

Pakistan Meteorological Department

Drought Bulletin of Pakistan July-September 2014



National Drought Monitoring Centre

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Drought Bulletin

July – September ,2014

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Quarterly Drought Bulletin

July – September ,2014

By

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1. Introduction

Pakistan has a long latitudinal extent and the rainfall variability during different seasons is considerably high. The climate of the country in its lower southern half is arid and hyper-arid. Some regions of the country in each seasons, remain drastically dry and area always vulnerable to drought. If subsequent seasons fail to generate significant precipitation, the drought conditions then are sure to take the vulnerable regions in the grip. All the provinces of Pakistan have a history of facing major droughts in the past.

Drought differs from other natural disaster (e.g. flood, tropical cyclones, tornadoes and earthquakes etc) in the sense that the effects of drought often accumulate slowly over a considerable period of time and may linger for years even after the termination of the event. Because of this drought is often referred to as a “Creeping Phenomena”. Drought impacts are less obvious and are spread over large geographical areas than are the damages that results from other natural hazards. Consequently drought affects more people than any other environmental hazard.

Unfortunately, no organizations dealing with the drought issues exist in Pakistan and the responses to drought for the distressed economic and social sector, whenever such situation arose, were taken on emergency and on adhoc basis. It is thus inevitable need of the time and Pakistan Meteorological Department (PMD) took an initiative to establish National Drought/Environment monitoring and Early Warning Centre (NDMC) in 2004-05 after the worst drought during 1999-2001 in Pakistan. The main objective is to monitor on drought situation in the country and issue advisory before time. Its national centre is in Islamabad which covers almost 25 canals adjacent to the existing Pakistan Meteorological Head office while four Regional Drought Monitoring Centers (RDMC's) are in Lahore, Karachi, Peshawar and Quetta. These four RDMC's cover those region which comes under their jurisdiction. These centers serve as a hub for the collection, consolidation

and analysis of drought related data from all the possible sources in the country. In order to strength the network, 50 Automatic weather stations (AWS) have been installed in different regions particularly the drought prone areas of the country. The data of eleven meteorological parameters (air temperature, humidity, wind speed, wind direction, dew point, sea level pressure, station level pressure, solar radiations, soil moisture at standard depths(5,10,20,50,100) and snow level are transmitted through satellite and GPRS technology after 3 hours. So, it has now become easy to access the data of remote areas of the country. NDMC has installed 335 Ordinary Rain-gauges at districts level in four provinces as shown in figure-1

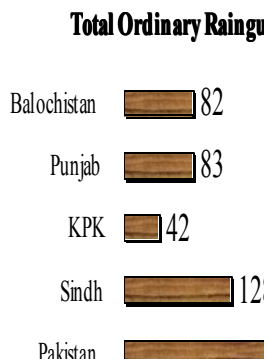


Figure-1 Rain-gauges Network of Pakistan by NDMC

NDMC also monitoring the water level situation of small dams in Barani areas of the country. NDMC using different indices like SPI, NDVI, CPA, RAI, Percent of normal, Probability of occurrence, Percentage departure and soil moisture analysis etc to monitor drought. NDMC issues fortnightly drought bulletin in different regions of the country especially the drought vulnerable

areas. Negotiations are underway with NGO's and National Disaster Management Authority (NDMA) for utilization of drought advisories / bulletin to end users.

2. Historical Background.

The Indian sub-continent is predominantly characterized by a tropical monsoon climate and entire regime is distinguished mainly by the differences in rainfall both in quantity and distribution. The most important feature is the regional and temporal alteration of atmospheric flow patterns associated with monsoon. There are two rainfall systems operating in the region (a) the southwest or summer monsoon and (b) the northeast or the winter monsoon.

Fortunately Pakistan also falls in this region which receive heavy amount of rainfall in summer due to SW monsoon and in winter due to western disturbances. The summer monsoon accounts for 70 to 80% of the annual rainfall over major parts of South Asia (IMD, 2009). In Pakistan, summer monsoon accounts 60 to 70% of the annual rainfall during July to September (Chaudhry, 1992). There is a large variability in the monsoon rainfall on both space and time scales.

Droughts in Pakistan region are mainly due to various kinds of failures of rains from southwest monsoon. Also there seems to be some association between El Nino and La Nina events and weak monsoons. Pakistan frequently experiences several droughts. The Punjab province experienced the worst droughts in 1899, 1920 and 1935. Khyber Pakhtunkhwa (KPK) experienced the worst droughts in 1902 and 1951, while Sindh had its worst droughts in 1871, 1881,1899,1931,1947 and 1999. Over more than hundred year's period between 1871-1988, 11 out of 21 drought years were El Nino years. The El Nino phase of the Southern Oscillations (ENSO) has direct impact on drought in Pakistan as it poses mainly negative impact on summer monsoon.

