) & D.G (M&E), FATA Secretariat alongwith FFC's Monitoring Team of all ongoing and recently completed flood protection schemes executed/being executed under Normal/ Emergent Flood Programme regularly on monthly basis for review the quality and physical progress on flood projects.
 - xiv. Provincial Irrigation Departments (PIDs) & Federal Line Agencies will pursue their cases with Provincial Finance Departments for early transfer of funds released by the Federal Government, so that all emergent approved ongoing & new flood protection schemes are completed before 30th June 2014.
 - xv. Provincial Irrigation Departments & Federal Line Agencies will submit completion reports of all completed flood protection schemes on PC-IV Proforma (*in triplicate*) to Federal Flood Commission alongwith built-in drawings & X-sections for onward submission to Ministry of Water & Power and Planning Commission. PIDs & Federal Line Agencies will strictly follow the instructions of Planning Commission, while preparing the completion reports.

4.3 Establishment of Flood Communication Cell

The Flood Communication Cell of Federal Flood Commission started functioning from 15th June 2014 till end monsoon season (15th October 2014) on round-the-clock basis and

communicated river flow data to all provinces and concerned agencies on daily basis in normal/low flood stage and 6-hourly basis in case of danger flood levels in main rivers. Based on PMD's Weather Forecasts and Advisories, FFC also issued Daily Flood/Weather Situation Reports to all concerned agencies through its Flood Communication Cell during the entire monsoon season 2014.

4.4 Specific Activities/ Initiatives undertaken by Federal Flood Commission to mitigate damages/losses due to 2014-Rains/Floods

The other major activities/ initiatives undertaken by Federal Flood Commission to mitigate damages/losses due to 2014-rains/floods included the followings:

- i. A High Level Flood Management Committee having representation from Federal Flood Commission (FFC), National Disaster Management Authority (NDMA), WAPDA, Pakistan Meteorological Department (PMD), PCIW, IRSA, Irrigation Departments of the four provinces and Engineer Directorate, GHQ, Rawalpindi was notified by the Ministry of Water and Power for the monsoon season 2014, as was done in the previous Monsoon Season (2013). The primary objective of the Committee on flood management would be to oversee and ensure proper operation of Tarbela, Chashma and Mangla Reservoirs during Monsoon Season 2014, besides, coordination for Flood Forecasting & Management activities.
- ii. The 49th Annual Meeting of Federal Flood Commission was organized on July 23, 2014, under the Chairmanship of Honourable Federal Minister for Water & Power, to review the status of preparedness of concerned Federal/ Provincial Government organizations and arrangements made for safe passage of Flood Season-2014.
- iii. A follow up meeting on decisions taken in 49th Annual Meeting of FFC was also held on 5th August, 2014 under the Chairmanship of Additional Secretary, Ministry of Water & Power, in committee room of office of Chief Engineering Advisor/ Chairman Federal Flood Commission, Islamabad.
- iv. Country-wide monitoring of flood works has been conducted by Federal Flood Commission (FFC), during Financial Year (2013-14), despite limited manpower and logistic support.
- v. The de-silting work in critical reaches (in Rawalpindi City) was carried out by WASA, Rawalpindi prior to start of Monsoon Season 2014.
- vi. PCIW has been advised for making all necessary arrangements for obtaining river flow data of "Eastern Rivers i.e. Ravi, Sutlej & Bias" from Indian counterpart and its dissemination well in time to all concerned organizations for taking further action at their end during Monsoon Season-2014.
- vii. Federal Flood Commission (FFC) initiated working on formulation of "National Flood Protection Plan-IV" through World Bank funded Water Sector Capacity Building & Advisory Services Project (WCAP). The Consultants were engaged for preparation of Comprehensive Flood Management Plan (NFPP-IV) for next ten years (based on integrated & innovative approach). The study is likely to be completed by the end of calendar year 2014.
- viii. Pakistan Meteorological Department (PMD) with its specialized Unit i.e. Flood Forecasting Division (FFD) established at Lahore and WAPDA worked well

during the entire Monsoon Season-2014 in close coordination with Federal Flood Commission.

4.5 49th Annual Meeting of Federal Flood Commission

The 49th Annual Meeting of Federal Flood Commission was organized on July 23, 2014, under the Chairmanship of Honorable Federal Minister for Water & Power, to review the status of preparedness of concerned Federal/ Provincial Government organizations and arrangements made for safe passage of Flood Season-2014. The following directions were issued to PIDs/ Federal Line Agencies, WAPDA, WASA & PMD:

- i. Federal Flood Commission will prepare proposal for improvement in Flood Management Facilities in the Country in consultation with Provincial Irrigation Departments and Federal Line Agencies. For that purpose, Provincial Irrigation Departments & FLAs will submit their proposals to FFC through Fax/Email latest by 25th July 2014. FFC will compile the same and arrange a consultative meeting on 5th August 2014 before making presentation to Honourable Federal Minister for Water & Power.
- ii. Federal Flood Commission will convene Pre/Post-flood preparatory meetings more frequently, besides, Annual Meeting, so as to review the progress on the pre-emptive measures properly. The Annual meeting would be organized in last week of April/first week of May in future.
- iii. Provincial Irrigation Departments & Federal Line Agencies will ensure availability of flood fighting material, earth moving machinery & additional labour etc. at sites of all critical locations of flood protection structures during Monsoon Season 2014.
- iv. PID, Punjab will pursue the case with IRI, Lahore for completion of Model Study of the Project namely "Increasing the discharge capacity of Shahdara Railway Bridge on River Ravi" within next two (2) months. The PC-I alongwith clearance of PDWP would be submitted to FFC in October 2014 for further processing.
- v. FFC being an Apex body at Federal Government level will ensure proper coordination among flood management related organizations & play a lead role in flood management related activities.
- vi. FFC will speed up progress on Flood Plain Mapping & Zoning Studies for identification of High Risk Areas in Flood Plains/Waterways and chalk out a Comprehensive Policy/River Act for removal of encroachments in Flood Plains/Waterways and restriction on future settlements in Flood Prone Areas.
- vii. Provincial Irrigation Departments & Federal Line Agencies will ensure strict vigilance and round the clock patrolling of flood embankments along major & other rivers, especially vulnerable locations.
- viii. Adequate O&M funds would be allocated each year by provinces to ensure timely repair and maintenance of flood protection infrastructure.
- ix. National Highway Authority will take immediate steps for early completion of River Training Works/Flood Embankments along either side of newly constructed Sultan Bahoo Bridge across River Chenab. Meanwhile, all necessary arrangements will be made at site for safe passage of flood flows during Monsoon Season 2014.

- x. PCIW will ensure that all necessary arrangements are made with Indian Counterpart (ICIW) for obtaining Eastern Rivers flow data & its transmission to end users during Monsoon Season 2014.
- xi. WASA Rawalpindi will dispose of excavated soil at proper disposal point, so as to restore the flood flow capacity of Lai Nullah in choked section. TMA & City District Government will take solid steps for stoppage of encroachments, dumping solid wastes/garbage & building material in bed of Lai Nullah.
- xii. WASA Rawalpindi will involve concerned Members National & Provincial Assemblies in removal of encroachments and implementation of long-term measures without further delay.
- xiii. PIDs & Federal Line Agencies will strictly follow the timeframe/schedule for execution of flood protection works under Normal/Emergent Flood Programme duly approved by the ECNEC, so as to ensure completion of proposed schemes by/before the target date i.e. 30th June each year.

4.6 Follow up Meeting on decisions of 49th Annual Meeting of FFC

A progress review meeting on decisions taken in 49th Annual Meeting of FFC was held on 05th August, 2014 under the Chairmanship of under the Chairmanship of Additional Secretary, Ministry of Water & Power, in committee room of office of Chief Engineering Advisor/ Chairman Federal Flood Commission, Islamabad. The following directions were issued to PIDs/ Federal Line Agencies, WAPDA & PMD:

- i. Provincial Irrigation Departments & Federal Line Agencies including PMD & WAPDA will prepare the concise presentation (*on the guidelines given by the Chair during the meeting*) to FFC by/before August 06, 2014 through {E-mail address: alamgir1962@hotmail.com}.
- ii. FFC will also prepare a comprehensive presentation for Honourable Federal Minister for Water & Power.
- iii. Next high level meeting to be chaired by the Honourable Federal Minister for Water & Power is likely to be held in 3rd week of August 2014 in the Committee Room of Ministry of Water & Power. The date & timing confirmation of the said meeting would be communicated by FFC to all concerned well in time.
- iv. Ministry of Water & Power will write D.O. letter to Chief Secretary, Government of Gilgit Baltistan regarding non-attendance or very low level participation by the GB-PWD in Ministry of Water & Power/Federal Flood Commission meetings.
- v. Irrigation & Small Dams, Government of AJK, Irrigation & Hydel Power, Directorate, FATA Secretariat will arrange meetings with Political Administrations/APAs and prepare Flood Fighting Plan for better flood preparedness during the Monsoon Season 2014. The Plan would be submitted to FFC within the weeks' time.

4.7 Post Flood Meeting of FFC

The Post Flood meeting of Federal Flood Commission was held on November 10, 2014 in the committee room of O/o Chief Engineering Advisor/Chairman Federal Flood

Commission, Islamabad under the Chairmanship of Honorable Chief Engineering Advisor/ Chairman FFC, Islamabad in order to review the damages caused to irrigation, drainage and flood protection infrastructure due to 2014 rains/floods. The following directions were taken:

- i. Irrigation Department, Government of the Punjab would expedite action on preparation of Plan for restoration and strengthening/rehabilitation of Irrigation Drainage & Flood Protection Infrastructure damaged during Flood Season 2014. The exercise would be carried out on fast track basis, so as to complete the task well before the start of Monsoon Season 2015.
- ii. Provincial Irrigation Department (PIDs) need to be fully active and move on fast track for immediate restoration of damaged infrastructure through their Provincial resources, besides, early completion of ongoing 2010, 2011, 2012 & 2013-Flood Damages Restoration and Rehabilitation including strengthening/remodeling work i.e. before start of Monsoon Season 2015.
- iii. PIDs would carry out field inspection of all flood protection infrastructure on war footing basis. Proposal for strengthening of all weak/damaged sections (urgent nature O&M Works) would be processed for approval of concerned forum. Simultaneously, matter would be taken up with Provincial Government for getting requisite funds. The entire exercise would be completed well before 30th June 2015.
- iv. PMD/Flood Forecasting Division, WAPDA (H&WM wing) & PCIW would thoroughly check their Flood Forecasting & Warning System equipment. All urgent nature repair/replacement works (O&M works) would be carried out before Pre-flood meeting of FFC.
- v. NDMA will share report on Multi-Sectoral Initial Rapid Assessment of flood damages caused during 2014 Monsoon Season with Federal Flood Commission.
- vi. Irrigation Departments, Government of Sindh and Balochistan would extend all possible assistance to PMD/Flood Forecasting Division, Lahore in providing rainfall and rivers flow/run off data to Flood Forecasting Division (FFD), Lahore on daily basis during forthcoming Monsoon Seasons.
- vii. PIDs in collaboration with District Administrations would make utmost efforts to remove encroachments from flood plains. The compliance report in this respect would be submitted to FFC before Pre-Flood Meeting of FFC, which is planned to be organized in April/May 2015.
- viii. PID, Punjab will pursue the case with IRI, Lahore for early completion of Model Study of the Project namely "Increasing the discharge capacity of Shahdara Railway Bridge on River Ravi". The updated PC-I alongwith clearance of PDWP would be submitted of FFC for further processing. The concerned organizations (SNGPL, Pak. Railways, Highway Department etc.) would be kept on board, while, updating PC-I.
- ix. The breaching sections operated during Flood Season 2014 would be immediately restored by the respective organizations (PID, Punjab, NHA & Pak. Railway). The allied structures i.e. LMB, RMB of Barrages/Bridges and connected flood embankments would be strengthened on the basis of new bench marks. The

encroachments in the escape channels would also be removed with held of District Administration.

- x. NHA & Pak. Railway would carry out survey of their existing Bridges to assess the damages occurred to bridges and their allied components during 2014-Flood Season. The chocked sections of the bridges as observed during the 2010 & 2014-Flood (like Kabul & Jindi Rivers Bridges on Motorway M-I, Revaz & Shershah Railway Bridges on River Chenab etc.) would be opened in order to restore the discharge capacity of those structures. The rehabilitation/strengthening and channelization works would also be completed before Pre-Flood Meeting of FFC to be held in April/May 2015.
- xi. Provincial Irrigation Departments & Federal Line Agencies would strictly follow the ECNEC approved schedule for Normal/ Emergent/ Flood Programme so that urgent nature flood protection schemes taken up under PSDP (2014-15) could be completed well before the start of Monsoon Season 2015/30th June 2015.
- xii. District Coordination Officer (DCO), Rawalpindi will direct the concerned quarter for removal of encroachments from Lai Nullah Waterway (banks and bed of Nullah). WASA Rawalpindi will also complete the balance resectioning/de-silting work of Long-Term Plan before 30th June 2015.
- xiii. District Coordination Officer (DCO), Rawalpindi will arrange joint meeting of all concerned organizations at the earliest to resolve the issue regarding stoppage of throwing solid wastes/building material and removal of encroachments from waterway of Lai Nullah. WASA, Rawalpindi would pursue the case for organizing meeting within a month's time.
- xiv. Irrigation Department, Government of the Punjab, Khyber Pakhtunkhwa & Balochistan will submit PC-Is proposed flood protection schemes taken up under PSDP (2014-15) through Normal/Emergent Flood Programme without further delay to FFC for consideration of Scrutinizing Committee of FFC.
- xv. Provincial Irrigation Department & Federal Line Agencies will submit utilization accounts of Normal/ Emergent Flood Programme alongwith demand for next installment of funds of FFC within a month's time for taking up their cases with Ministry of Water & Power/Planning Commission.
- xvi. In wake of consecutive flood events during the past five years in the country including recent flood 2014, Planning Commission would consider the demand of additional funds on priority basis for enhancing the budget allocation for Normal/ Emergent Flood Programme under PSDP (2014-15) from Rs. 1000 million to Rs. 5000 million. The outcome of the demand (presently under process with Planning Commission) would be communicated at the earliest to Ministry of Water & Power/FFC, so that proposed woks could be processed for approval and executed before start of Monsoon Season 2015.
- xvii. Provincial Irrigation Department & Federal Line Agencies will submit to FFC the completion reports of all completed flood protection schemes on PC-IV Proforma (in triplicate) along with as-built drawing, X-sections & coloured site pictures immediately for onward submission to Ministry of Water & Power and Planning Commission.

- xviii. Provincial Irrigation Departments & Federal Line Agencies will fully comply with already communicated recommendations of FFC's Monitoring Team regarding execution of flood protection schemes and convey the compliance reports at the earliest to FFC.

- xix. The next/Pre-Flood meeting of FFC would be held in April/May 2015 to review the progress on above listed decisions and status of preparedness of PIDs and FLAs for Monsoon Season 2015.

FLOODS-2014

5. MONSOON SEASON 2014

The rains/floods of 2014 caused considerable damages to private as well as public infrastructure in Punjab and some parts of Sindh, Khyber Pakhtunkhwa and Gilgit-Baltistan & AJK due to riverine and flash floods, besides, urban flooding. Torrential rains during first week of September 2014 in the Northeastern parts of the country, augmented by flood flows from India, resulted in High to Exceptionally High Flood discharges at various control points (Barrages) on River Chenab, Jhelum & Ravi. The unprecedented rains in northern Punjab (Lahore & Gujranwala Divisions) caused severe urban and flash flooding. The Exceptionally High Flood flows in the Jhelum & Chenab and their tributaries (local Nullahs) caused severe riverine/flash flooding in northern and central parts of Punjab (Lahore, Gujranwala, Rawalpindi & Faisalabad, Sargodha & Multan Divisions).

5.1 Seasonal Rainfall Forecast for Monsoon Season 2014 issued by PMD

Pakistan Meteorological Department issued following Seasonal Forecast for Monsoon Season 2014:

“The total amount of rainfall averaged over Pakistan during monsoon season (July – September 2014) will remain slightly below normal, which means that overall availability of water in the country from monsoon rainfall would be satisfactory. Main features of **Seasonal Outlook** are as under;

- i. Onset of monsoon is likely to be in the last week of June, 2014 and the rainfall during July will remain below normal.
- ii. Rainfall will increase gradually in August over Northern parts of the country. During August and September, monsoon will remain by and large normal. However, northeastern parts of the country are expected to receive slightly above normal precipitation during the period. Effective water management practices may be adopted to fill the major reservoirs upto their Maximum Conservation Level.
- iii. At occasions, the interaction of Easterly and Westerly Systems may result in heavy downpour causing localized urban/ flash flooding.
- iv. Monsoon rainfall would be unevenly distributed during July to September.”

Note: This is a seasonal forecast with confidence level of 80% and meant for the planning purpose only. Normal rainfall for the period July to September of Pakistan is 137.5 mm.

5.2 Floods/Rains during Monsoon Season 2014

5.2.1 Significant Flood Situation in River Jhelum:

- Inflows in Mangla Reservoir started increasing early morning of 4th September 2014, when water level in reservoir was 1228.00 feet.
- Inflow gradually increased from 200,000 Cusecs on 4th September at 0100 hours to 634,000 Cusecs on 5th September 2014 at 1300 hours, raising reservoir level to 1240.11 feet.

- After issuance of necessary warnings to Districts Administrations in downstream areas, outflow was gradually increased from 34,000 on 5th September 2014 at 1200 hours to about 499,000 Cusecs on 5th September 2014 at 2200 hours. After receding inflows in reservoir, outflow was accordingly reduced.
- River Jhelum at Rasul attained Exceptionally High Flood level (with maximum discharge of 516,000 cusecs) on 6.9.2014 at 0900 hours.

5.2.2 Significant flood situation in River Chenab:

- Inflow at Marala started increasing on 4th September at 2000 hours.
- On 6th September, 2014, warning of Exceptionally High Flood was received from PMD and flow increased to 861,000 cusecs on the same day at 1800 hrs. Concerned agencies including NDMA, District Administrations were immediately informed about the situation by PMD/Flood Forecasting Division, Lahore and Federal Flood Commission.
- As a result of riverine/flash floods & urban flooding, Lahore, Gujranwala, Rawalpindi & Faisalabad & Sargodha Divisions and adjoining areas experienced massive inundation.
- Outflow from Marala Barrage, supplemented by flows from local Nullahs, enhanced flood peak upto 947,000 Cusecs which arrived at Khanki Barrage (Design Capacity: 800,0000 cusecs) on early morning of 7th September. Breaching section was activated by Punjab Irrigation Department (PID) to save the Barrage. No loss of life was reported and water re-entered the river without affecting any population.
- Flood peak of 904,285 cusecs was experienced at Qadirabad Barrage (Design Capacity 800,000 cusecs) at 1100 hrs on 7th September which was passed safely without activating breaching section.
- Flood peak of around 703,000 cusecs reached Trimmu Headworks (Design Capacity 645,000 cusecs) on 10th September at 1900 hrs. The pre-determined breaching section in RMB (Right Marginal Bund @ RD 18000) was operated on 10th September at 1000 hours as per SOPs of the Headworks. Two breaches had occurred in Jhang Flood Protection Bund located along left bank of Chenab River.
- Around 70,000 – 75,000 Cusecs flood flow reportedly passed through the breach. Athara Hazari Tehsil, Kot Bahadar, Basu Astana, Ahmedpur Sial and adjoining areas (around 79 villages) were affected.
- A peak discharge of 454,000 cusecs was recorded in River Chenab at Panjnad (High Flood Stage) on 16th September 2014.

The flood flows (inflows & outflows) of major rivers at important control structures i.e. Reservoirs & Barrages (including hydrographs of Rivers Jhelum & Chenab) is attached as **Appendix-II**, whereas rainfall data of monsoon season 2014 is attached as **Appendix-III**, and historic details of Escapages below Kotri Barrage during the period {(1976-77) to (2013-14)} is attached as **Appendix-IV**.

5.3 Highest ever recorded flood peaks during major flood events

Highest ever recorded flood peaks during major flood events at various control points of Indus Basin are given in **Table-5**.

5.4 Country-Wide Losses/ Damages due to 2014 Rains/ Floods

The rains/floods of 2014 caused considerable damages to private as well as public infrastructure in Punjab and some parts of Sindh, Khyber Pakhtunkhwa and Gilgit-Baltistan & AJK due to riverine and flash floods, besides, urban flooding. The 2014-rains/floods affected cropped area of about 2.415 million acres, 4,065 villages, claiming about 367 lives, fully damaging 107,102 houses and a population of about 2.600 million has also been affected. Province wise detail of losses/damages is given in **Table-6**.

5.5 2014-Rains/Flood Damages to Flood Protection Infrastructure and need for their Restoration/ Rehabilitation

As reported by the Irrigation Department, Government of the Punjab 172 No. Sub-works of emergent nature costing Rs.766.573 million were immediately restored from provincial resources, whereas funds for restoring the remaining 159 Nos. works costing to Rs. 3892.890 Million were being pursued for which summary for arranging funds was moved to Chief Minister, Govt. of the Punjab. Zone wise detail is given in **Table-7**:

Table-5
Major Flood Events & Historic Flood Peaks Recorded in Major Rivers

Dam/ Barrage Site	Designed Capacity	Highest Recorded		1973 Peak Date	1976 Peak Date	1988 Peak Date	1992 Peak Date	2010 Peak [^] Date	2011-Peak [^] Date	2012-Peak [^] Date	2013-Peak [^] Date	2014-Peak	
		Year	Flow (Cusecs)									Inflow/Date	Outflow/Date
Indus River													
Tarbela Reservoir	1,500,000	1929	8,75,000	<u>420,000</u> July 1973	<u>304,000</u> 3.8.76	<u>556,900</u> 22.7.88	<u>500,000</u> 10.9.92	<u>833,000</u> 30.7.10	<u>272,200</u> 28.6.11	<u>295,000</u> 4.8.12	<u>392,000</u> 14.8.13	<u>299,000</u> 28-7-2014	<u>240,000</u> 15-8-2014
Jinnah Barrage	950,000	1942	950,000	<u>564,000</u> 20.7.73	<u>862,000</u> 2.8.76	<u>598,000</u> 2.8.88	<u>849,245</u> 10.9.92	<u>937,453</u> 30.7.10	<u>293,900</u> 26.7.11	<u>285,300</u> 18.7.12	<u>479,603</u> 13.8.13	<u>258,000</u> 25-7-2014	<u>250,000</u> 25-7-2014
Chashma Barrage	950,000	2010	1,036,700	<u>510,000</u> 22.7.73	<u>787,000</u> 3.8.76	<u>580,000</u> 3.8.88	<u>668,000</u> 11.8.92	<u>1,036,700</u> 1.8.10	<u>356,500</u> 28.7.11	<u>298,300</u> 8.7.12	<u>637,482</u> 14.8.13	<u>282,000</u> 17-8-2014	<u>258,000</u> 17-8-2014
Taunsa Barrage	1,000,000	2010	960,000	<u>568,000</u> 29.7.73	<u>675,000</u> 7.8.76	<u>560,000</u> 21.7.88	<u>655,000</u> 14.9.92	<u>960,000</u> 2.8.10	<u>249,200</u> 31.8.11	<u>243,400</u> 10.9.12	<u>516,017</u> 17.8.13	<u>261,000</u> 30-7-2014	<u>233,000</u> 30-7-2014
Guddu Barrage	1,100,000	1976	1,199,672	<u>1,084,000</u> 18.8.73	<u>1,199,672</u> 15.8.76	<u>1,163,000</u> 30.7.88	<u>1,087,000</u> 18.9.92	<u>1,148,738</u> [*] 8.8.10	<u>272,300</u> 3.9.11	<u>236,100</u> 12.9.12	<u>567,418</u> 20.8.13	<u>367,000</u> 18-9-2014	<u>341,000</u> 18-9-2014
Sukkur Barrage	900,000	1976	1,161,000	<u>1,077,000</u> 21.8.73	<u>1,161,000</u> 16.8.76	<u>1,116,000</u> 30.7.88	<u>1,068,000</u> 20.9.92	<u>1,130,995</u> ^{**} 10.8.10	<u>260,800</u> 6.9.11	<u>214,800</u> 14.9.12	<u>510,875</u> 24.8.13	<u>321,000</u> 20.9.2014	<u>269,000</u> 20.9.2014
Kotri Barrage	875,000	1956	980,000	<u>786,000</u> Aug 1973	<u>765,000</u> Aug 1976	<u>649,600</u> 17.8.88	<u>689,300</u> 30.9.92	<u>964,900</u> 27.8.10	<u>261,400</u> 14.9.11	<u>166,000</u> 21.9.12	<u>381,696</u> 30.8.13	<u>145,000</u> 25-9-2014	<u>110,000</u> 25-9-2014
Jhelum River													
Mangla Reservoir	1,230,000	1929	1,100,000	<u>2,20,000</u> 9.8.73	<u>480,060</u> 3.8.76	<u>425,515</u> 16.7.88	<u>1,030,000</u> 10.9.92	<u>344,400</u> 30.7.10	<u>141,300</u> 16.9.11	<u>1150,00</u> 18.9.12	<u>179,000</u> 13.8.13	<u>634,000</u> 5-9-2014	<u>500,000</u> 5-9-2014
Rasul Barrage	8,50,000	1929	1,000,000	<u>2,70,000</u> 9.8.73	<u>2,69,000</u> 4.8.76	<u>261,664</u> 17.7.88	<u>952,170</u> 10.9.92	<u>263,796</u> 30.7.10	<u>105,800</u> 17.9.11	<u>42500</u> 4.8.12	<u>43,080</u> 19.8.13	<u>516,000</u> 6-9-2014	<u>516,000</u> 6-9-2014
Chenab River													
Marala Barrage	1,100,000	1957	1,100,000	<u>770,000</u> 9.8.73	<u>549,000</u> 1.8.76	<u>751,000</u> 25.9.88	<u>845,000</u> 10.9.92	<u>314,378</u> 6.8.10	<u>150,400</u> 16.9.11	<u>183,200</u> 4.8.12	<u>377,290</u> 15.8.13	<u>861,464</u> 6-9-2014	<u>858,464</u> 6-9-2014
Khanki Barrage	8,50,000	1957	1,066,000	<u>1,000,000</u> 10.8.73	<u>615,000</u> 2.8.76	<u>864,000</u> 26.9.88	<u>910,500</u> 10.9.92	<u>334,437</u> 7.8.10	<u>171,400</u> 17.9.11	<u>194,800</u> 4.8.12	<u>410,331</u> 15.8.13	<u>947,000</u> 7-9-2014	<u>947,000</u> 7-9-2014
Qadirabad Barrage	8,07,000	1992	9,48,530	<u>854,000</u> 10.8.73	<u>629,000</u> 2.8.76	<u>892,000</u> 26.9.88	<u>948,530</u> 11.9.92	<u>329,483</u> 7.8.10	<u>171,000</u> 17.9.11	<u>194,800</u> 5.8.12	<u>407,803</u> 15.8.13	<u>904,000</u> 7-9-2014	<u>904,000</u> 7-9-2014
Trimmu Barrage	6,45,000	1959	9,43,000	<u>753,000</u> 12.8.73	<u>706,000</u> 10.8.76	<u>584,000</u> 19.7.88	<u>888,000</u> 14.9.92	<u>328,926</u> 11.8.10	<u>132,900</u> 20.9.11	<u>87,800</u> 7.8.12	<u>272,609</u> 20.8.13	<u>703,000</u> 10-9-2014	<u>703,000</u> 10-9-2014
Panjnad Headworks	7,00,000	1973	8,03,000	<u>803,000</u> 17.8.73	<u>710,000</u> 12.8.76	<u>507,000</u> 27.7.88	<u>744,152</u> 18.08.92	<u>310,117</u> 13.8.10	<u>151,300</u> 24.9.11	<u>65,600</u> 17.9.12	<u>317,261</u> 28.8.13	<u>454,000</u> 16-9-2014	<u>454,000</u> 16-9-2014
Ravi River													
Jassar	275,000	1955	6,86,000	<u>228,000</u> 10.8.73	<u>170,000</u> 9.8.76	<u>582,000</u> 25.9.88	<u>149,000</u> 11.9.92	<u>195,000</u> 23.8.10	<u>27,700</u> 19.9.11	<u>30,500</u> 26.8.12	<u>67,700</u> 16.8.13	<u>68,000</u> 7-9-2014	<u>68,000</u> 7-9-2014
Shahdara	250,000	1988	5,76,000	<u>237,380</u> 11.8.73	<u>170,000</u> 10.8.76	<u>576,000</u> 27.9.88	<u>63,000</u> 12.9.92	<u>41,900</u> 21.8.10	<u>43,000</u> 14.8.11	<u>40,800</u> 22.8.12	<u>74,880</u> 17.8.13	<u>91,000</u> 8-9-2014	<u>91,000</u> 8-9-2014
Balloki Barrage	2,25,000	1988	3,99,000	<u>2,44,000</u> 13.8.73	<u>234,000</u> 11.8.76	<u>399,000</u> 28.9.88	<u>112,157</u> 13.9.92	<u>69,900</u> 23.8.10	<u>72,100</u> 15.8.11	<u>60,800</u> 23.8.12	<u>117,770</u> 18.8.13	<u>132,000</u> 9-9-2014	<u>118,000</u> 9-9-2014
Sidhnai Barrage	1,50,000	1988	3,30,000	<u>2,10,000</u> 18.8.73	<u>244,000</u> 15.8.76	<u>330,000</u> 2.10.88	<u>95,500</u> 16.9.92	<u>27,600</u> 28.7.10	<u>30,300</u> 19.8.11	<u>28,600</u> 14.9.12	<u>87,904</u> 23.8.13	<u>86,000</u> 12-9-2014	<u>71,000</u> 12-9-2014
Sutlej River													
Suleimanki Headworks	3,25,000	1955	5,98,872	<u>177,000</u> 15.8.73	<u>119,000</u> 6.9.76	<u>399,000</u> 30.9.88	<u>197,000</u> 3.9.92	<u>58,300</u> 30.9.10	<u>82,000</u> 29.8.11	<u>21,700</u> 30.8.12	<u>82,370</u> 22.8.13	<u>26,000</u> 7-9-2014	<u>21,000</u> 7-9-2014
Islam Headworks	3,00,000	1955	4,93,000	<u>166,000</u> 17.8.73	<u>111,000</u> 8.9.76	<u>306,000</u> 4.10.88	<u>183,000</u> 7.9.92	<u>31,500</u> 20.9.10	<u>49,600</u> 3.9.11	<u>14,200</u> 13.9.12	<u>70,932</u> 25.8.13	<u>20,000</u> 8-9-2014	<u>18,000</u> 8-9-2014

* It does not include flood flows passed through breaches occurred in LMB Guddu Barrage; ** It does not include flood flows passed through breaches occurred in Tori Flood Bund. ^ Based on the Inflows experienced upstream of the Dam/ Barrage site.

Table-6

COUNTRY-WIDE LOSSES/DAMAGES DUE TO RAIN/FLOOD 2014

Province/ Region	Persons Died	Persons Affected	Persons Injured	Houses Damaged	Villages Affected	Cropped Area Affected (Acres)	Cattle Heads Perished
Punjab	286	2,474,727	512	100,000	3,484	2,413,797	1,733
Sindh	-	65,583	-	-	267	-	-
Khyber Pakhtunkhwa	12	-	15	42	-	-	-
Gilgit- Baltistan	13	13,266	35	1,292	127	1,513	5,369
AJ & K	56	46,979	111	5,768	187	-	2,620
G. Total	367	2,600,555	673	107,102	4,065	2,415,310	9,722

Source: NDMA

Table-7

2014-Flood Damages to Canal and Flood Protection Infrastructure in Punjab

(Million Rs)

Sr. No.	Name of Irrigation Zone	2014 Flood Damages Restoration Works in Punjab			
		Works pending for Restoration		Works restored on Emergent Basis	
		No. of Works	Tentative Cost	No. of Works	Tentative Cost
1	Faisalabad Zone	4	69.500	30	69.115
2	Lahore zone	94	3440.400	46	192.440
3	Sargodha zone	7	104.190	5	5.600
4	Multan zone	49	266.550	44	143.180
5	D.G. Khan zone	-	-	44	213.150
6	Bahawalpur zone	5	12.250	3	143.088
	Total:-	159	3892.890	172	766.573

5.6 Meetings of Flood Management Committee during Monsoon Season 2014

A High Level Flood Management Committee having representation from Federal Flood Commission (FFC), National Disaster Management Authority (NDMA), WAPDA, Pakistan Meteorological Department (PMD), PCIW, IRSA and Engineer Directorate, GHQ, Rawalpindi was notified by the Ministry of Water and Power on 28-02-2014 for the Monsoon Season 2014, as was done in the previous Monsoon Season (2013). The primary objective of the Committee on flood management would be to oversee and ensure proper operation of Tarbela, Chashma and Mangla Reservoirs during Monsoon Season 2014, besides, coordination for Flood Forecasting & Management activities.

The Committee had following five meetings during monsoon season-2014 wherein necessary precautionary measures were issued to all concerned authorities so as to save human lives and damages to property.

- First Meeting of Flood Management Committee was held on 26th August, 2014.
- 2nd Meeting of Flood Management Committee was held on 6th September, 2014.
- 3rd Meeting of Flood Management Committee was held on 8th September, 2014.
- 4th Meeting of Flood Management Committee was held on 12th September, 2014.
- Last/5th Meeting of Flood Management Committee was held on 2nd October 2014.

Following decisions were taken during the 1st Meeting of Flood Management Committee held on 26th August, 2014:

- i. Pakistan Meteorological Department will issue the updated Weather Outlook for the last phase of current monsoon season (2014) within a couple of days.
- ii. Pakistan Meteorological Department will closely watch the weather situation of the Region in general and Pakistan in particular for the remaining period of current monsoon season. Any change in the weather situation, noticed by PMD would be shared with all stakeholders well in time for further course of action.
- iii. Committee agreed to organize an International Workshop on Water Resources Development, in the country. It was agreed that International Workshop on Water Resources Development will be organized in due course of time.
- iv. Next meeting of the Flood Management Committee would be convened by Mid September, 2014.