Due to climate change, wet and dry cycles some years we receive more rains in wet spell and in dry spell we receive less rain. Due to less rain we have drought and heavy rain we have floods (flash flood, urban flood, costal flood and river flood)

3. Monsoon 2014

• Rainfall Distribution (July-September) 2014

During Third quarter of the year (July-September) 2014, Above Normal (30 %) precipitation was observed over Pakistan. During the quarter high temporal and spatial variable precipitation was observed. Normally July and August are the wettest months in the country however this year, below normal rainfall observed during these months in the country. During the first week of September 2014, heavy rainfall developed the flash flood situation in hill torrents region in the

country while some of the urban cities (Lahore, Sialkot, Gujranwala, and Kashmir) were also influenced urban and riverine flooding. These monsoonal rainfalls lessen the moisture stress in the country along with some strong winds. The evaporation rate was less as compare to the previous quarter. Pakistan Meteorological department predicated normal rainfall in their seasonal outlook during this quarter.

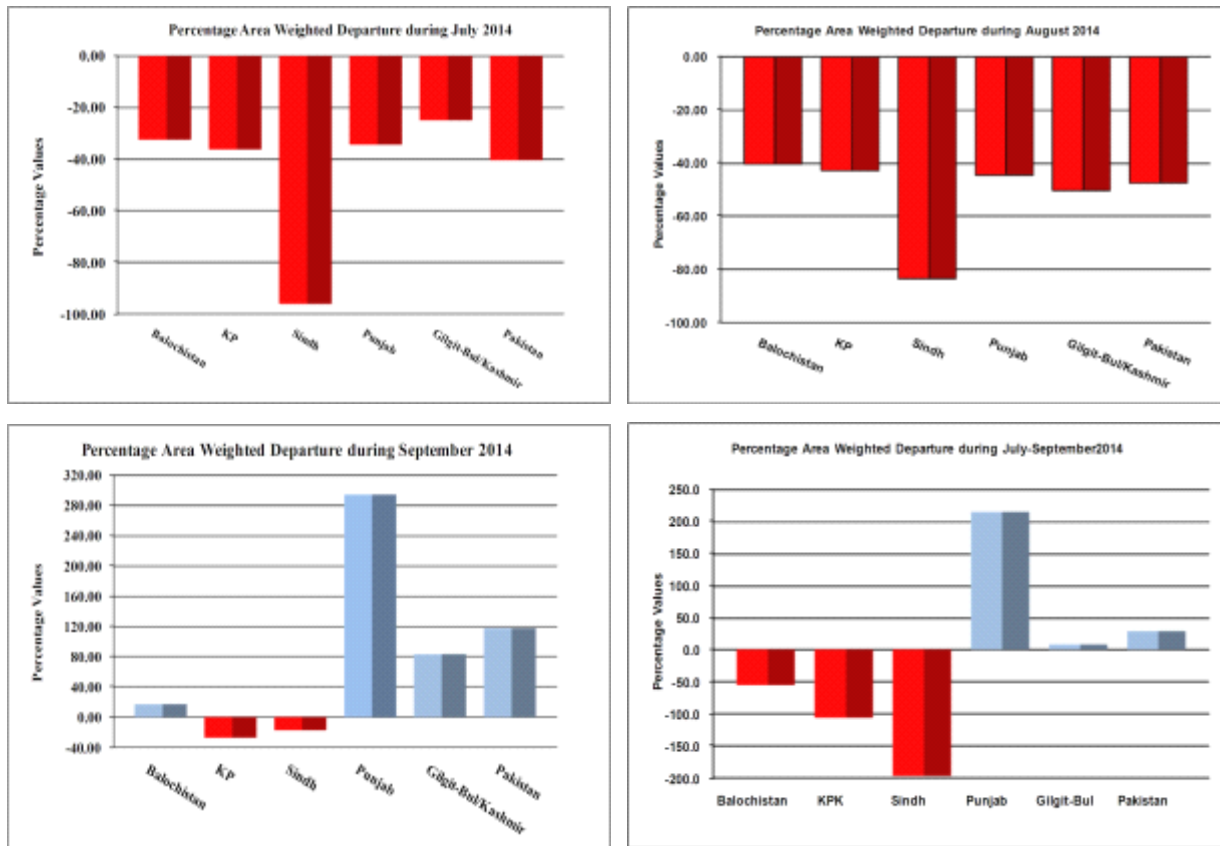


Figure-2 Percentage departure of rainfall during (July-September) 2014

During July 2014, 40% below normal rainfall received in the country and in Sindh it was almost -96%. Rainfall was below normal in all the province of the country i.e. Punjab (-34%), Balochistan (-32%), KP (-36%) and Gilgit-Baltistan Kashmir region (-25%). During August 2014, rainfall again in the country was well below normal (-47%), the maximum of which was in Sindh (-84%), Gilgit-Baltistan and Kashmir (-50%), Punjab (-44%), and KP (-42%). During September, 2014, Amount of rainfall was well above normal in the country (118%), Well above normal rainfall was observed in Punjab (295%), Gilgit-Baltistan and Kashmir (83%) and Balochistan (17%) while in KP (-27%) and Sindh (-17%), it was slightly below normal.

The figures-2 shows percentage area weighed departure rainfall occurred during (July-September) 2014. The amount of rainfall was normal (30%) in the country during 3rd quarter of the year.

Viewing the rainfall distribution on province basis, over Punjab, it was above-normal (216%) while well below normal in Sindh (-197%), Khyber-Pakhtunkha (-106%) and Balochistan (-56%). however normal rainfall observed in Gilgit-Baltistan and Kashmir. The spatial distribution of monthly and seasonal analyses of Pakistan is as shown below in figure-3.