2nd Meeting of Flood Management Committee was held on 6th September, 2014. Following decisions were taken:

- i. Irrigation Department, Government of the Punjab in coordination with all stakeholders at Provincial as well as Federal Government level will make utmost

efforts for safe passage of flood flows already generated in Rivers Jhelum & Chenab.

- ii. The concerned field formations of Irrigation Department, Government of the Punjab will strengthen and ensure strict vigilance and round the clock patrolling of flood protection structures, Barrages/Headworks and their allied structures till the flood flows in all rivers and their tributaries are subsided.
- iii. Trimmu Headwork is likely to receive flood flows of around 900,000 Cusecs some time mid night/early morning of 9th September 2014. Keeping in mind the design capacity of the Headwork (645,000 Cusecs), the pre-determined breaching section may have to be operated according to prescribed SOPs. Irrigation Department, Government of the Punjab should make all necessary arrangements in coordination with Districts Administration, so as to avoid loss of life and minimize damages to private & public property.
- iv. Pakistan Meteorological Department will closely watch the weather situation of the Region in general and Pakistan in particular for the remaining period of current monsoon season. Any change in the weather situation, should be shared with all stakeholders by PMD well in time for further course of action.
- v. Pakistan Meteorological Department will make its best efforts to further improve its skill in Weather & Flood Forecast, so that enough reaction time (at least 48 hours before) could be provided to all stakeholders for taking necessary steps for flood mitigation and management, besides, avoiding loss of life and damages to private and public property.
- vi. The Mangla Dam Operation Authority would take utmost care and vigilance in reservoir operation and strictly follow the SOPs and safety guidelines of the structure.
- vii. Next meeting of the Flood Management Committee would be held on 8th September, 2014 at 1200 hours in the Committee Room of office of Chief Engineering Advisor/ Chairman, FFC Islamabad.

3rd Meeting of Flood Management Committee was held on 8th September, 2014. Following decisions were taken:

- i. Pakistan Meteorological Department will closely watch the weather situation of the Region in general and Pakistan in particular for the remaining period of current monsoon season. Any change in the weather situation, would be immediately shared with all stakeholders by PMD well in time.
- ii. Irrigation Department, Government of the Punjab in coordination with all stakeholders at Provincial as well as Federal Government level will make utmost

efforts for safe passage of flood flows already generated in Rivers Jhelum & Chenab.

- iii. Irrigation Department, Government of the Punjab in coordination with District Administration would immediately act for release of flood water passed through the breaches occurred in Jabalpur Flood Protection Bund, which had inundated the abadies and cropped area in the vicinity.
- iv. The concerned field formations of Irrigation Department, Government of the Punjab will strengthen and ensure strict vigilance and round the clock patrolling of flood protection structures, Barrages/Headworks and their allied structures till the flood flows in all rivers and their tributaries are subsided.
- v. As Trimmu Headwork was likely to receive flood flows of around 9,00,000 Cusecs on 9th September 2014 and keeping in mind the design capacity of the Headwork (6,45,000 Cusecs), the pre-determined breaching section may have to be operated according to prescribed SOPs. Irrigation Department, Government of the Punjab would make all necessary arrangements in close coordination with PDMA/DDMAs/Districts Administrations and all other concerned departments so as to avoid loss of life and minimize damages to private & public property.
- vi. Head Muhammad Wala Bridge & Sher Shah Railway Bridge located downstream of Trimmu Headworks are likely to receive “Exceptionally High Flood Flows,” NHA would ensure that all necessary have been made in coordination with all concerned organizations. The pre-determined breaching sections are likely to be operated according to prescribed SOPs. NHA would make all necessary arrangements in close coordination with PDMA/DDMAs/Districts Administration, so as to avoid loss of life and minimize damages to private & public property, in case breaches are operated.
- vii. Since the monsoon system is still active in upper region, hence, Mangla Dam Operation Authority would take utmost care and vigilance in reservoir operation and strictly follow the SOPs and safety guidelines of the structure.

4th Meeting of Flood Management Committee was held on 12th September, 2014. Following decisions were taken during the meeting:

- i. PCIW, FFC & PMD will arrange joint meeting, as soon as the Monsoon Season 2014 is over, to review the existing Flood Forecasting & Warning System capability of PMD/Flood Forecasting Division, Lahore, besides, the facilities with PCIW for obtaining the flood flows data of eastern River including River Chenab. A proposal for capacity building of PCIW and PMD/Flood Forecasting Division would be prepared and submitted to Federal Flood Commission for inclusion in investment Plan of NFPP-IV (2015-25). A report of 2014-Floods would also be jointly prepared and submitted to Federal Flood Commission.

- ii. The Team of Irrigation Department, Government of the Punjab, Pak. Railway & NHA will arrange joint field visits/survey of all flood problematic sites creating hindrance in passage of flood flows during flood season, especially observed during 2010 & 2014 monsoon season. The list of potential sites and recommendations for rectification the problem would be submitted to Federal Flood Commission at the earliest for taking further action in the matter.
- iii. Pakistan Commissioner for Indus Water (PCIW) would make utmost efforts to obtain inflows and reservoir levels of Thein, Bhakra & Pong Dams from India, which would significantly help for better flood forecast in the Eastern Rivers.
- iv. PMD will issue necessary warnings to all concerned agencies including National Health Emergency Preparedness Network, NDMA regarding likely dengue outbreak in the flood affected areas of the country owing to hot and humid weather during the next week, as predicted by PMD. NDMA will coordinate and ensure that such information has transmitted to concerned quarters well in time.
- v. The concerned field formations of Punjab & Sindh Irrigation Departments will strengthen and ensure strict vigilance and round the clock patrolling of flood protection structures, Barrages/Headworks and their allied structures till the flood flows in all rivers and their tributaries are subsided.
- vi. According to PMD/Flood Forecasting Division, Lahore, flood peak of 600,000 - 700,000 Cusecs was expected @ Panjnad Headwork on 15th /16th September 2014. Keeping in mind the design capacity of the Headwork (700,000 Cusecs), the pre-determined breaching section may have to be operated according to prescribed SOPs. Irrigation Department, Government of the Punjab would make all necessary arrangements in close coordination with Pak. Army, PDMA/DDMAs/Districts Administrations and all other concerned departments so as to avoid loss of life and minimize damages to private & public property.
- vii. NHA would make all necessary arrangements in close coordination with all concerned organizations including PID, Punjab, Pak Army PDMA/DDMAs/Districts Administration, for successful operation of pre-determined breaching sections of Head Muhammad Wala Bridge & Sher Shah Railway Bridge according to prescribed SOPs, so as to avoid loss of life and minimize damages to private & public property.
- viii. Since the monsoon system may be active in upper region, hence, Mangla Dam Operation Authority would take utmost care and vigilance in reservoir operation and strictly follow the SOPs and safety guidelines of the structure.
- ix. Next meeting of the Committee on Flood Management would be held in 3rd /4th week of October 2014.

5th Meeting of Flood Management Committee was held on 2nd October, 2014. Following decisions were taken during the meeting:

- i. The Flood Management Committee (FMC) may be renamed as Flood Advisory Committee (FAC) of Pakistan. The TORs may be reframed as under;
 - a) The Committee would oversee the performance of Flood Management Committees of Mangla & Tarbela Dam projects and their coordination with Flood Forecasting Division, Lahore.
 - b) The committee would review the SOPs of reservoirs, as and when suggested by the Dams Operating Authorities and process for approval of competent authority.
 - c) The Committee would have at least three mandatory meetings during Monsoon Season i.e. first week of July, August & September. A special meeting would be arranged, if so recommended by any member of FAC. FFC will provide secretariat facility to the FAC.
- ii. Chief Meteorologist, Flood Forecasting Division would be the spokesman for FAC during Monsoon Season. Representative of Pak. Railway would also be added in the list of members of FAC.
- iii. For proper regulation of flood flows and to avoid synchronization of flood peaks in Rivers Indus, Jhelum & Chenab during Monsoon Season (July- September), there would be direct link between Flood Forecasting Division, Lahore and Tarbela as well as Mangla Dam Operating authorities during flood season.
- iv. FFC would prepare proposal for renaming Flood Management Committee (FMC) as flood Advisory Committee (FAC) with revised TORs and submit to Ministry of Water & Power for approval and notification for Monsoon Season 2015.

Appendix-I

**LIST OF FLOOD PROTECTION SCHEMES
UNDER NORMAL/ EMERGENT FLOOD
PROGRAMME OF PSDP (2014-15)**

**FLOOD PROTECTION SCHEMES BEING IMPLEMENTED UNDER
NORMAL/EMERGENT FLOOD PROGRAMME (2014-15)**

(Rs. in million)

S#	Name of Scheme	Approved Cost	Upto date Expenditure	Status of implementation	Remarks
		Date of App.	(28-02-2015)	Physical Progress (%age)	
I	<u>PUNJAB</u>				
	<u>ON-GOING SCHEMES</u>				
1	Construction of J-Head Spur at RD 20+000 and Guide Head Spur at RD 25+000 Magasson Branch District Muzaffargarh	<u>590.920</u> 11-4-2014	51.493	22%	Work in progress
2	Protecting Irrigation System near Head Regulator Bakaini, Area of Bait Daryai Gabbar Arrian from hectic erosive action of Indus River.	<u>535.474</u> 18-6-2012	426.554	92%	Work in progress
3	Construction of J-Head Spur at RD: 15+000 Shehr Sultan Flood Bund (Revised)	<u>179.392</u> 26-12-2013	176.718	100%	Completion Report awaited
	<u>NEW SCHEMES</u>				
4	Protecting 1-AR Minor and area of Lundi Pitafi from hectic erosion action of Indus River.	78.693	Nil	Nil	PC-I under Submission to FFC
5	Checking Erosive Action of Chenab river of Left Bank near gangwal, Papin Village u/s marala barrage	231.910	Nil	Nil	Under approval of CDWP.
	Sub-Total (Punjab)	1,616.389	654.765		
II	<u>SINDH</u>				
	<u>ON-GOING SCHEMES</u>				
1	Raising/strengthening, providing stone pitching along F.P bund RD 169 to 263.5 & RD 502 to 120, District Kambar, Shahdad Kot, Larkana, Dadu, Jamshoro	<u>492.236</u> 1-3-2008	374.075	90%	Curtailed to 80% due to damages during 2010- Flood. Revised PC-I awaited from PID Sindh
2	Raising/strengthening providing stone pitching along Suprio bund RD 0 to 95 District Kambar, Shahdad Kot, Larkana, Dadu, Jamshoro	<u>253.181</u> 12-1-2008	237.525	100%	- Work completed - PC IV awaited
3	Extension of stone apron & pitching along K.K bund mile 11/3 to 12/4 and recoupment of damage stone apron and pitching from mile 10/7+500 to 11/1+110 District Kashmore	<u>234.549</u> 30-4-2009	219.337	80%	Work in progress
4	Rehabilitation of Short/Spur Stud along Sukkur Begari Bund mile 0/0 to 0/3 Vulnerable Point	<u>54.987</u> 8-4-2014	51.195	85%	Work in progress
5	Providing stone pitching along Qadirpur Bund mile from 10/4 to 12/4	<u>44.667</u> 8-4-2014	48.473	100%	- Work completed. - PC-IV awaited.
6	Constructing stone pitching along K.K Bund Mile 0/0 to 0/4 and 1/1+110 to 1/2 + 220.	<u>38.678</u> 7-3-2014	42.604	100%	-do-
	<u>NEW SCHEMES</u>				
7	R&S along U/S Right Marginal bund from mile 0/0 to 5/4 & U/S Right spur Bund mile 0/0 to 3/0	57.029	NIL	NIL	PC-I approved by DDWP on 13.3.2015 subject to cost rationalization.
8	Construction Stone Studs along Qadirpur loop Bund mile 5/2 to 7/0	93.276	NIL	NIL	Modified PC-Is of scheme submitted to M/o Water & Power for approval of CDWP.

9	Providing stone apron and pitching along sukkur beghari bund mile from 0/0 to 2/0 vulnerable point sukkur city	139.997	NIL	NIL	Modified PC-Is of scheme submitted to M/o Water & Power for approval of CDWP.
10	Providing stone apron along Qadirpur Loop Bund mile 4/6 to 5/0	36.097	NIL	NIL	Scheme was cleared by S.C of FFC held on 9-02-2015 subject to funds availability. Modified PC-I of schemes are awaited from PID Sindh.
11	Earthwork for Raising & Strengthening along L.M Bund (old) mile 6/7 to 13/2.	161.688	NIL	NIL	-do-
12	Providing Stone Pitching along Baiji Bund from mile 2/4 to 3/4 and 7/4 to 8/4.	58.596	NIL	NIL	-do-
	Sub-Total (Sindh)	1,664.981	973.209		
III	KHYBER PAKHTUNKHWA (KP)				
1	Construction of Flood Protection Structure at critical locations in different Nullahs in District Peshawar and Nowshera.	30.000	NIL	NIL	PC-I approved by DDWP on 13.3.2015 subject to compliance of FFC's observations
2	Construction of Flood Protection Structure at critical locations in District Charsadda.	7.000	NIL	NIL	-do-
3	Construction of Flood Protection Structure at critical locations in differen Nullahs in Distrcit Swat.	19.868	NIL	NIL	-do-
4	Construction of Flood Protection Structure at critical locations in differen Nullahs in Distrcit Abbottabad and Mansehra.	10.000	NIL	NIL	-do-
5	Construction of Flood Protection Structure at critical locations in differen Nullahs in Distrcit Kohat & Karak.	9.630	NIL	NIL	-do-
6	Construction of Flood Protection Structure at critical locations in differen Nullahs in Distrcit Bannu & Lakki Marwat.	10.000	NIL	NIL	-do-
7	Construction of Flood Protection Structure at village Kala on Badri Nullah District Swabi.	6.106	NIL	NIL	-do-
	ONGOING SCHEMES				
8	Construction of Flood Protection Structure on Dheri Julagram Nullah for Protection of Dheri Village District Malakand (Revised).	10.840	NIL	NIL	-do-
	Sub-Total (KP)	103.444	0.000		
IV	BALUCHISTAN (NEW SCHEMES)				
a	SOUTH ZONE				
1	Flood Protection Bund of Shahool at Mouza Drazi Dureji area Hub River	2.500	NIL	NIL	PC-I approved by DDWP on 13.3.2015 subject to compliance of FFC's observations
2	Flood Protection Bund along Nehaar River okri area for Agricultural Lands and Abadies of village Haji Ali Bakhsh Shahwani	2.000	NIL	NIL	-do-
3	Flood Protection Bund along Kundi Wari Dhora Tehsil Hub of Agricultural Lands	2.000	NIL	NIL	-do-
4	Flood Protection Wall Mastung Town.	2.500	NIL	NIL	-do-
5	Flood Protection Bund Sancela	2.500	NIL	NIL	-do-
6	Flood Protection Bund Kheson Don	2.500	NIL	NIL	-do-
7	Flood Protection Bund for Agriculture Lands of Mir Mohammad Ayoub and others Allah Dumb area Nal.	2.000	NIL	NIL	-do-
8	Flood Protection Bund for Agriculture Lands of Kundi Umrani village Tehsil Jhao.	2.000	NIL	NIL	-do-
9	Flood Protection Bund Kharan Town along Kullan River.	2.500	NIL	NIL	-do-
10	Construction of Flood Protection Mirani Kaur Jusak.	2.000			-do-
11	Flood Protection works of Agricultural Lands of Killi Aslam Mehnaz, Bit Buleda	2.000	NIL	NIL	-do-

12	Flood Protection Bund at Killi Haji Muhammad Azim Sabrap.	2.000	NIL	NIL	-do-
13	Flood Protection Wall (Killi Kareem Jan) old Poultry Farm Chitkan	2.500	NIL	NIL	-do-
14	Flood Protection of water Supply scheme Ormara Town and Navy Base.	5.000	NIL	NIL	-do-
	Total (South Zone)	34.000			
b	NORTH ZONE				
15	PC-I/Estimate for				PC-I approved by DDWP on 13.3.2015 subject to compliance of FFC's observations
	i. Flood Protection of Zinda Pir area village Haji Hussain.	2.000	NIL	NIL	
	ii. Flood Protection wall Khudaidad and other Khost area (Court Case).	1.000	NIL	NIL	
	Sub-total:	3.000			
16	PC-I/Estimate for				PC-I approved by DDWP on 13.3.2015 subject to compliance of FFC's observations
	i. Flood Protection of PCC Wall Meharbzai Nooruddin Bazai Aghberg area	2.000	NIL	NIL	
	ii. Flood Protection of Killi Bahadurabad Brewery Area	2.000	NIL	NIL	
	iii. Flood Protection of Agricultural land and grave yard Nohisar area	2.500	NIL	NIL	
	iv. Flood Protection of Mashwani Town Punjpai	2.000	NIL	NIL	
	Sub-total:	8.500			
17	Constrction of 1 No. Spur for Flood Protection of Trehar Village.	2.000	NIL	NIL	-do-
18	PC-I/Estimate for				
	i. Flood Protection Bund Kachhi Khachar Gurgoi Druq	2.000	NIL	NIL	-do-
	ii. Flood Protection Bund for Killi Sardar Raza Khan Musakhail	2.000	NIL	NIL	-do-
	Sub-total:	4.000			
19	Flood Protection Work of Chotair area Ziarat Vill. & Orchards Malik Lal Mohammad & Malik Lal Gul	2.000	NIL	NIL	-do-
20	Flood Protection for Agricultural Land and houses Killi Yaqoob Karez Suri Mehterzai area District Killa Saifullah	2.000	NIL	NIL	-do-
21	PC-I/Estimate for				
	i. Flood Protection Works of Killi Nill Ahmed Khan Bostan.	2.000	NIL	NIL	-do-
	ii. Flood Protection of Lands /Orchards of Haji Abdul Hameed Bazai Koze Kach Rud Mulazai	2.000	NIL	NIL	-do-
	iii. Flood Protection Scheme of Lands/Orchards for Haji Ghulam Murtaza Mara Jalazai Toba Achakzai	2.000	NIL	NIL	-do-
	iv. Flood Protection of Lands of Machka Manda	2.000	NIL	NIL	-do-
	Sub-total:	8.000			
22	Flood Protection of Kohlu Town at Various Location at Kohlu	2.000	NIL	NIL	-do-
23	Constrction of Flood Protection of New Abadies of Rehman Khan and others Killi Saqi Appozai & Protection Wall for houses Ziauddin and others along right side of Salazai Creck.	2.500	NIL	NIL	-do-
	Total (North Zone) :	34.000	0.000		
	Sub-Total (Balochistan)	68.000	0.000		
V	Gilgit Baltistan				
1	Const. of flood protective and river training works at Darel / Tangir Valley.	<u>30.900</u> 5/4/2007	12.665	98%	Work in progress
2	Const. of flood protective bund at Sailing (Ph-II)	<u>12.786</u> 16-02-2010	10.453	100%	*Work completed *PC-IV awaited
3	Const. of protective bunt at Ghursey Ph-IV	<u>24.113</u> 17-05-2012	1.000	40%	Work in progress
4	Const. of protective works District Ghanche.	<u>16.428</u> 17-05-2012	1.000	25%	Work in progress
	Sub-Total (GB):	84.227	25.118		