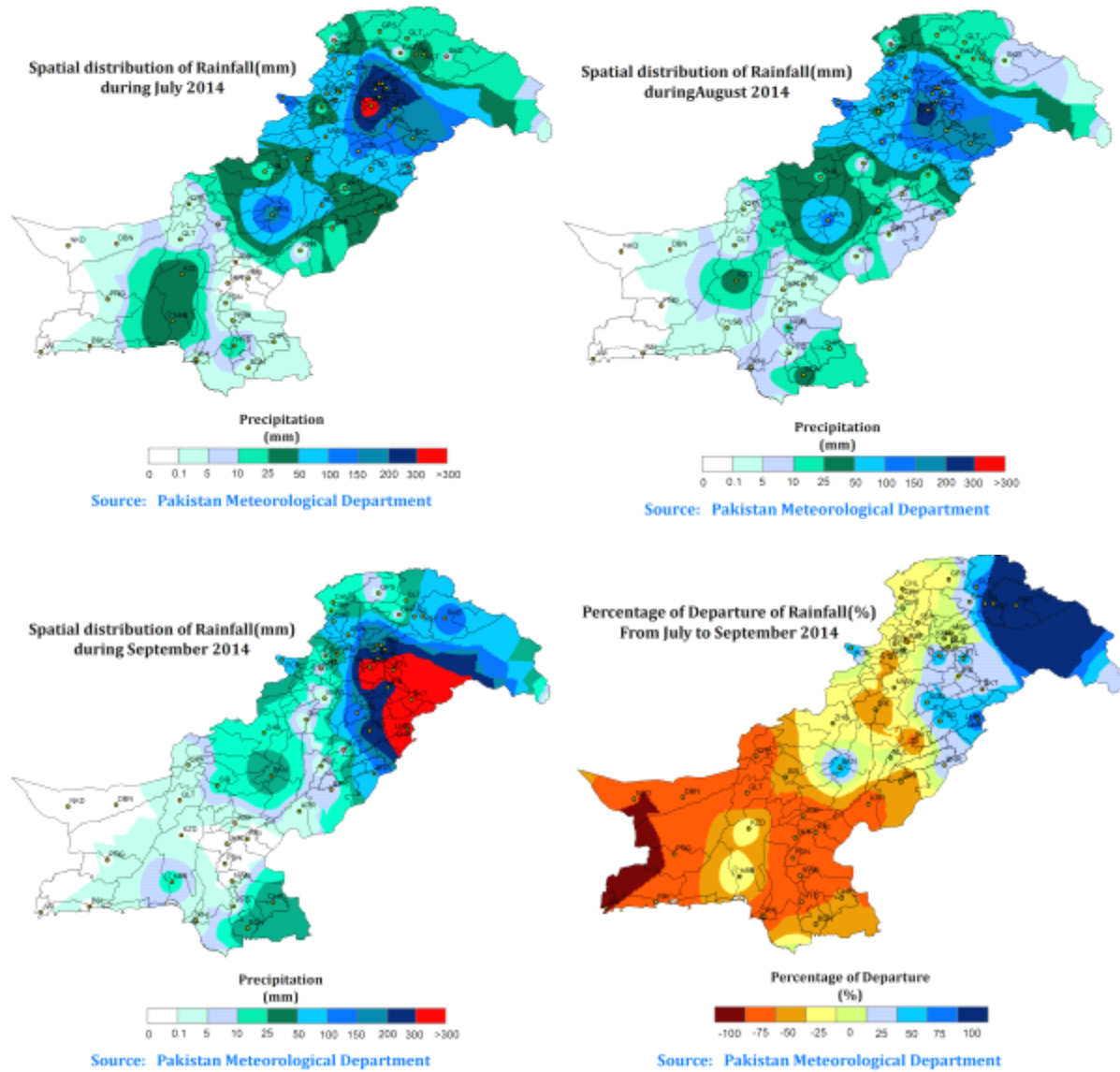
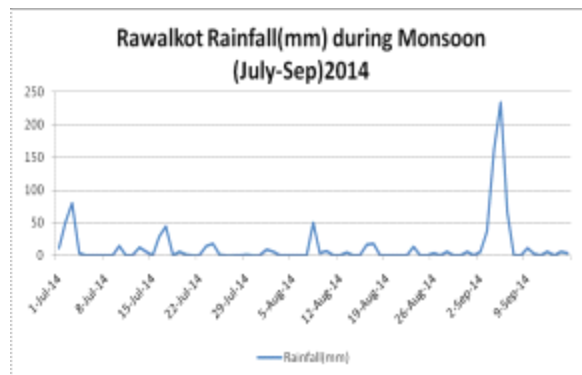
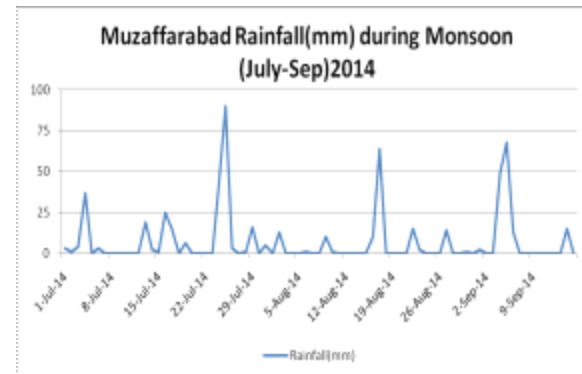
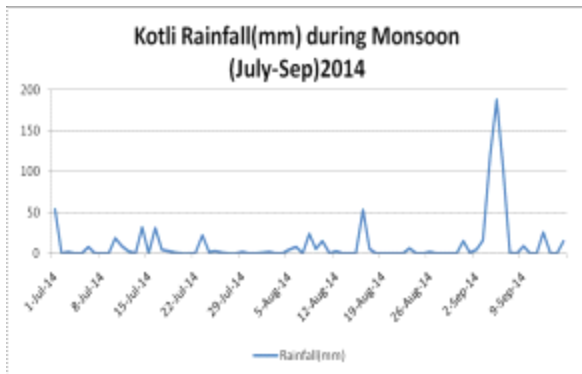
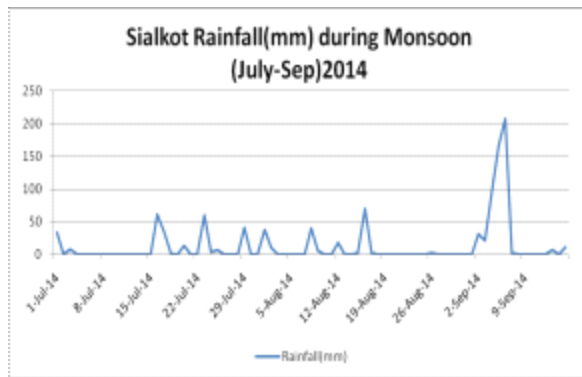
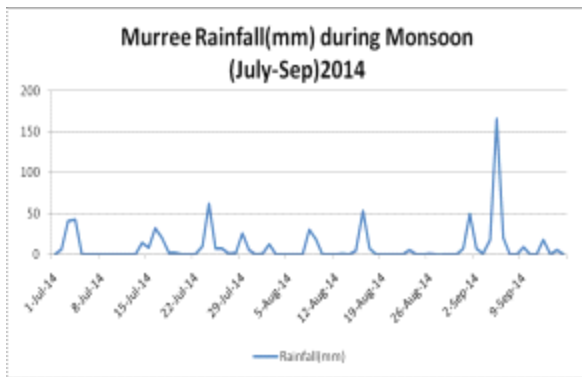
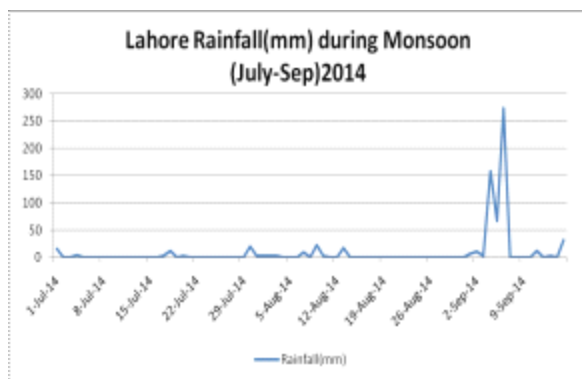
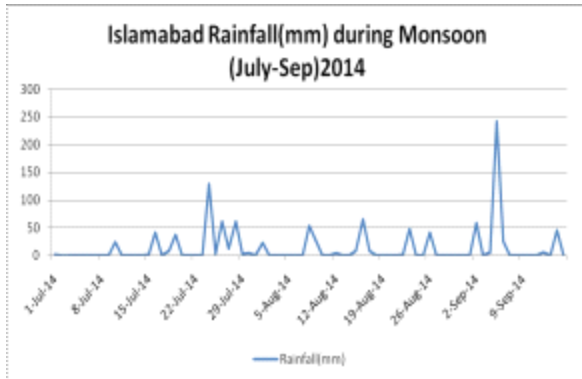