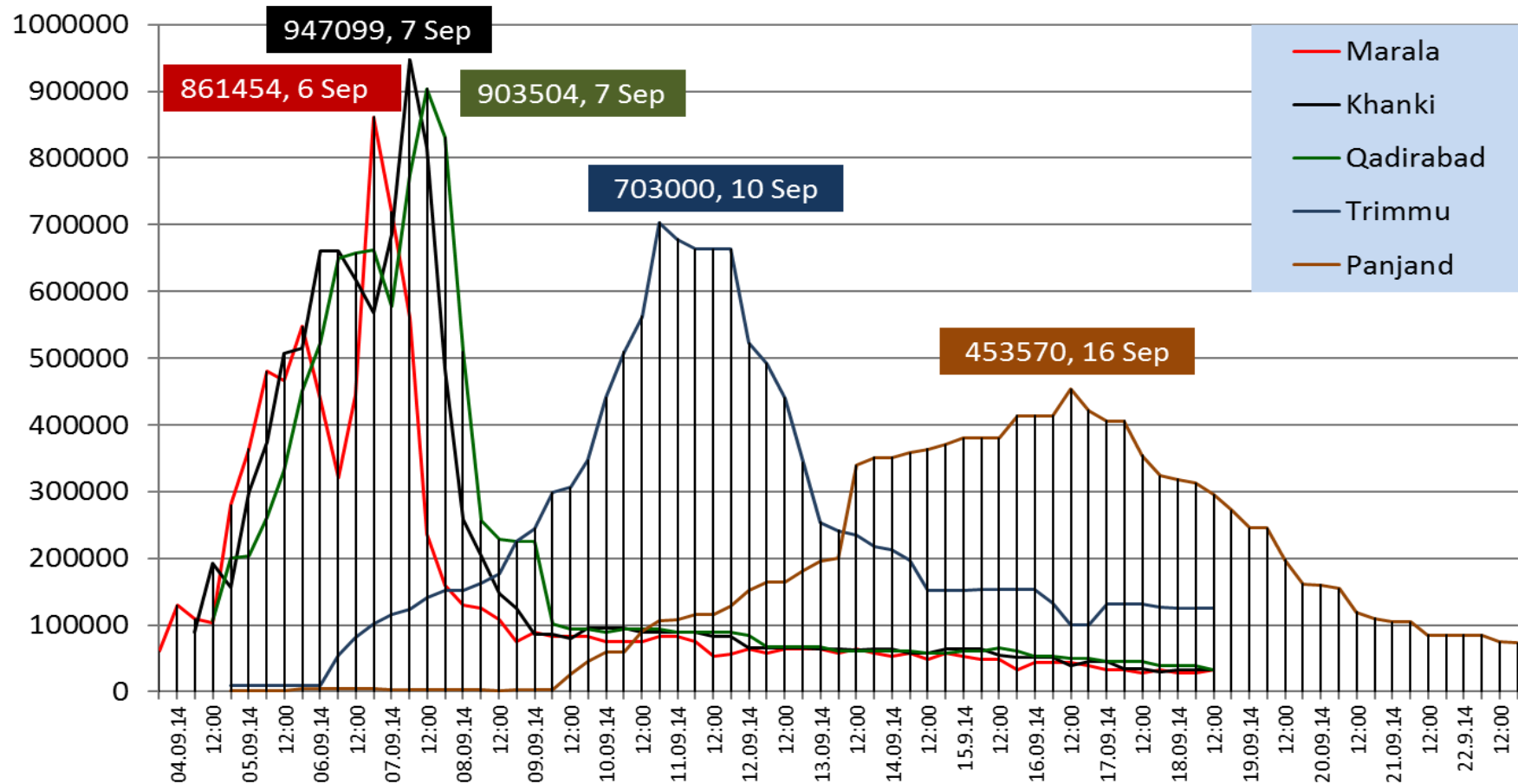
VI	FATA				
1	Flood Protection Scheme for Protection of Village abadies & agriculture land of Qabal Khan Kach Kurailia Algad in Pir Tangi Area in FR Tank	<u>5.994</u> 14-2-2013	3.585	100%	*Completed. *Completion Report Awaited.
2	Flood Protection Scheme for Protection of Umer Shah Kach in Khoi Payer Ustrana Area FR DIKHAN	<u>4.414</u> 14-2-2013	3.115	100%	* Completed * Completion Report awaited
3	Construction of Flood protection Bund for agricultures land and village abadies of Noor Alam kach Shahoor and Dana Wat Algad Sarwakai Tehsil SW Agency	<u>4.523</u> 14-2-2013	1.297	80%	Work in progress
4	Construction of Flood Protection Bund for the Protection of land Bahadar khan kach near Khar village in Bajur Agency	<u>3.500</u> 17-5-2012	2.177	98%	Work in progress
5	Flood Protection bund at Kacha Algad Morang Valley FR Lakki	<u>4.000</u> 17-5-2012	0.912	23%	*Work in progress. * Delayed due to funding constraints
6	Flood Protection Bund for Protection of land Waheed Kach Haji Lawang Khawar in Bajur Agency	<u>2.980</u> 17-5-2012	NIL	25%	Work in progress.
7	Construction of flood protection scheme of Nazar Jan S/o Ghazi Marjan village Mangleen Area, F.R. Tank	<u>5.294</u> 17-5-2012	0.596	12%	Work in progress.
8	Construction of Flood Protection works for the safety of village abadies and culturable land of Manri Kanri (Saifur-Rehman Kach) Tehsil Sararogha SWA	<u>5.944</u> 17-5-2012	0.493	65%	Work in progress.
9	Flood Protection Schemes for the protection of cultural land & village abadies of Umer Kach Sada Tehsil Kuram Agency.	<u>3.500</u> 17-5-2012	NIL	NIL	Tendering Approved
10	Flood protection scheme on Tochi River on Downstream Boya bridge in Datta Khel Tehsil North Waziristan Agency	<u>3.500</u> 17-05-2012	NIL	NIL	-do-
11	Flood Protection Scheme for the Protection of cultural land & village abadies of Umer Kach Sada Tehsil Kurram Agency	<u>2.990</u> 17-05-2012	NIL	NIL	-do-
12	Construction of flood protection scheme for the protection of land of Haji Noor Muhammad village Koi Bahara Ustrana Area, F.R. D.I. Khan	<u>5.484</u> 17-05-2012	NIL	NIL	-do-
13	Construction of Flood Protection Bund for the land of Bakhta Jan Kach Ping Area FRTank	<u>2.751</u> 17-05-2012	NIL	NIL	-do-
	Sub-Total(FATA)	54.874	12.175		
VII	AJ&K				
1	Protecting & Checking of Erosion Against flood on River Kunhar Brarkot Distt. Muzaffarabad	16.630 30-9-2013	NIL	40%	Work in Progress.
2	Protecting & checking of erosion against flood along left edge of River Mahl near Bhount Chowk in District Bagh (Ongoing)	13.575 13-10-2009	NIL	87%	Work in progress
3	Restoring of Damages for Protection of Military Installation at Khandaq Post Near LOC on Right Bank of River Munawar Tawi District Bimber Azad Kashmir	59.605 24-06-2014	NIL	NIL	Pending for want of funds.
	Sub-Total (AJ&K)	89.810			
	Grand Total:	3681.725	1665.267		

Note: Rs. 852.650 million were released last year, out of which Rs. 499.913 million have been spent upto 28-02-2015, whereas balance (Rs. 352.737 million) would be spent on ongoing schemes taken up under PSDP (2014-15).

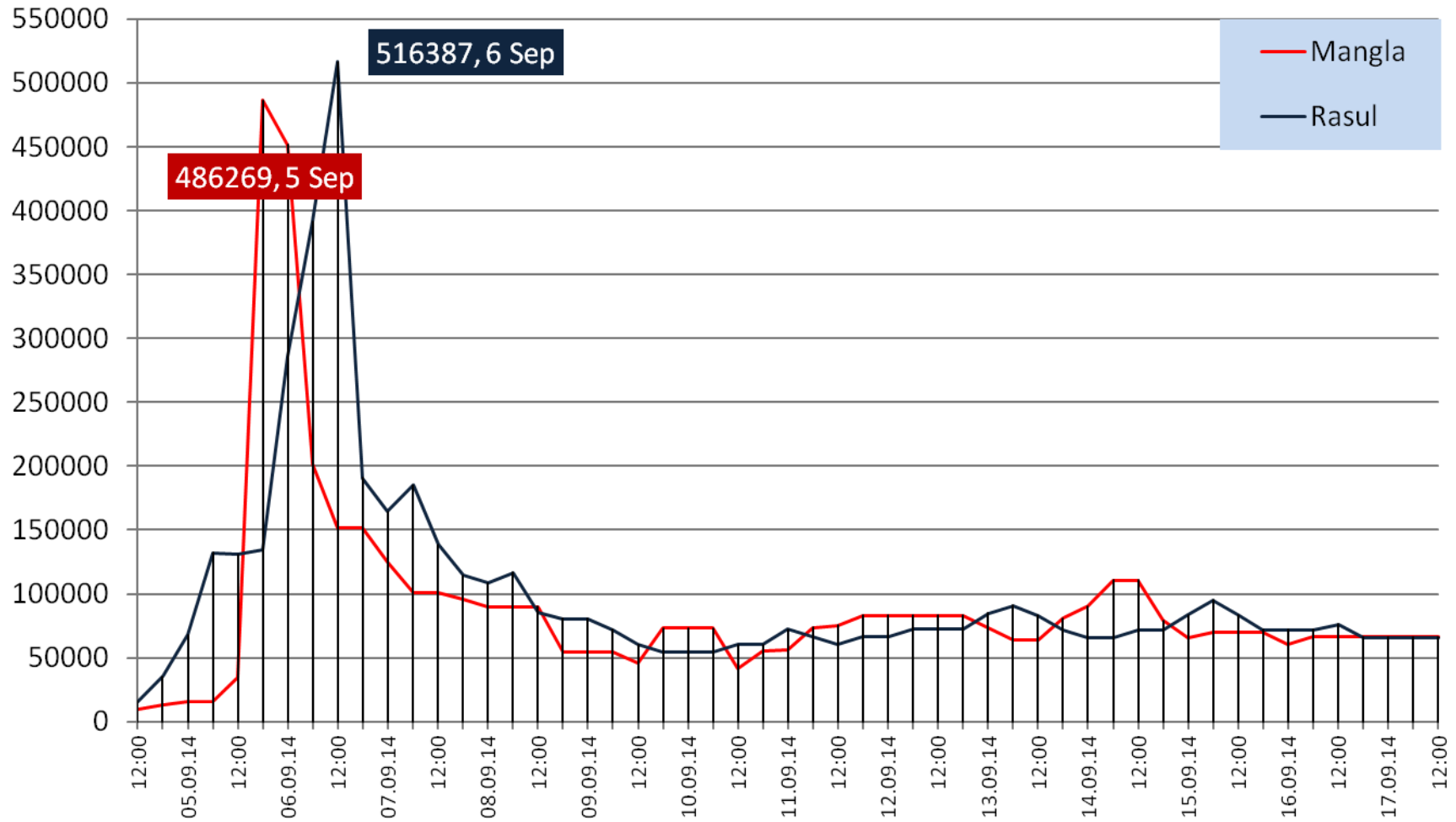
Appendix-II

**MAJOR RIVERS FLOW DATA OF
MONSOON SEASON 2014**

RIVER CHENAB AT MARALA, KHANKI, QADIRABAD, TRIMMU AND PANJNAD HYDROGRAPHS FOR 2014 FLOOD SEASON



RIVER JHELUM AT MANGLA & RASSOL HYDROGRAPHS FOR 2014 FLOOD SEASON



Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Jul-14	600	1442.00	190800	170000	89300	251000	243000	644.60	255000	240000	230000	208000
2-Jul-14	600	1444.74	200700	160000	95100	245100	237100	645.60	259700	240000	227200	206800
3-Jul-14	600	1448.55	216500	160000	105700	250200	241900	646.20	255200	240000	229400	208800
4-Jul-14	600	1454.18	254800	145000	118100	248500	240200	646.90	257800	240000	255100	232200
5-Jul-14	600	1460.06	269300	145000	108600	245500	237200	646.20	235000	240000	248500	226100
6-Jul-14	600	1464.34	239000	145000	91500	224800	216500	646.00	243100	240000	245300	223200
7-Jul-14	600	1465.70	193200	162800	79700	247700	239400	644.80	230000	240000	260500	236700
8-Jul-14	600	1465.22	164400	172000	71700	245200	236900	644.70	245200	240000	257800	234200
9-Jul-14	600	1464.28	156000	178000	66300	248900	240600	644.00	237800	240000	253100	229500
10-Jul-14	600	1463.26	153400	175000	67300	244500	236200	644.50	252600	240000	252300	227700
11-Jul-14	600	1462.42	157400	175000	73400	240100	231800	644.70	238900	240000	258400	233400
12-Jul-14	600	1462.14	169600	175000	66000	235200	226900	643.80	225600	230000	253400	229300
13-Jul-14	600	1462.32	179700	175000	68500	231600	223300	643.50	233100	230000	240600	212900
14-Jul-14	600	1463.46	200600	175000	70000	234300	226000	643.00	225900	225000	256200	228300
15-Jul-14	600	1465.42	218500	175000	69400	238600	230300	643.30	234700	225000	251800	223900
16-Jul-14	600	1468.23	237000	175000	64100	239500	231300	643.10	229200	225000	247700	219800
17-Jul-14	600	1472.17	262900	175000	75000	247600	239300	642.80	228200	225000	249200	221300
18-Jul-14	600	1476.47	272000	175000	78300	251200	242900	644.40	239500	215000	267400	247400
19-Jul-14	600	1480.98	267500	165000	80300	248300	240000	645.80	239900	215000	251800	227900
20-Jul-14	600	1483.50	224300	165000	66900	241200	232900	646.40	232500	215000	248300	224400
21-Jul-14	600	1483.85	183800	175000	60500	226100	217800	645.50	218000	215000	240100	216200
22-Jul-14	600	1483.30	167600	179700	57500	226100	217800	644.60	224500	215000	237100	213200
23-Jul-14	600	1482.32	167900	190000	53300	241600	233300	644.20	231500	215000	237100	213200
24-Jul-14	600	1482.01	178500	185000	54300	231400	223100	644.90	242500	215000	231600	207700
25-Jul-14	600	1483.30	205700	175000	57200	227700	214800	645.00	231300	215000	236700	212800
26-Jul-14	600	1485.78	233300	175000	64700	237500	229200	646.30	245400	215000	242400	218500
27-Jul-14	600	1489.79	258900	165000	66700	238000	225700	646.80	234500	215000	241700	215800
28-Jul-14	600	1494.95	280100	155000	65600	225000	216700	648.00	249200	214100	237500	209600
29-Jul-14	600	1500.62	282400	145000	72400	255900	247600	648.00	240100	228700	242000	214100
30-Jul-14	600	1506.40	286800	145000	66000	239100	231300	648.00	233200	221800	257600	229700
31-Jul-14	600	1511.95	283200	145000	63000	242300	234500	648.00	224300	212900	248300	220400