Figure-3 Spatial distribution of rainfall during (July-September) 2014

Comparing the daily intensities of rainfall and number of rainy days during the period, it depicts that monsoon systems were fairly deep enough to precipitate in somewhat cloud burst proportion especially over Islamabad, Sialkot, Lahore and Muzaffarabad areas during July to September 2014 and as depicted in following graphs.



- ***Rainfall spell***

- ***July-2014***

There were three rainfall spells 1-5, 15-19 and 25-30 July; Northern areas and Balochistan received little higher rains than last year, rest of the agriculture plane received much lesser rain than last year. During July cumulative rainfall was 39% below normal and temperatures remain normal.

- ***August-2014***

There were three rainfall spells on 1-5, 15-19 and 25-30 July; Northern areas and Balochistan received little higher rains than last year. Rains in other parts of the country were much lesser rain than last year. In August four scattered rainfall spells were observed on 1-2, 8-10, 15-17 and 27-28. Cumulative rainfall in July and August was less than last year. Temperatures remained higher in first half of month than last year, while in second half remain normal. Higher solar radiation and higher relative humidity increased the crop growth, although rains were lesser in agriculture plain.

- ***September-2014***

A wide spread system developed 1st September and started raining in Punjab, Gigit/Baltistan, KPK and some parts of Sindh. These rains continuously burst from 2-6 September, 14 for five days without any break, the same situation was there in the adjoining provinces of India and Jammu Kashmir. These record breaking rains were in the catchment areas of Rivers Jhelum, Chenab, Ravi and Sutlej. Cumulative rainfall from 1-6 September was reported maximum in Lahore 557 mm, Sialkot 523 mm, Islamabad 345 mm, Mangla 345 mm, Gujranwala 336mm, Gujrat 310 mm and rest of met stations in Punjab received less than 300 mm rain, in Azad Kashmir maximum cumulative rain was 507 mm at Rawalakot, In KPK Kakul 154 mm, In Sindh Badin received rain of 50 mm and Balochistan maximum cumulative rain 34 mm.

- ***Temperature***

Maximum temperature during July, 2014 were observed at least 2°C higher than normal values across the country. Dir and Saidu Sharif were observed to be higher by at least 8°C higher than normal. This above normal temperature has triggered the kharif crop water requirement to sustain their physiological process like photosynthesis in 2nd and 3rd week, the humidity factor increased on different stations.

Maximum temperature during August, 2014 was observed around 1°C higher than normal values across the country. Parachinar and Chhor were observed to be higher by at least 2°C higher than

normal. This above normal temperature has triggered the kharif crop water requirement to sustain their physiological process like photosynthesis.

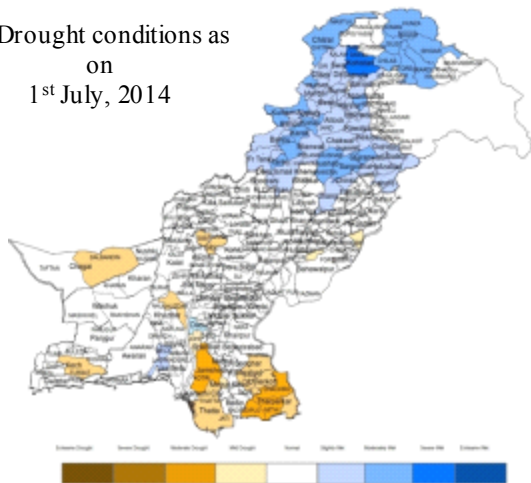
Maximum temperature observed during September, 2014 was at least 1°C lower than normal values across the country. In Faisalabad, Mainwali, Sargodha, Shorkot and Parachinar the temperature was observed to be lower by at least 2°C

4. Drought tool

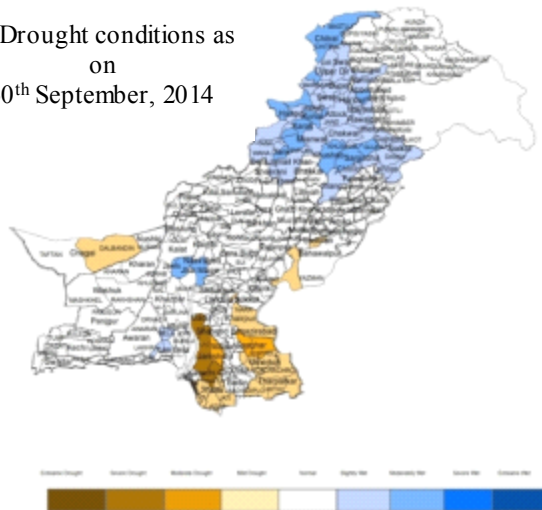
I. Standardized Precipitation Index (SPI)

The Standardized Precipitation Index (SPI) was developed for the purpose of defining and monitoring drought (McKee *et al.*, 1993). The SPI calculation for any location is based on a series of accumulated precipitation for a fixed time scale of interest (i.e. 1, 3, 6, 9, 12, months). Such a series is fitted to a probability distribution, which is then transformed into a normal distribution, so that the mean SPI for the location and desired period is zero (Edwards and McKee, 1997).

a) Drought conditions as
on
1st July, 2014



b) Drought conditions as
on
30th September, 2014



Positive SPI values indicate greater than median precipitation, and negative values indicate less than median precipitation. Because the SPI is normalized, wetter and drier climates can be represented in the same way, and wet periods can also be monitored using the SPI. Here we are including 1 month and seasonal maps to show the drought conditions for the monsoon season in the country.

II. Cumulative Precipitation Anomaly (CPA)

Due to intense monsoon precipitation, rainfall observed almost 30% above normal during monsoon season (July to September) as forecasted by PMD. Soil moisture conditions are good, especially in the central and southern parts of the country. However a negative anomaly can be seen in the upper and southwestern parts of the country.