Discharge in Cusec

DATE	INDUS						JHELUM				
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL	
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Jul-14	172100	133600	103300	48900	24600	-	1193.65	62800	40000	39000	19700
2-Jul-14	185800	146200	108300	52500	29200	-	1194.45	62800	40000	35100	15800
3-Jul-14	200300	161500	116800	61000	35600	-	1195.60	67800	35000	39000	19700
4-Jul-14	201000	162700	125500	69500	36600	-	1196.90	67100	30000	31400	11900
5-Jul-14	205100	166700	137400	81300	38000	-	1198.80	74200	20000	18900	5300
6-Jul-14	202400	163400	139100	83300	41500	3100	1200.35	60000	15000	9300	NIL
7-Jul-14	199000	158600	136600	80700	48600	9600	1201.35	56100	25000	25100	15800
8-Jul-14	194000	154600	129500	73700	55200	16100	1202.25	53400	25000	25200	15800
9-Jul-14	186100	147300	125500	69700	62100	22700	1203.10	53100	25000	21200	11900
10-Jul-14	202200	163400	120500	64700	70500	30900	1204.05	56400	25000	21200	11900
11-Jul-14	215900	176200	125800	70000	70500	30900	1204.95	54700	25000	21200	11900
12-Jul-14	216100	176200	140400	84600	68800	29300	1205.75	51400	25000	25100	15800
13-Jul-14	213300	173300	142400	86500	63300	23000	1206.75	53000	20000	21200	11900
14-Jul-14	212700	173300	142400	86500	60400	19900	1207.60	48100	20000	14600	5300
15-Jul-14	198500	159100	140400	84600	58300	18400	1208.50	49700	20000	14600	5300
16-Jul-14	191500	151800	133000	77200	63200	23300	1209.40	49700	20000	9300	NIL
17-Jul-14	187400	149500	128400	72500	67700	27600	1210.70	60400	15000	9200	NIL
18-Jul-14	187100	149500	126300	70500	72000	32000	1211.95	58900	15000	7200	NIL
19-Jul-14	190000	161100	126300	70500	72200	32000	1212.90	48400	15000	9200	NIL
20-Jul-14	200600	162100	133000	77200	70900	30500	1213.80	46600	15000	8200	NIL
21-Jul-14	204000	165800	138000	82200	6600	26100	1214.55	41300	15000	9200	NIL
22-Jul-14	205100	166800	142300	86200	64800	24300	1215.25	39600	15000	9200	NIL
23-Jul-14	198800	160500	145500	89500	63400	23000	1216.05	43100	15000	9200	NIL
24-Jul-14	191700	155400	142200	86200	63400	22900	1216.80	43100	15000	9200	NIL
25-Jul-14	191300	155400	142200	86200	65700	26100	1218.30	65900	15000	9500	NIL
26-Jul-14	191300	155400	142100	86200	72000	35000	1219.30	50100	15000	9500	NIL
27-Jul-14	194900	159000	138600	82700	74200	35000	1220.15	45200	15000	9500	NIL
28-Jul-14	197700	162100	140400	84600	74600	35000	1220.95	40700	11000	9800	5300
29-Jul-14	197700	162100	144100	88600	73300	33400	1221.95	47100	10000	4000	NIL
30-Jul-14	195700	162100	146400	91000	69000	30500	1222.80	41600	10000	3500	NIL
31-Jul-14	195700	162100	146100	91000	68200	32100	1223.40	37300	15000	4000	NIL

Discharge in Cusecs

DATE	CHENAB								RAVI			
	MARALA		QADIRABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Jul-14	75400	41700	55800	33800	19500	3900	17200	2100	41300	11200	16800	1300
2-Jul-14	86700	53000	86700	53000	23900	8300	15100	NIL	41300	8900	16100	700
3-Jul-14	98700	65000	71600	49500	29100	13500	9200	NIL	41300	8900	16800	1300
4-Jul-14	98700	65000	82000	60000	41600	26000	11000	NIL	41300	8900	17400	2000
5-Jul-14	82700	49000	73000	51000	45200	29600	11400	NIL	41300	8900	17500	2000
6-Jul-14	67100	32900	47000	25000	55100	39500	15100	NIL	40700	8300	18500	3000
7-Jul-14	67100	32900	37300	15300	56100	40500	19200	4100	40700	8300	18500	3000
8-Jul-14	67100	32900	29700	7700	41700	26000	19200	4100	40700	8300	18500	3000
9-Jul-14	67400	32900	34800	12800	24900	9200	25000	9900	40700	8300	18000	3000
10-Jul-14	73100	38300	34800	12800	15700	NIL	36000	20800	40700	8300	18400	3000
11-Jul-14	77000	41900	31600	23100	19900	4200	34600	19400	39800	7400	18500	3000
12-Jul-14	73700	38300	37300	15300	19900	4200	30200	15100	39800	7400	16800	1300
13-Jul-14	83300	49000	38500	29900	17200	1400	22200	7000	39900	7400	16800	1300
14-Jul-14	77900	43600	50900	28900	17300	1400	21300	6100	39900	7400	16200	700
15-Jul-14	83200	49000	47100	25100	19000	2100	17200	2100	38500	6000	16200	700
16-Jul-14	76600	42300	55800	33800	19000	2100	17200	2100	36700	4200	17300	1700
17-Jul-14	96500	62300	63000	41000	24400	7000	15100	NIL	36700	4200	17300	1700
18-Jul-14	89800	55700	75400	53400	26700	9600	16000	800	38200	5700	17300	2000
19-Jul-14	62600	28900	55800	33800	26700	10500	16000	800	44100	11600	16500	2000
20-Jul-14	61300	27500	34800	12800	39700	23800	17200	2100	45300	12800	17000	1700
21-Jul-14	66700	32900	29800	7800	44000	27100	15100	NIL	44100	11600	15500	NIL
22-Jul-14	66700	32900	26000	4000	26600	10200	15100	NIL	41200	8700	21400	5900
23-Jul-14	72100	38300	29800	7800	22400	7500	18200	NIL	40600	8100	19300	3900
24-Jul-14	96100	62300	38600	16600	22400	7500	22200	NIL	38500	6000	19300	3900
25-Jul-14	76900	43200	59700	37700	18400	3500	17400	NIL	38500	6000	17400	2000
26-Jul-14	76900	43200	49800	27800	16400	NIL	26000	NIL	41000	8500	16100	700
27-Jul-14	88000	54300	49800	27800	23500	7100	20200	NIL	41800	9300	16800	1300
28-Jul-14	86100	54300	49800	27800	32100	15700	18200	NIL	41000	8500	16800	1300
29-Jul-14	86100	54300	59700	37700	35100	18700	18200	NIL	42200	9700	16600	1300
30-Jul-14	91500	59700	67700	45700	39800	23400	15100	NIL	43100	10600	16600	1300
31-Jul-14	80800	49000	64200	42200	39800	23400	16000	800	43100	10600	19300	4000

Discharge in Cusec

DATE	SUTLEJ				LINKS/ CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Jul-14	15400	2000	2300	NIL	2000	4400	22000	NIL	35.0	18.9
2-Jul-14	15400	2000	1900	NIL	2000	4400	22000	NIL	36.1	21.7
3-Jul-14	16400	3000	2400	NIL	2000	4400	22000	NIL	26.7	16.7
4-Jul-14	16400	3000	3000	NIL	2000	4400	22000	NIL	21.1	15.6
5-Jul-14	16400	3000	1800	NIL	2000	4400	22000	NIL	26.3	13.4
6-Jul-14	16500	3000	2300	NIL	2000	4400	22000	NIL	27.6	13.4
7-Jul-14	16500	3000	2300	NIL	2000	4400	22000	NIL	27.7	11.6
8-Jul-14	16500	3000	2300	NIL	2000	4400	22000	NIL	25.5	9.4
9-Jul-14	16900	3600	2300	NIL	2000	4400	22000	NIL	25.5	9.4
10-Jul-14	16900	3600	2300	NIL	2000	4400	22000	NIL	31.6	10.4
11-Jul-14	16900	2600	2500	NIL	2000	4400	22000	NIL	34.2	15.4
12-Jul-14	16300	3000	2700	NIL	2000	4400	22000	NIL	34.6	15.2
13-Jul-14	16400	3000	2600	NIL	2000	4400	22000	NIL	36.2	17.2
14-Jul-14	16600	3000	2300	NIL	2000	4400	22000	NIL	34.7	16.2
15-Jul-14	16000	2300	1700	NIL	2000	4400	22000	NIL	34.3	16.2
16-Jul-14	16100	2300	1700	NIL	2000	4400	22000	NIL	35.8	16.4
17-Jul-14	16100	3000	1700	NIL	2000	4400	22000	NIL	26.5	16.1
18-Jul-14	16100	2300	2000	NIL	2000	4400	22000	NIL	22.2	14.6
19-Jul-14	16100	2400	1800	NIL	2000	4400	22000	NIL	27.2	12.2
20-Jul-14	16400	2800	2600	NIL	39700	4400	22000	NIL	28.5	11.4
21-Jul-14	16800	3600	2000	NIL	44000	4400	22000	NIL	32.6	15.1
22-Jul-14	16800	3600	2000	NIL	26600	4400	22000	NIL	34.6	13.4
23-Jul-14	16900	3600	2300	NIL	22400	4400	22000	NIL	36.6	14.0
24-Jul-14	16800	3400	2300	NIL	22400	4400	22000	NIL	38.5	16.4
25-Jul-14	16600	3000	2500	NIL	18400	4400	22000	NIL	38.6	17.2
26-Jul-14	16600	2900	2600	NIL	16400	4400	22000	NIL	36.3	19.6
27-Jul-14	15700	2000	2700	NIL	23500	4400	22000	NIL	35.6	17.2
28-Jul-14	15700	2000	1700	NIL	32100	4400	22000	NIL	37.3	18.4
29-Jul-14	15100	2500	1400	NIL	35100	4400	22000	NIL	35.6	16.2
30-Jul-14	15100	3400	1200	NIL	39800	4400	22000	NIL	36.7	17.0
31-Jul-14	15400	2900	1300	NIL	39800	4400	22000	NIL	34.5	16.2

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Aug-14	600	1515.95	266500	164300	59000	219100	211300	647.20	200100	205000	243500	215600
2-Aug-14	600	1519.95	269500	167300	57000	216900	209100	646.50	204200	205000	222100	194700
3-Aug-14	600	1523.95	272300	166000	61200	226000	218200	647.00	224500	205000	222100	194700
4-Aug-14	600	1527.40	236700	145000	53700	217900	210100	647.60	228600	205000	225500	198100
5-Aug-14	600	1530.00	214300	145000	53300	193600	185400	646.80	200900	205000	226000	198100
6-Aug-14	600	1531.50	207000	165400	43400	231500	223300	644.80	189600	205000	219200	191300
7-Aug-14	600	1533.00	217300	175000	41900	220100	211900	644.10	212800	205000	221900	194000
8-Aug-14	600	1534.50	219000	177000	42200	209600	201400	643.90	220700	205000	216100	188500
9-Aug-14	600	1536.00	228700	186400	42600	233400	225200	644.40	232400	205000	209000	183000
10-Aug-14	600	1537.00	247500	219100	54700	243900	235700	646.30	252600	205000	209900	183000
11-Aug-14	600	1538.50	228000	185700	44600	245600	234400	647.80	255500	205000	214500	187200
12-Aug-14	600	1540.00	203100	160900	43000	219500	211300	648.00	267100	238600	212600	186100
13-Aug-14	600	1541.50	207700	163800	38600	211000	202800	648.00	336300	211900	234500	206600
14-Aug-14	600	1543.00	219800	175900	38800	209400	201200	646.90	207400	205000	227700	199800
15-Aug-14	600	1544.25	230000	193300	38300	219800	211500	646.60	224500	205000	211000	184700
16-Aug-14	600	1545.50	239000	202300	44000	253800	245500	646.10	216200	205000	202600	176900
17-Aug-14	600	1546.75	247600	210900	44800	251200	243600	648.00	276800	217400	209500	183100
18-Aug-14	600	1548.00	218600	181900	48700	239600	232900	648.00	274600	250000	216600	189400
19-Aug-14	600	1549.00	174500	145300	36400	216300	209300	648.00	268800	244500	235300	207400
20-Aug-14	600	1550.00	145000	115600	28500	193900	186400	647.20	213100	205000	247300	218400
21-Aug-14	600	1550.00	114800	114300	23100	140000	134700	644.00	165700	190000	230700	210800
22-Aug-14	600	1548.94	129900	160000	22800	123700	115700	640.50	148900	165000	202500	174600
23-Aug-14	600	1547.25	136200	170000	22700	123000	115000	640.70	179700	165000	169900	145000
24-Aug-14	600	1546.50	135900	170000	24700	178600	170600	643.50	202100	165000	149300	121400
25-Aug-14	600	1545.30	135900	170000	23600	190800	182800	645.30	197400	165000	163100	135200
26-Aug-14	600	1544.12	135200	170000	23900	192900	184900	646.40	191700	165000	162800	135200
27-Aug-14	600	1543.12	131700	160000	24400	208100	200700	647.80	201500	165000	158900	131300
28-Aug-14	600	1542.68	133000	145000	24700	188900	181500	648.90	201500	165000	158900	131300
29-Aug-14	600	1542.07	128100	145000	25200	177600	170200	648.60	171100	165300	149000	121700
30-Aug-14	600	1541.07	116900	145000	21000	178800	171400	648.00	166900	165000	149700	122500
31-Aug-14	600	1539.72	107000	145000	19100	186500	178500	647.80	172800	165000	155100	127200

Discharge in Cusec

DATE	INDUS						JHELMUM					
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL		
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S	
1-Aug-14	194800	160600	146600	91000	66200	33600	1224.05	39100	15000	4300	NIL	
2-Aug-14	201500	171600	146300	91000	67900	43600	1224.80	42900	15000	9800	5300	
3-Aug-14	203000	173900	150000	95600	72100	43600	1225.35	35400	15000	9800	5300	
4-Aug-14	193900	163700	152000	97300	73300	36300	1225.75	29900	15000	9800	5300	
5-Aug-14	187000	155000	144400	89300	74700	36300	1226.10	28000	15000	9800	5300	
6-Aug-14	186200	153600	139100	84000	74900	35600	1226.45	28000	15000	9800	5300	
7-Aug-14	186500	153100	137800	82800	75200	36300	1226.95	28600	10000	4500	NIL	
8-Aug-14	190400	157300	137000	81700	76400	38100	1227.50	30400	10000	4500	NIL	
9-Aug-14	190100	157300	137700	82800	77900	39400	1228.05	30400	10000	9800	5300	
10-Aug-14	189100	158700	140000	85000	72300	33600	1228.70	34100	10000	4500	NIL	
11-Aug-14	187200	155900	140500	85100	67300	28500	1229.00	23100	12000	4500	NIL	
12-Aug-14	175200	144700	140500	85100	65300	25900	1229.30	23100	12000	4500	NIL	
13-Aug-14	173700	142400	137300	81600	64100	24700	1229.65	25000	12000	4900	NIL	
14-Aug-14	172100	138900	129800	740000	62700	23100	1229.90	21300	12000	10000	5300	
15-Aug-14	179000	144000	125400	69600	62700	23000	1230.20	23500	12000	4500	NIL	
16-Aug-14	192300	157300	125300	69600	64000	24300	1230.80	35500	12000	4500	NIL	
17-Aug-14	186900	172300	141100	86700	65200	25900	1231.55	41300	12000	9500	5300	
18-Aug-14	185300	167300	150000	97200	62200	23100	1232.10	33500	12000	9500	5300	
19-Aug-14	184400	166000	155100	101400	59900	20600	1232.45	25700	12000	9800	5300	
20-Aug-14	178100	151600	154900	100300	56900	17100	1232.80	23700	10000	4500	NIL	
21-Aug-14	189000	161200	142700	87800	56700	17100	1233.10	21700	10000	4500	NIL	
22-Aug-14	206700	178000	143000	87700	66400	27100	1233.15	25100	23100	13500	NIL	
23-Aug-14	209500	178000	151900	96500	75500	36200	1233.00	27600	33500	25600	5300	
24-Aug-14	179200	145400	160100	104700	75900	36200	1232.70	28300	40000	29400	5300	
25-Aug-14	160100	126500	152000	96500	74000	34000	1232.30	24400	40000	31400	8000	
26-Aug-14	151800	117600	138400	83000	69700	29600	1231.91	24400	40000	43100	19700	
27-Aug-14	136300	102100	119100	63600	69700	29600	1231.50	24400	40000	35300	11900	
28-Aug-14	134600	115600	98500	44400	74100	34000	1230.90	21500	45000	35300	11900	
29-Aug-14	136200	110400	91600	37700	74100	34000	1230.35	23500	45000	39100	15800	
30-Aug-14	133700	102100	91800	37700	64600	25000	1229.70	20200	45000	39100	15800	
31-Aug-14	127100	101900	89700	36100	52700	14100	1229.05	20900	45000	35100	11900	

Discharge in Cusec

DATE	CHENAB						RAVI					
	MARALA		QADIR ABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Aug-14	88000	54300	34800	12800	38300	23400	19000	4100	45900	13400	18700	3300
2-Aug-14	97100	63500	44900	22900	41700	26800	21300	6100	49000	16500	18900	3300
3-Aug-14	82500	49000	44900	22900	41900	28000	23500	8400	47400	14900	18800	3300
4-Aug-14	66400	32900	26500	6500	30500	16600	26600	11500	49000	16500	19400	4000
5-Aug-14	64400	32900	26700	15300	34600	18700	26600	11500	46300	13800	18400	3300
6-Aug-14	69800	38300	40300	30300	38900	23000	28600	13400	36200	3700	19200	4000
7-Aug-14	69800	38300	25300	15300	27500	10600	28600	13400	28500	NIL	22000	6600
8-Aug-14	66400	32900	26300	11600	25000	7500	27600	12100	28500	NIL	19400	4000
9-Aug-14	77200	43600	43400	22900	33700	16200	28000	12400	33400	900	17100	1700
10-Aug-14	66400	32900	33600	11600	34700	17200	28000	12400	39800	7300	15500	NIL
11-Aug-14	61000	27600	24700	2700	37000	19500	14200	NIL	49000	16500	14200	NIL
12-Aug-14	61000	27600	20600	NIL	29800	12300	21900	NIL	45700	13200	13700	NIL
13-Aug-14	61000	27600	24700	2700	39500	22000	20700	NIL	44600	12100	19400	NIL
14-Aug-14	66300	32900	33600	11600	27300	11300	21900	6300	43400	10900	21400	NIL
15-Aug-14	71700	38300	22500	65600	22300	6300	21900	6400	41000	8500	18800	3300
16-Aug-14	87700	54300	35600	11500	23400	9100	22100	6400	39700	7200	19500	4000
17-Aug-14	97200	69000	71400	49400	32400	18100	24900	9200	41000	8500	17200	1700
18-Aug-14	63600	38300	59700	37700	31300	17000	24100	8400	51900	19400	16800	1300
19-Aug-14	47900	22200	26000	4000	35600	21300	20700	5300	54800	22300	15800	300
20-Aug-14	51500	22200	22000	NIL	62800	47500	22100	6700	47000	14500	21800	6300
21-Aug-14	47200	15300	14200	NIL	61600	48300	22800	7100	41000	8500	27700	12200
22-Aug-14	48800	16900	13000	NIL	47800	34500	23800	8200	32500	NIL	25900	10400
23-Aug-14	48800	16900	27400	9100	28200	12100	29000	13300	32500	NIL	16000	700
24-Aug-14	47200	15300	28500	6500	19700	2900	37000	21300	35700	3700	16100	700
25-Aug-14	43400	11500	27300	5300	11300	NIL	42300	26400	38400	5900	12500	NIL
26-Aug-14	39900	7900	22000	NIL	10500	NIL	37700	21800	37500	5000	6500	NIL
27-Aug-14	39900	7900	22000	NIL	15900	NIL	28000	12200	38800	4300	10000	NIL
28-Aug-14	42400	11500	20000	NIL	15900	NIL	18900	3100	36200	3700	15200	NIL
29-Aug-14	36900	5900	20900	NIL	17400	NIL	16900	1000	36200	3700	17700	2300
30-Aug-14	28900	9000	20900	NIL	17400	NIL	15800	NIL	36200	3700	16900	1300
31-Aug-14	27500	11000	21400	NIL	21900	4500	15800	NIL	35000	2500	17600	2300

DATE	SUTLEJ				LINKS/CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Aug-14	15400	2000	2000	NIL	7000	4400	22000	NIL	35.3	19.6
2-Aug-14	15500	2000	2100	NIL	7000	4400	22000	NIL	32.5	20.4
3-Aug-14	15800	2500	2500	NIL	7000	4400	22000	NIL	30.0	14.2
4-Aug-14	15800	2700	2300	NIL	7000	4400	22000	NIL	29.6	13.6
5-Aug-14	16100	2800	2300	NIL	7000	4400	11400	NIL	32.7	15.6
6-Aug-14	16400	2900	2100	NIL	9700	4400	10000	NIL	34.6	15.2
7-Aug-14	14700	1000	200	NIL	12000	4400	10000	NIL	33.7	16.1
8-Aug-14	13900	200	2300	NIL	13700	4400	14800	NIL	35.6	19.6
9-Aug-14	13700	NIL	1100	NIL	17000	4400	20500	NIL	37.0	16.6
10-Aug-14	14300	700	1100	NIL	17000	4400	22000	NIL	29.2	14.2
11-Aug-14	15200	1600	1200	NIL	18300	4400	22000	NIL	32.6	13.2
12-Aug-14	15700	2000	500	NIL	20000	4400	20600	NIL	34.6	16.0
13-Aug-14	17000	3300	500	NIL	20000	4400	22000	NIL	34.5	17.4
14-Aug-14	17000	3300	500	NIL	20000	4400	22000	NIL	34.6	14.1
15-Aug-14	16600	2900	1000	NIL	20000	4400	22000	NIL	35.6	17.6
16-Aug-14	16600	2900	2300	NIL	20000	4400	22000	NIL	32.6	17.3
17-Aug-14	14700	1000	2100	NIL	20000	4400	22000	NIL	20.5	12.1
18-Aug-14	15300	1700	2300	NIL	20000	4400	22000	NIL	26.5	10.3
19-Aug-14	15700	2100	2300	NIL	20000	4400	22000	NIL	30.2	9.3
20-Aug-14	16700	3000	2000	NIL	20000	4400	22000	NIL	31.1	9.1
21-Aug-14	17200	3400	1300	NIL	18000	4400	14200	NIL	33.5	9.6
22-Aug-14	17200	3400	1300	NIL	14300	4400	13000	NIL	35.5	10.2
23-Aug-14	16700	2900	1300	NIL	6200	4400	18300	NIL	33.5	13.1
24-Aug-14	16700	2900	1300	NIL	6000	4400	22000	NIL	28.6	11.4
25-Aug-14	15900	2100	1300	NIL	6000	4400	22000	NIL	28.2	11.3
26-Aug-14	16000	2100	1500	NIL	6000	4400	22000	NIL	29.1	14.2
27-Aug-14	15600	1800	1500	NIL	6000	4400	22000	NIL	NR	NR
28-Aug-14	15600	1800	1500	NIL	6000	4400	20000	NIL	25.6	9.4
29-Aug-14	14800	1100	1500	NIL	8800	4400	20900	NIL	26.5	13.1
30-Aug-14	14800	1100	1300	NIL	12200	4400	20900	NIL	24.6	11.4
31-Aug-14	15300	1600	1300	NIL	7500	4400	21400	NIL	26.4	14.2

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Sep-14	600	1538.30	106300	145000	17000	160500	152500	647.60	171300	165000	155100	127200
2-Sep-14	600	1537.06	101300	135000	19200	188100	180100	647.00	163200	165000	157000	129100
3-Sep-14	600	1535.77	99700	135000	18800	193500	185500	646.90	172100	165000	156600	129100
4-Sep-14	600	1534.39	97200	13500	18800	126700	118700	646.60	166500	165000	154400	127700
5-Sep-14	600	1533.70	116900	135000	20100	173400	165400	645.30	151900	165000	149000	122000
6-Sep-14	600	1535.20	156000	113900	17600	232200	224200	645.00	167000	165000	149000	121700
7-Sep-14	600	1536.62	132200	92100	17800	198500	187800	647.30	284800	206200	149300	122100
8-Sep-14	600	1538.12	114700	72400	16800	101300	93300	649.00	167100	122300	161900	144000
9-Sep-14	600	1539.62	118000	75700	19500	132000	124000	649.00	97400	91400	164700	149100
10-Sep-14	600	1541.12	110400	66800	17600	120200	112200	649.00	108300	102300	105000	89300
11-Sep-14	600	1542.62	103600	59700	17200	99000	90700	649.00	90000	84000	85400	69600
12-Sep-14	600	1543.87	93800	57000	15400	91300	83000	648.40	68900	77600	84300	69200
13-Sep-14	600	1545.37	89500	45500	15000	105400	97100	648.60	86200	75300	74500	59000
14-Sep-14	600	1546.37	87600	58000	14900	71000	62700	648.20	70400	74200	67300	51400
15-Sep-14	600	1547.37	84300	54700	15400	93700	85900	647.80	71500	74100	62200	46300
16-Sep-14	600	1548.37	83100	53500	15200	90500	82500	648.30	92500	75000	67300	51400
17-Sep-14	600	1549.37	77900	48400	16000	75800	67800	648.10	76400	75300	67300	51400
18-Sep-14	600	1550.00	74900	56100	15200	89000	81000	647.90	72100	70600	64800	48900
19-Sep-14	600	1550.00	77800	77200	15900	90200	81900	647.50	65900	68100	71100	55200
20-Sep-14	600	1550.00	77800	77200	16300	97000	88700	647.70	74400	64200	66000	50100
21-Sep-14	600	1550.00	79900	79400	16300	76400	68100	648.20	89100	72000	62200	46300
22-Sep-14	600	1550.00	79300	78700	17200	98700	90400	648.40	84800	73800	62200	64300
23-Sep-14	600	1550.00	74600	74000	16600	111700	103400	648.50	95700	87200	64800	48900
24-Sep-14	600	1550.00	70800	70200	15900	63700	55400	648.50	96200	90100	68600	52700
25-Sep-14	600	1550.00	74100	73500	16300	82700	74400	648.50	86000	79900	77500	61600
26-Sep-14	600	1550.00	71900	71300	16900	68800	60400	648.30	79100	77900	77500	61600
27-Sep-14	600	1550.00	70800	8000	17500	71500	63200	647.40	86500	100000	69800	53900
28-Sep-14	600	1549.13	65300	8000	16700	105700	97400	646.70	93100	100000	66800	51400
29-Sep-14	600	1548.49	62100	8000	17500	87500	79200	646.20	98000	100000	82100	66700
30-Sep-14	600	1547.82	61200	8000	15300	106300	98000	645.80	100100	100000	91600	76400

Discharge in Cusec

DATE	INDUS						JHELMUM					
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL		
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S	
1-Sep-14	120700	94500	85600	32500	44000	10700	1228.40	20900	45000	39100	15800	
2-Sep-14	116600	94200	85200	32500	37900	21700	1227.85	24600	45000	35100	11900	
3-Sep-14	118200	94200	85100	32500	31800	14300	1227.25	22700	45000	39100	15800	
4-Sep-14	121900	95800	83300	30000	29900	3500	1229.00	95000	30000	46800	23600	
5-Sep-14	119600	90900	83300	30000	29400	1000	1236.60	310200	15000	142500	132000	
6-Sep-14	122100	88800	83700	30000	29400	500	1239.95	41300	28200	391600	391600	
7-Sep-14	122100	88800	81300	27600	29300	NIL	1240.70	146800	128400	185200	185200	
8-Sep-14	121000	86300	78700	25800	29300	NIL	1241.10	107500	95200	118700	116800	
9-Sep-14	121000	86300	78700	25800	29300	NIL	1241.65	84800	68400	74500	71800	
10-Sep-14	146300	118000	77800	25800	28900	NIL	1241.65	85800	63300	56900	54200	
11-Sep-14	190400	164900	81400	28800	28700	NIL	1242.00	77100	62700	62700	73400	
12-Sep-14	205300	177500	97700	44200	28700	NIL	1242.00	80600	80600	80600	72100	
13-Sep-14	207600	180400	124700	70800	26700	NIL	1242.00	77300	77300	77300	90600	
14-Sep-14	219700	197100	135900	82000	25000	NIL	1242.00	69200	69200	69200	66000	
15-Sep-14	260900	238900	150500	96500	24500	NIL	1242.00	80000	80000	98400	95200	
16-Sep-14	270500	246100	163000	109600	26100	NIL	1242.00	66200	66200	75000	71800	
17-Sep-14	300000	274100	178600	125200	50800	11100	1242.00	66300	66300	69100	65900	
18-Sep-14	309400	284500	201000	147600	70000	32200	1242.00	62400	62400	69000	65900	
19-Sep-14	366800	340900	250100	197900	82400	44800	1242.00	60700	60700	60500	57400	
20-Sep-14	339700	313700	304800	252700	93900	57000	1242.00	56500	56500	58500	54800	
21-Sep-14	285000	259400	321000	268900	110600	73600	1242.00	53700	53700	58000	52000	
22-Sep-14	195900	173500	255700	203600	129200	93600	1242.00	56000	56000	63200	52000	
23-Sep-14	159000	136100	190700	138800	133200	98200	1242.00	47500	47500	55200	37200	
24-Sep-14	125700	105300	130000	78000	139100	104000	1242.00	47600	47600	50600	31400	
25-Sep-14	107700	88500	91900	38900	145400	110300	1242.00	43300	43300	48900	27500	
26-Sep-14	102100	80500	80600	28700	128300	93600	1242.00	42100	42100	38200	19700	
27-Sep-14	99700	74300	73300	22300	109200	75300	1242.00	42100	42100	39800	19700	
28-Sep-14	97300	74300	69900	19400	77400	43300	1242.00	33800	33800	33900	11900	
29-Sep-14	97700	75100	69100	18500	57700	23200	1241.80	36800	45000	33300	11900	
30-Sep-14	92600	69300	69000	18500	45200	10700	1241.50	32700	45000	33300	11900	

Discharge in Cusec

DATE	CHENAB								RAVI			
	MARALA		QADIR ABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Sep-14	27100	11000	23400	1400	24700	7300	13700	NIL	30000	NIL	17600	2000
2-Sep-14	33000	9000	26000	4000	27600	10200	13900	NIL	32000	NIL	17300	2000
3-Sep-14	422000	15300	31100	9100	20700	3300	13900	NIL	32000	NIL	16000	700
4-Sep-14	136700	109100	31100	9100	23900	9100	15800	NIL	36100	4300	15800	4600
5-Sep-14	485000	470000	271100	261500	25100	9100	13900	NIL	45600	22500	12200	300
6-Sep-14	323300	320300	655700	649300	70900	55400	20200	4500	75500	62500	14700	1300
7-Sep-14	562800	559800	776400	774100	126900	123900	15800	NIL	84600	73600	21000	6600
8-Sep-14	127500	124500	256300	256300	163000	16300	18900	3100	105100	92600	21500	6600
9-Sep-14	85400	82400	103000	102200	298300	298300	18900	3100	131800	11800	24300	11600
10-Sep-14	78700	75700	93900	93900	509400	509400	75900	60100	109200	94500	33300	20900
11-Sep-14	78700	75700	89500	89500	592300	593400	131500	116000	63100	48800	50400	37600
12-Sep-14	61500	58500	67600	67600	438900	438900	179800	164900	44100	29500	79000	64700
13-Sep-14	61500	58500	63800	63800	241700	241700	215300	200400	38100	24100	79400	64800
14-Sep-14	61500	58500	61400	61400	197800	197800	358300	358300	35600	23100	79700	64800
15-Sep-14	52000	49000	61400	61400	153700	153700	379600	379600	36300	19200	47100	32200
16-Sep-14	46600	43600	53400	53400	132600	132600	413600	413600	34900	15300	31000	15700
17-Sep-14	37100	32900	46100	46100	130800	130800	406100	406100	32100	8500	26800	11700
18-Sep-14	31700	27600	42000	38500	128500	124500	312300	312300	31400	4800	18500	3300
19-Sep-14	33500	27600	30100	19300	130500	124500	261000	245600	27000	NIL	12800	NIL
20-Sep-14	33700	27600	33500	17100	113000	104000	175,600	159700	28000	NIL	11800	NIL
21-Sep-14	33900	27600	31100	10100	95300	81300	120,300	104500	31900	3700	13800	NIL
22-Sep-14	33900	27600	31300	10300	86300	71300	100,400	84600	32900	3700	15300	NIL
23-Sep-14	34300	27600	36500	15500	78900	63200	89100	73300	31000	1800	15300	NIL
24-Sep-14	34300	27600	27000	21000	75600	59900	85700	69900	28200	NIL	18100	2600
25-Sep-14	35000	27600	35700	14700	69400	53700	70700	54800	27200	NIL	18100	2600
26-Sep-14	31600	22200	23000	15000	57600	41900	67000	51100	26700	NIL	18100	2600
27-Sep-14	26700	16900	35400	13400	49900	34200	60900	45100	26700	NIL	16700	1300
28-Sep-14	25700	15300	32900	10800	47300	31600	52100	36300	27300	NIL	15500	NIL
29-Sep-14	31200	15300	28900	6900	45900	30200	49600	33800	26500	NIL	15000	NIL
30-Sep-14	24500	7000	26200	4200	37800	22100	38400	22700	26000	NIL	14300	NIL