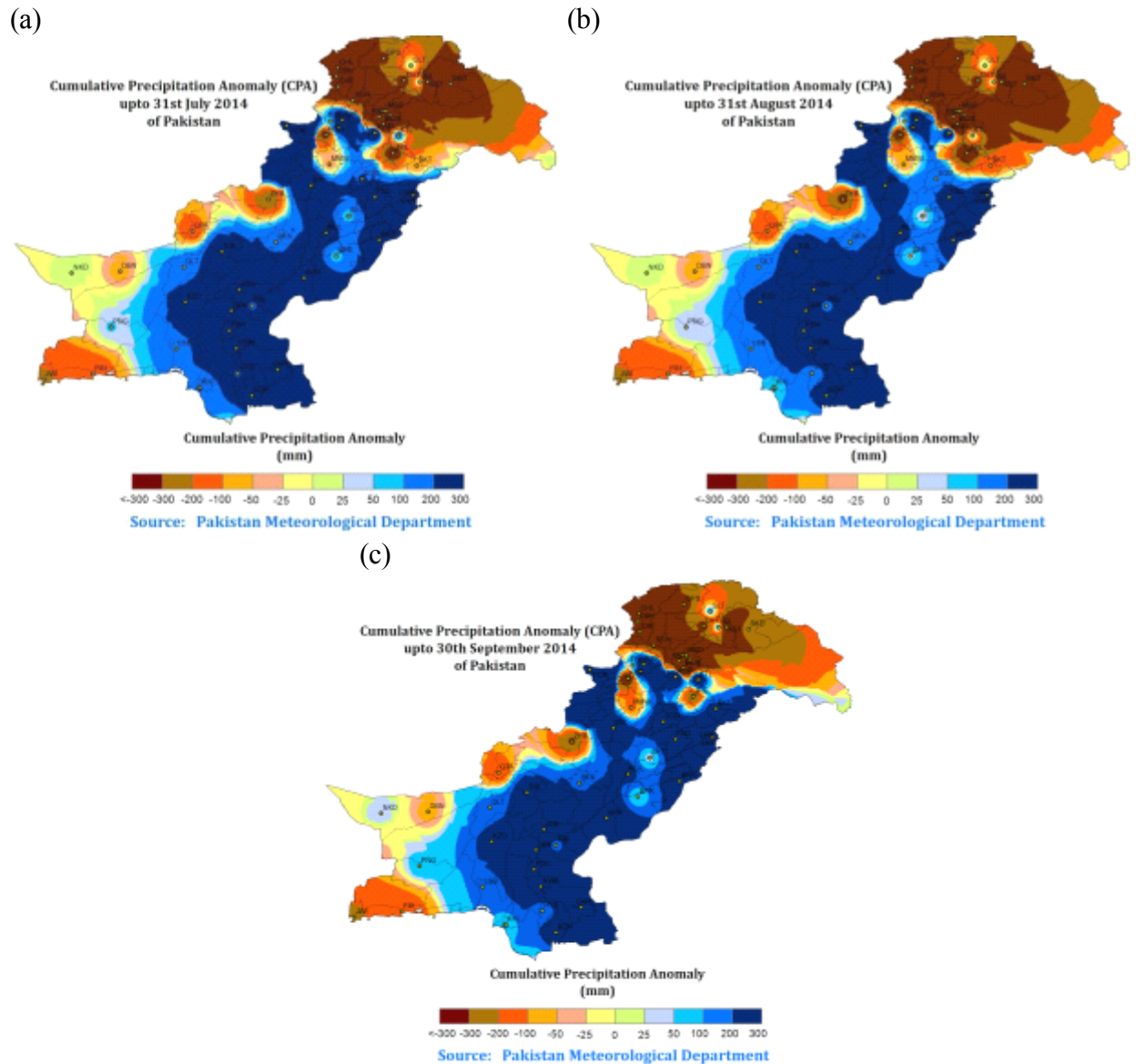
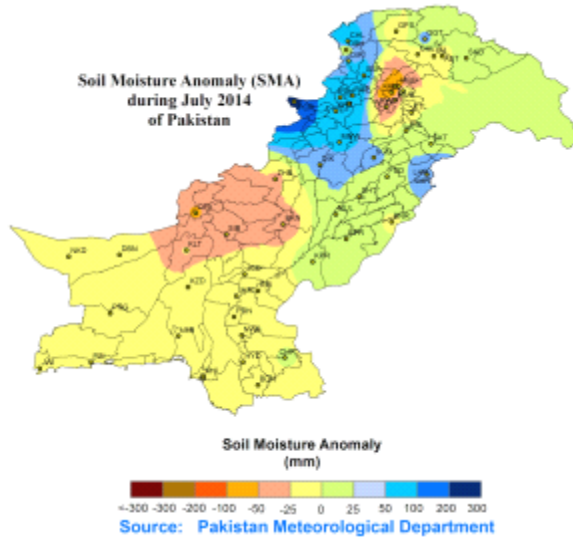


Figure-5 Cumulative precipitation anomaly during (July-September) 2014 of Pakistan
 This positive anomaly in rainfall will be sufficient to provide enough moisture to the soil and fulfill the sowing of Rabi crops in these regions. Most parts of Eastern Sindh and southern Punjab districts (Ranjan Pur and D.G.Khan) are under flood water due to intense rainfall in the region.