Discharge in Cusec

DATE	SUTLEJ				LINKS/CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Sep-14	15300	1800	1500	NIL	6000	4400	22000	NIL	23.6	10.0
2-Sep-14	14700	1000	1500	NIL	6000	4400	22000	NIL	27.2	13.5
3-Sep-14	15400	1900	1500	NIL	4300	4400	22000	NIL	23.6	15.2
4-Sep-14	15600	4300	800	NIL	2000	4400	22000	NIL	17.6	7.6
5-Sep-14	21000	19500	2700	2000	2000	4400	9600	NIL	13.0	7.7
6-Sep-14	24100	20100	5000	3300	2000	4400	6400	NIL	9.1	7.1
7-Sep-14	26100	21400	18600	16400	2000	4300	2300	NIL	15.5	7.2
8-Sep-14	25900	20700	19600	17300	2000	4100	NIL	NIL	22.0	10.5
9-Sep-14	21100	15800	19800	17800	2000	4000	800	NIL	26.7	13.2
10-Sep-14	18100	12900	19800	17800	2000	4000	NIL	NIL	22.3	11.3
11-Sep-14	16500	10800	16600	14600	2000	4000	NIL	NIL	26.6	11.2
12-Sep-14	15400	9900	11000	8700	2000	4000	NIL	NIL	25.6	12.3
13-Sep-14	15400	8600	10800	8500	2000	4000	NIL	NIL	25.7	12.7
14-Sep-14	11600	3900	10100	7500	2000	4000	NIL	NIL	27.7	12.1
15-Sep-14	11800	3900	9100	6400	2000	4000	NIL	NIL	23.6	12.1
16-Sep-14	9800	500	4400	1700	2000	4000	NIL	NIL	26.3	8.4
17-Sep-14	9900	NIL	3300	800	2000	4000	NIL	NIL	27.6	7.2
18-Sep-14	11200	900	3100	800	2000	4000	3500	NIL	29.6	8.3
19-Sep-14	12500	2000	2300	NIL	2000	4000	10800	NIL	30.6	8.8
20-Sep-14	13200	1700	2000	NIL	2000	4000	16400	NIL	31.3	12.1
21-Sep-14	12600	1000	2000	NIL	2000	4100	21000	NIL	26.6	8.6
22-Sep-14	12700	1000	2700	NIL	2000	4100	21000	NIL	25.3	7.2
23-Sep-14	12900	1600	2200	NIL	2000	4100	21000	NIL	27.6	9.1
24-Sep-14	13000	1300	2200	NIL	2000	4100	21000	NIL	28.6	8.1
25-Sep-14	12000	NIL	2200	NIL	2000	4100	21000	NIL	21.6	10.4
26-Sep-14	11500	NIL	2200	NIL	2000	4100	21000	NIL	17.6	5.1
27-Sep-14	11500	NIL	2200	NIL	2000	4100	22000	NIL	23.6	6.4
28-Sep-14	11000	NIL	1500	NIL	2000	4100	22000	NIL	25.6	7.3
29-Sep-14	11000	NIL	1100	NIL	2000	4100	22000	NIL	24.2	10.4
30-Sep-14	10800	NIL	600	NIL	2000	4100	22000	NIL	24.4	6.4

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Oct-14	600	1546.90	59000	85000	15400	86200	77900	645.30	99100	100000	91000	76400
2-Oct-14	600	1546.00	59600	85000	15700	108300	100000	644.20	92100	100000	89800	75200
3-Oct-14	600	1545.12	60200	85000	14600	97800	86500	644.10	104900	100000	90500	67100
4-Oct-14	600	1544.25	60500	85000	15300	111000	102500	642.90	92800	100000	90500	67100
5-Oct-14	600	1543.40	60900	85000	14700	96600	88100	642.30	10000	100000	88900	66400
6-Oct-14	600	1542.52	60100	85000	14900	102500	94000	641.80	95200	95200	88900	66600
7-Oct-14	600	1541.63	59800	85000	20300	113300	104800	642.10	102800	102800	88900	66600
8-Oct-14	600	1540.77	60600	85000	14700	104200	96500	643.70	116900	116900	86800	60800
9-Oct-14	600	1540.15	62500	80000	16800	123400	115700	644.40	106100	106100	84800	59500
10-Oct-14	600	1538.90	55700	90000	16000	110800	102500	645.60	113700	113700	83600	58300
11-Oct-14	600	1537.39	48700	90000	13000	127500	119200	645.40	94400	94400	81100	56000
12-Oct-14	600	1535.86	48100	90000	14300	104600	96600	645.90	118900	118900	82300	58000
13-Oct-14	600	1534.28	46800	90000	14000	116800	108800	645.20	99100	99100	81800	57800
14-Oct-14	600	1532.52	41800	90000	14200	99500	92300	645.10	107500	107500	86400	64400
15-Oct-14	600	1531.39	44300	75000	14200	11100	103900	644.50	101100	101100	87300	66800
16-Oct-14	600	1530.20	42600	75000	18400	93900	86700	645.20	99500	72000	89300	76300
17-Oct-14	600	1529.07	40300	70000	16100	104300	97100	645.60	84200	60000	86100	69600
18-Oct-14	600	1528.56	37100	50000	15300	79300	71600	646.30	87600	60000	77700	58200
19-Oct-14	600	1528.05	36900	50000	14600	69300	63300	645.60	66100	60000	65800	56900
20-Oct-14	600	1527.48	35200	50000	15200	66900	62200	644.70	61900	60000	62100	53600
21-Oct-14	600	1527.17	35300	43000	13900	66700	63700	644.50	62500	50000	62100	53600
22-Oct-14	600	1526.87	35600	43000	13100	72100	69100	644.60	61600	56000	60800	52800
23-Oct-14	600	1526.42	31500	43000	13200	63500	60500	644.00	52200	56000	60900	56600
24-Oct-14	600	1526.06	33900	43000	13200	84200	81200	643.60	55300	56000	57100	53000
25-Oct-14	600	1525.69	33600	43000	14900	55900	52900	643.00	53100	56000	54900	52900
26-Oct-14	600	1525.31	33300	43000	14600	59500	56500	642.90	57800	55000	56000	54000
27-Oct-14	600	1524.88	32000	43000	14900	48300	45300	642.50	54700	55000	53800	51900
28-Oct-14	600	1524.22	30900	48000	14000	62300	59300	642.10	54700	55000	52600	49600
29-Oct-14	600	1523.61	32400	48000	13900	63000	60000	641.80	55900	55000	52500	49500
30-Oct-14	600	1522.98	32000	38600	13300	59700	56700	642.40	64800	55000	54700	51700
31-Oct-14	600	1522.37	32400	48000	14600	64400	60200	642.60	60900	55000	54700	51700

Discharge in Cusec

DATE	INDUS						JHELUM				
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL	
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Oct-14	81500	61100	67200	17500	36100	2000	1241.20	32700	45000	33400	11900
2-Oct-14	89200	73500	60400	12200	34500	1300	1240.85	30600	45000	33600	11900
3-Oct-14	94200	81100	60400	12200	27700	NIL	1240.40	26500	45000	33600	11900
4-Oct-14	93100	80000	63600	14600	25700	NIL	1239.95	26600	45000	270000	5300
5-Oct-14	86100	72300	72000	22200	24000	NIL	1239.50	27400	45000	35200	15800
6-Oct-14	86100	72200	72000	22200	22800	NIL	1239.00	25500	45000	35200	15800
7-Oct-14	78000	68800	69200	20400	19600	NIL	1238.40	21500	45000	35200	15800
8-Oct-14	80100	71900	68700	20400	17800	NIL	1238.05	31300	45000	43200	23600
9-Oct-14	77700	69100	65800	17300	15000	NIL	1237.45	16500	40000	37400	15800
10-Oct-14	77700	69100	65800	17300	15100	NIL	1237.05	24400	40000	33700	11900
11-Oct-14	77700	69100	65800	17300	17000	NIL	1236.80	20200	30000	30000	15800
12-Oct-14	72300	62700	61700	20000	20100	NIL	1236.50	18300	30000	27300	5300
13-Oct-14	62800	53200	59800	17900	20100	NIL	1236.15	16300	30000	30100	8000
14-Oct-14	62500	53200	54000	14700	18600	NIL	1235.80	16300	30000	27400	5300
15-Oct-14	61000	53200	52400	13200	16600	NIL	1235.45	16300	30000	27400	5300
16-Oct-14	60700	53200	52300	13200	16600	NIL	1235.25	17200	25000	27400	5300
17-Oct-14	73900	66000	51400	13200	18600	NIL	1235.00	15200	25000	30100	8000
18-Oct-14	76700	72800	59700	22900	18600	NIL	1234.75	15200	25000	27400	5300
19-Oct-14	80600	73700	65800	29100	15600	NIL	1234.45	16300	28000	27400	5300
20-Oct-14	81100	73700	66500	29700	13700	NIL	1234.10	14300	28000	27400	5300
21-Oct-14	77900	70500	66600	31800	12300	NIL	1233.75	14300	28000	25700	5300
22-Oct-14	71100	63300	66600	34900	12200	NIL	1233.40	14300	28000	32000	11900
23-Oct-14	71200	63000	63800	29700	18200	NIL	1233.10	14300	26000	23400	5300
24-Oct-14	69000	60400	60500	26700	23500	NIL	1232.75	12300	26000	26100	8000
25-Oct-14	67000	58400	57400	23800	26700	1600	1232.40	12300	26000	23400	5300
26-Oct-14	67000	58400	52800	19700	27000	3200	1232.10	14800	26000	23400	5300
27-Oct-14	67000	58400	52700	19700	27200	4100	1231.80	14300	26000	23400	5300
28-Oct-14	66200	58400	52400	19200	25400	4100	1231.50	14300	26000	23400	5300
29-Oct-14	65000	58400	52500	20700	21400	11200	1231.10	10400	26000	23400	5300
30-Oct-14	65000	58400	52600	22700	18700	18700	1230.75	12300	26000	23400	5300
31-Oct-14	62800	56300	52300	24600	15900	15900	1230.35	14400	30000	34900	15800

Discharge in Cusec

DATE	CHENAB						RAVI					
	MARALA		QADIR ABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Oct-14	25000	7000	24800	2800	33800	18100	38300	22700	26000	NIL	14800	NIL
2-Oct-14	22100	7000	23500	1500	26600	10800	34300	18700	14400	NIL	14400	NIL
3-Oct-14	22500	7000	22000	NIL	27000	10800	26800	11400	27000	NIL	14800	NIL
4-Oct-14	23000	7000	22000	NIL	26600	10800	26800	11400	28000	NIL	14500	NIL
5-Oct-14	22900	7000	220000	NIL	25400	9600	24800	9400	30200	900	14000	NIL
6-Oct-14	24000	7000	21000	NIL	25400	9600	24000	8800	30800	2500	14000	NIL
7-Oct-14	23000	7000	21000	NIL	24000	8200	24000	8800	30800	2500	14000	NIL
8-Oct-14	23000	7000	21000	NIL	24000	8200	26100	10900	28900	600	14000	NIL
9-Oct-14	24300	7000	22000	NIL	26600	10800	21400	6500	29300	NIL	14000	NIL
10-Oct-14	23000	7000	24800	NIL	21200	8200	21600	6500	29600	NIL	14800	NIL
11-Oct-14	23000	7000	22000	NIL	23900	9400	21200	6000	30000	600	12000	NIL
12-Oct-14	22000	7000	21000	NIL	24700	9200	21000	6000	30000	600	14400	NIL
13-Oct-14	21800	7000	21000	NIL	23700	8200	20600	5600	30000	600	13900	NIL
14-Oct-14	21600	7000	21000	NIL	34100	18600	20500	5600	27000	NIL	14000	NIL
15-Oct-14	21600	7000	19500	NIL	33500	18100	20300	5600	26000	NIL	14100	NIL
16-Oct-14	17700	7000	21000	NIL	28200	12400	19200	10000	25000	NIL	14800	NIL
17-Oct-14	14700	7000	20500	NIL	26300	10300	20100	10900	24500	NIL	14100	NIL
18-Oct-14	14700	7000	19000	NIL	26500	10300	21700	12500	23500	NIL	14100	NIL
19-Oct-14	14200	7000	19000	NIL	26700	10300	18900	8700	19500	NIL	13900	NIL
20-Oct-14	14200	7000	19000	NIL	20700	4300	19300	9900	19000	NIL	14100	NIL
21-Oct-14	12900	6000	20400	NIL	18400	2200	13100	9900	18400	2400	14700	1300
22-Oct-14	12700	6000	21000	NIL	14300	5600	10000	6500	20000	3600	11600	4600
23-Oct-14	12700	6000	21000	NIL	11600	2900	9700	6400	20100	3600	7700	700
24-Oct-14	12700	6000	21000	NIL	8700	NIL	11400	8200	18900	2400	9400	2300
25-Oct-14	12400	6000	20500	NIL	8700	NIL	9700	6500	19500	3000	11000	4000
26-Oct-14	12900	6000	19000	NIL	8700	NIL	8500	5300	18300	1800	11100	4000
27-Oct-14	12600	6000	19000	NIL	8700	NIL	7800	4600	18300	1800	11100	4000
28-Oct-14	12600	6000	21000	NIL	8100	NIL	7800	4600	18300	1800	11100	4000
29-Oct-14	12400	6000	19000	NIL	8100	NIL	8000	4800	19100	1800	11100	4000
30-Oct-14	12600	6000	19000	NIL	8100	NIL	6900	3700	19100	1800	10100	3000
31-Oct-14	12400	6000	19500	NIL	7700	NIL	6900	3700	19100	1300	10100	3000

Discharge in Cusec

DATE	SUTLEJ				LINKS/CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Oct-14	10500	NIL	800	NIL	2000	4100	22000	NIL	26.4	5.4
2-Oct-14	10000	NIL	800	NIL	2000	4100	22000	NIL	26.4	6.2
3-Oct-14	10000	NIL	800	NIL	2000	4100	22000	NIL	27.5	7.0
4-Oct-14	11400	NIL	800	NIL	2000	4100	22000	NIL	20.6	9.4
5-Oct-14	11600	NIL	800	NIL	2000	4100	22000	NIL	23.9	13.3
6-Oct-14	11700	NIL	800	NIL	2000	4100	21000	NIL	21.1	12.2
7-Oct-14	11700	NIL	800	NIL	1800	4100	21000	NIL	17.8	11.1
8-Oct-14	11600	NIL	500	NIL	1800	4100	21000	NIL	17.2	12.2
9-Oct-14	11800	NIL	500	NIL	1800	4100	22000	NIL	18.3	11.7
10-Oct-14	11600	NIL	1100	NIL	1800	4100	22000	NIL	17.2	11.2
11-Oct-14	11600	NIL	1300	NIL	3200	4000	22000	NIL	17.2	6.7
12-Oct-14	11400	NIL	1400	NIL	11000	3900	21000	NIL	16.7	6.1
13-Oct-14	11400	NIL	1300	NIL	15000	3900	21000	NIL	16.7	8.9
14-Oct-14	11400	NIL	1500	NIL	15000	3900	21000	NIL	17.2	7.8
15-Oct-14	11400	NIL	2000	NIL	15000	3700	19500	NIL	19.4	10.0
16-Oct-14	10800	NIL	2000	NIL	15000	3600	21000	NIL	18.3	10.6
17-Oct-14	10800	NIL	1700	NIL	15000	3600	20500	NIL	17.8	11.1
18-Oct-14	10200	NIL	1700	NIL	13500	3600	19000	NIL	17.2	7.8
19-Oct-14	9800	NIL	1700	NIL	13000	3600	19000	NIL	17.2	6.1
20-Oct-14	8500	NIL	2000	NIL	12100	3600	19000	NIL	17.2	9.4
21-Oct-14	7400	NIL	1500	NIL	5300	3600	20400	NIL	15.0	8.3
22-Oct-14	7600	500	1200	NIL	700	3600	21000	NIL	16.1	6.7
23-Oct-14	7100	NIL	1200	NIL	NIL	3600	21000	NIL	17.8	5.6
24-Oct-14	7000	NIL	1200	NIL	NIL	3700	21000	NIL	18.3	6.1
25-Oct-14	6900	NIL	1200	NIL	NIL	3800	20500	NIL	17.2	6.1
26-Oct-14	6900	NIL	1200	NIL	NIL	3800	19000	NIL	16.7	5.0
27-Oct-14	6900	NIL	1200	NIL	NIL	3800	19000	NIL	16.7	5.6
28-Oct-14	6900	NIL	1000	NIL	NIL	3800	21000	NIL	17.2	11.7
29-Oct-14	6900	NIL	1000	NIL	NIL	3800	19000	NIL	16.1	7.8
30-Oct-14	7200	NIL	1000	NIL	NIL	3800	19000	NIL	14.4	6.7
31-Oct-14	7300	NIL	1000	NIL	NIL	3800	19000	NIL	13.9	5.6

Appendix-III

**MONTHLY RAINFALL DATA
(JULY-SEPTEMBER 2014)**

TELEMETRIC NETWORK RAINFALL (MM) FOR THE MONTH OF JULY-2014																																		
Sr#	STATIONS	Rainfall Recorded in mm during past 24 hours (0800 to 0800 HRS PST)																																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	#	26	#	#	30	#	Total Since 01-07-14		
1	INDUS CATCHMENT																																	
1	CHAKDARA	0	0	4	2	0	0	0	0	0	0	0	0	1	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	52		
2	DAGGAR	0	0	0	22	0	0	0	0	0	0	0	0	0	7	1	6	41	0	0	0	0	0	0	0	0	0	0	0	0	77			
3	OGHI	0	0	8	37	0	0	0	0	0	0	0	0	15	5	0	18	24	0	1	0	0	0	0	0	#	0	0	0	1	125			
4	PHULRA	0	0	2	4	0	0	0	0	0	0	0	0	0	16	3	2	34	0	22	0	0	0	0	0	3	1	0	0	1	88			
5	NOWSHERA	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	#	0	41			
6	ATTOCK	0	0	4	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	0	0	0	0	0	0	*	*	*	*	*	*	16		
7	DHOKPATHAN	17	0	23	1	0	0	0	0	0	0	0	0	0	0	0	10	10	0	1	0	0	0	0	0	0	0	#	6	0	91			
8	KURRUM GARHI	0	0	13	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	15			
9	BESHAM	14	0	0	2	2	0	0	0	0	0	3	0	0	1	0	0	20	14	5	0	0	0	0	0	1	0	0	0	0	62			
10	DRATIAN	0	0	*	0	0	*	*	*	*	0	0	0	0	1	0	35	1	5	7	0	0	0	0	29	9	34	0	#	2	141			
11	GHARIALA	0	2	3	0	0	2	0	0	0	0	0	0	14	0	0	0	0	5	0	0	0	0	0	0	3	1	0	1	#	0	71		
12	TANDA DAM	0	0	3	1	0	5	0	0	0	0	0	0	0	0	0	27	88	4	0	0	0	0	0	0	0	4	0	3	0	0	135		
13	DARA-E-TANG	1	0	9	1	0	1	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7	0	23		
14	WARSAK	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	1	13	1	2	0	0	46		
15	RASHID ABAD	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	4	0	10		
2	JHELUM CATCHMENT																																	
16	MUZAFFARABAD	0	*	2	9	0	4	0	0	*	0	0	0	16	3	0	1	3	1	0	0	0	0	0	0	#	3	1	0	5	1	3	94	
17	DOMEL	5	2	2	19	0	14	0	0	0	0	0	0	25	1	1	3	6	0	1	0	0	0	0	14	#	3	0	2	3	1	0	140	
18	CHATTARKALLAS	2	0	0	18	0	12	0	0	0	0	0	0	7	2	0	0	1	0	0	0	0	0	0	2	3	1	1	0	0	2	0	51	
19	SEHRKAKOTA	16	2	16	51	0	11	0	0	0	29	0	0	0	22	0	15	124	0	0	0	0	0	0	30	3	0	0	0	0	0	8	327	
20	PALANDRI	34	0	30	5	0	0	0	0	0	8	0	0	0	29	0	38	1	0	21	0	0	0	0	41	0	0	0	0	0	0	6	213	
21	KOTLI	15	0	0	0	0	0	0	0	*	10	3	0	0	30	2	14	1	0	1	0	0	0	10	2	1	0	0	0	0	0	89		
22	MANGLA	12	0	0	0	0	4	0	0	0	3	0	0	0	0	4	0	0	4	0	0	0	0	0	10	3	0	0	1	2	0	0	43	
23	ROHTAS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
24	NAUSERI	0	4	2	12	0	0	0	0	0	0	0	0	1	2	0	11	*	0	0	0	0	0	0	0	3	1	0	0	4	0	0	40	
25	TALHATTA	19	0	6	9	0	0	0	0	0	0	0	0	5	2	7	20	11	0	4	0	0	0	0	11	7	1	1	0	1	1	9	114	

26	HATTIAN BALA	39	25	1	25	0	1	0	0	0	1	0	8	26	7	0	6	5	0	1	0	0	0	0	0	5	3	14	0	0	0	0	7	174	
27	SARA-I-ALAMGIR	12	1	4	0	0	7	0	0	0	10	0	0	0	0	0	8	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	45	
28	CHAKRI	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	17	1	0	1	0	0	0	0	0	6	0	0	3	4	0	0	0	34	
29	PALOTE	7	0	1	0	0	1	0	0	0	12	0	0	0	0	10	18	0	16	7	0	0	0	0	0	14	#	8	3	7	3	0	0	121	
30	BABA SHAH JALAL	1	5	2	0	0	0	0	0	0	2	0	2	0	0	0	0	0	1	1	0	0	0	0	3	0	3	0	0	4	0	0	24		
3	CHENAB CATCHMENT																																		
31	KUND	3	5	16	0	0	2	0	0	0	0	0	0	0	0	61	1	1	0	0	0	0	*	0	26	0	0	0	0	0	0	0	115		
32	DAULATNAGAR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	*	*	*	0	*	*	*	*	*	*	*	*	*	*	*	0	
33	MARALA (CHENAB)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	24	
34	MARALA (SHAMPUR)	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	0	*	*	*	*	*	*	*	*	*	*	0
35	PALKU	0	8	9	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	21	
36	AIK NULLAH(Ura)	*	*	26	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	*	0	*	*	*	*	*	*	*	*	*	26
37	SHADIWAL	50	1	0	1	0	0	0	0	0	0	0	0	0	0	27	5	17	0	8	0	0	0	0	19	4	0	0	1	2	0	0	135		
38	ALEXANDRA BRIDGE	6	*	0	0	0	0	0	0	0	0	0	0	0	0	15	15	0	0	19	0	0	0	0	1	8	0	0	1	1	0	0	66		
4	RAVI CATCHMENT																																		
39	ZAFARWAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
40	SHAKAR GARH	33	0	0	0	0	0	0	0	0	5	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	5	#	14	0	120		
41	KOTNAINA	9	0	0	0	0	0	0	0	0	3	*	0	0	0	87	0	1	0	9	0	0	0	0	9	7	0	0	0	0	0	0	125		
42	JASSAR	30	0	0	0	0	0	0	0	0	0	0	0	0	0	33	41	1	0	18	0	0	0	0	0	0	0	0	0	0	4	0	127		
43	RAVI SYPHON	10	0	0	0	0	0	0	0	0	0	0	0	0	0	7	17	0	23	0	0	0	0	0	0	0	0	0	1	22	0	0	80		
44	SHARQPUR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	*	*	*	*	*	*	*	*	*	*	*	0
5	SUTLEJ CATCHMENT																																		
45	GS WALA	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#	0	17	0	36		
Note:- * means data not received ε*																																			

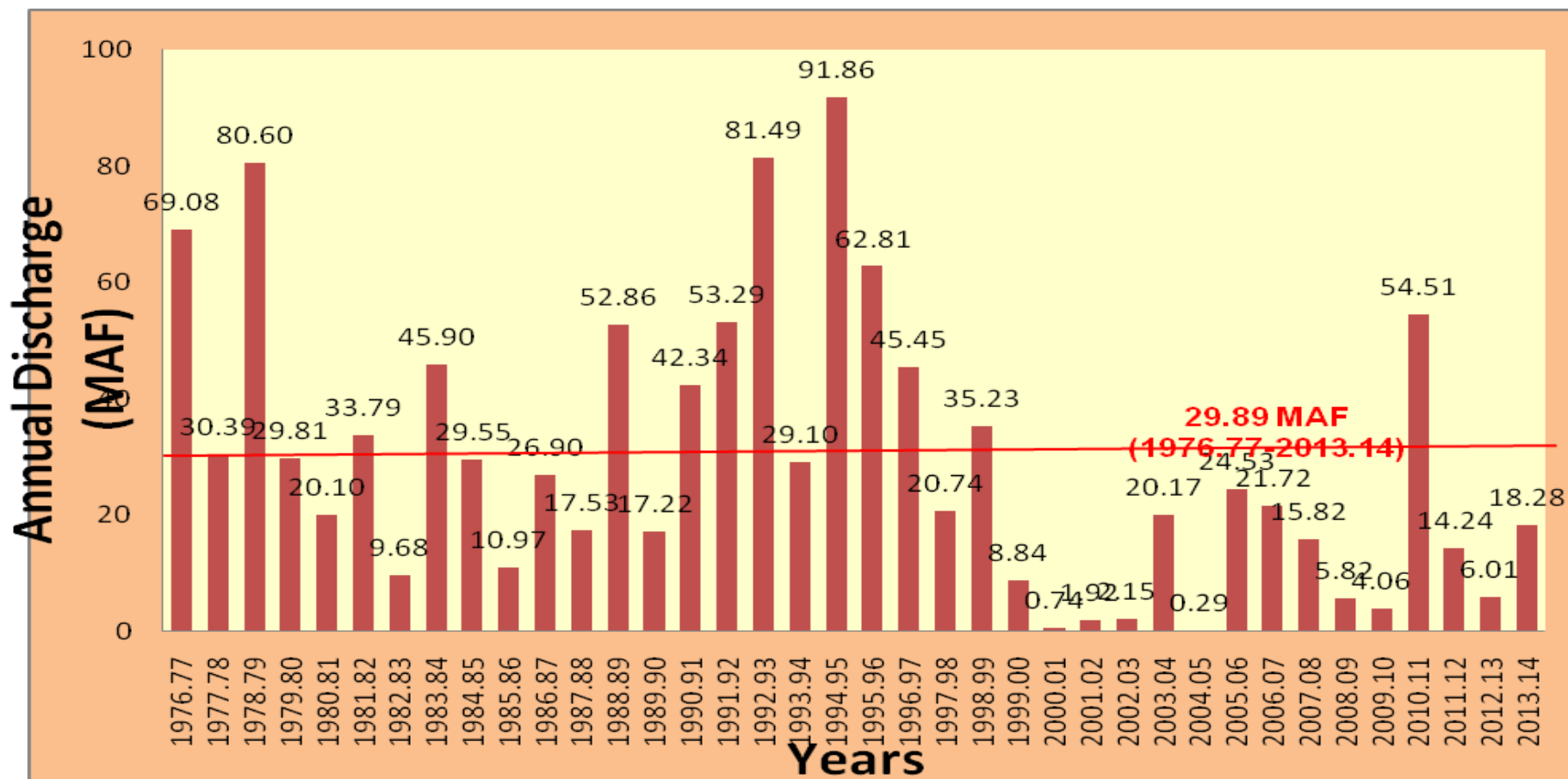
TELEMETRIC NETWORK RAINFALL (MM) FOR THE MONTH OF AUGUST-2014																																		
Sr#	STATIONS	Rainfall Recorded in mm during past 24 hours (0800 to 0800 HRS PST)																																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	#	30	31	Total Since 01-08-14	
1	INDUS CATCHMENT																																	
1	CHAKDARA	0	1	1	0	0	0	0	12	12	0	0	0	0	4	12	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	44
2	DAGGAR	0	0	0	0	0	0	0	34	34	0	0	0	2	1	0	6	0	0	0	0	0	6	9	0	0	0	0	0	0	0	0	0	92
3	OGHI	0	3	0	0	0	4	0	0	5	0	0	0	0	2	2	4	0	0	0	0	5	0	0	0	12	0	1	0	0	0	0	38	
4	PHULRA	0	8	0	0	0	0	0	9	35	0	0	0	0	1	12	0	0	0	0	0	0	15	0	0	8	1	0	0	0	0	0	89	
5	NOWSHERA	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	1	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	23	
6	ATTOCK	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
7	DHOKPATHAN	0	0	0	0	0	2	0	0	10	0	0	0	0	0	34	5	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	62	
8	KURRUM GARHI	5	0	0	0	0	0	0	0	0	1	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	
9	BESHAM	0	12	2	3	0	0	0	0	11	0	0	0	0	6	10	31	0	0	0	0	0	0	0	0	0	11	1	3	0	2	0	92	
10	DRATIAN	0	1	0	0	0	0	0	30	14	0	0	0	0	26	6	20	2	0	0	0	0	9	14	0	0	0	0	0	0	0	0	122	
11	GHARIALA	0	0	0	0	0	12	0	0	7	0	0	0	0	0	74	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	108	
12	TANDA DAM	0	0	0	10	0	8	0	0	0	0	0	0	0	0	40	0	0	0	0	0	6	11	0	0	0	0	0	0	0	0	0	75	
13	DARA-E-TANG	0	8	0	0	0	0	0	0	0	3	0	0	0	0	26	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	
14	WARSAK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	1	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	49	
15	RASHID ABAD	0	0	0	0	0	0	0	0	0	0	0	6	1	4	0	3	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	42	
2	JHELUM CATCHMENT																																	
16	MUZAFFARABAD	0	6	0	0	0	0	0	5	1	0	0	0	0	1	22	*	*	*	0	*	1	0	*	*	*	0	*	0	0	0	0	36	
17	DOMEL	0	9	0	0	0	6	0	0	1	0	0	0	2	0	1	27	0	0	0	0	3	0	0	0	0	5	0	0	0	0	0	54	
18	CHATTARKALLAS	4	1	0	0	0	0	0	2	0	0	0	0	0	3	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	14	
19	SEHRKAKOTA	1	6	0	0	0	0	8	7	6	0	0	4	0	6	86	5	0	0	0	0	6	0	0	15	1	0	0	0	0	0	0	151	
20	PALANDRI	4	1	0	0	0	0	89	10	3	0	0	3	0	1	23	8	0	0	0	0	10	0	0	60	0	1	0	0	0	0	0	213	
21	KOTLI	1	0	0	0	0	0	3	0	0	0	1	2	*	0	0	0	*	*	*	0	*	0	2	*	*	*	0	*	0	*	9		
22	MANGLA	0	6	0	0	0	3	0	50	3	5	0	1	0	2	0	30	15	0	0	0	0	3	0	0	2	0	0	*	0	0	0	120	
23	ROHTAS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
24	NAUSERI	0	0	0	0	0	0	2	2	0	0	0	0	0	0	11	5	0	0	0	0	0	0	0	0	1	3	1	1	0	0	0	26	
25	TALHATTA	0	7	0	0	0	3	0	0	16	0	0	0	0	0	6	12	0	0	0	0	15	2	0	0	0	0	0	0	2	0	0	63	

26	HATTIAN BALA	1	0	0	0	0	0	0	2	4	2	0	0	0	0	7	25	2	0	0	0	0	0	4	9	0	4	0	15	0	0	0	0	3	78	
27	SARA-I-ALAMGIR	0	0	0	0	0	0	0	1	1	1	1	0	1	1	3	0	0	8	4	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	32
28	CHAKRI	17	3	0	1	0	0	0	1	0	0	1	1	0	0	0	4	0	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	0	36	
29	PALOTE	30	2	0	0	0	6	0	5	19	0	0	0	0	1	1	39	11	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	121		
30	BABA SHAH JALA	4	2	0	0	3	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	17		
3	CHENAB CATCHMENT																																			
31	KUND	1	8	0	0	0	17	0	46	0	4	0	36	0	0	0	63	14	0	0	0	0	0	0	0	0	0	5	0	0	0	0	194			
32	DAULATNAGAR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	
33	MARALA (CHENAB)	7	0	0	0	0	0	0	32	2	0	0	0	0	0	3	49	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	95		
34	MARALA (SHAMPU)	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	
35	PALKU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	*	0	0	0	0	0	0	0	0	0	0	0	0	0	4		
36	AIK NULLAH(Ura)	*	*	*	*	*	*	*	0	*	*	*	0	0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
37	SHADIWAL	25	1	0	0	0	0	0	100	5	13	0	0	0	0	59	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	208		
38	ALEXANDRA BRIDGE	7	1	0	0	0	1	0	0	8	6	0	1	0	*	*	52	0	*	*	0	*	*	0	0	0	0	3	0	*	*	*	*	79		
4	RAVI CATCHMENT																																			
39	ZAFARWAL	0	5	0	0	1	0	0	9	15	0	0	0	2	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62		
40	SHAKAR GARH	0	0	0	0	4	0	1	1	0	0	0	0	4	0	0	9	43	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	62		
41	KOTNAINA	0	0	0	0	17	0	4	7	3	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	*	*	0	0	0	*	0	41			
42	JASSAR	0	0	0	0	0	0	6	19	2	0	0	0	3	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35		
43	RAVI SYPHON	0	0	0	0	0	0	0	0	36	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39		
44	SHARQPUR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
5	SUTLEJ CATCHMENT																																			
45	GS WALA	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	5			
Note:- * means data not available																																				

TELEMETRIC NETWORK RAINFALL (MM) FOR THE MONTH OF SEPTEMBER-2014																																	
Sr#	STATIONS	Rainfall Recorded in mm during past 24 hours (0800 to 0800 HRS PST)																															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total Since 01-09-14	
1	INDUS CATCHMENT																																
1	CHAKDARA	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
2	DAGGAR	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	
3	OGHI	7	6	0	0	57	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	
4	PHULRA	12	3	0	10	114	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142	
5	NOWSHERA	0	0	0	0	0	0	10	0	8	0	0	3	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	
6	ATTOCK	*	*	*	*	*	*	*	*	*	*	*	*	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	
7	DHOKPATHAN	0	0	0	0	2	0	0	0	10	0	0	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	
8	KURRUM GARHI	0	2	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	
9	BESHAM	20	0	0	0	4	0	0	0	9	0	0	8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	
10	DRATIAN	10	0	6	0	181	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	
11	GHARIALA	0	0	0	0	11	13	0	1	25	0	0	9	0	16	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	
12	TANDA DAM	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
13	DARA-E-TANG	0	0	0	0	0	0	0	0	0	14	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	
14	WARSAK	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
15	RASHID ABAD	0	0	0	0	0	0	0	0	4	0	0	5	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	
2	JHELUM CATCHMENT																																
16	MUZAFFARABAD	*	*	0	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17	DOMEL	0	0	1	13	8	1	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	
18	CHATTARKALLAS	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
19	SEHRKAKOTA	2	4	27	79	107	73	0	0	0	5	0	3	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	310	
20	PALANDRI	0	15	10	103	259	80	0	0	3	0	0	4	0	6	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	485	
21	KOTLI	*	*	1	*	*	*	1	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
22	MANGLA	0	0	2	14	147	2	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181	
23	ROHTAS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
24	NAUSERI	0	7	0	32	62	8	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	
25	TALHATTA	11	3	0	21	20	1	0	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	

ESCAPAGE BELOW KOTRI

HYDROLOGICAL YEAR FROM APRIL TO MARCH



Note: Based on the data supplied by Irrigation Department, Govt. of Sindh.