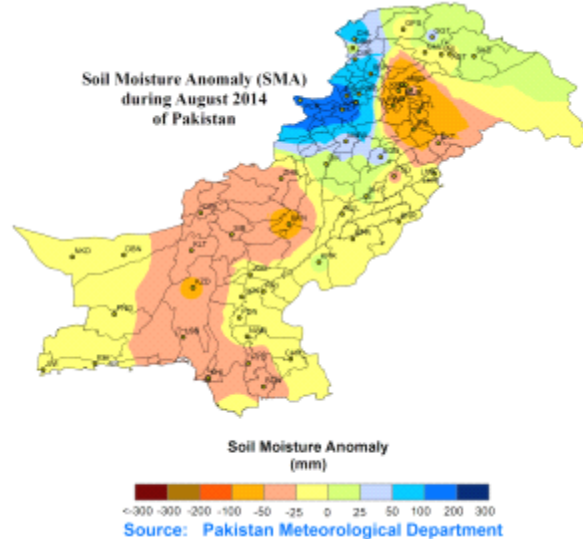
III. Soil Moisture Anomaly (SMA)

Due to the normal rainfall (11%) during July-September, 2014 in the country, most of the moisture stress was observed in some districts of KP, Potwar region, Southwest Balochistan and Sindh as shown in figure-6. Soil moisture conditions in north eastern Punjab including Barani areas and central and north western parts of the country were normal.

(a)



(b)



(c)

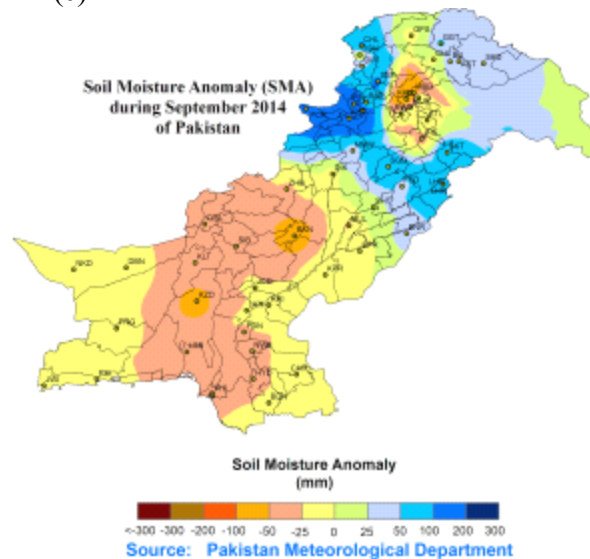


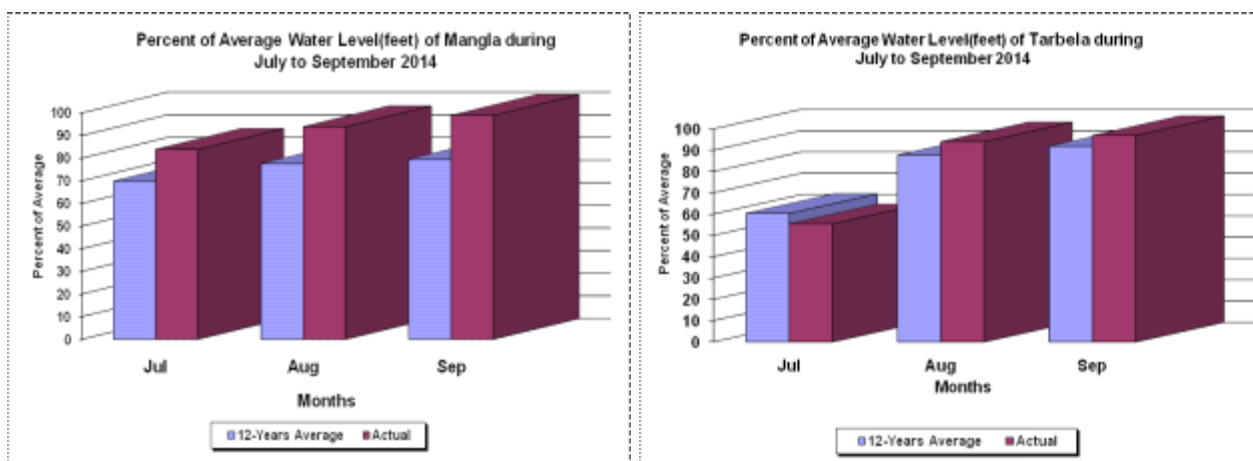
Figure-6 soil moisture anomaly during (July-September) 2014 of Pakistan. It was predicted that rainfall will be normal (10%) during July-September 2014 and because of this, soil moisture stress was lessened especially in the rainfed and agricultural plains of the country. The rainfall was below normal which strengthened the moisture stress in southern parts of the country. However, the above-normal rainfall during September caused a slight moisture stress in the country as shown in figure-6.

IV. Water Level of Reservoirs

Pakistan has two main reservoirs of water in the form of dam i.e. Tarbela and Mangla. The dead level of Tarbela is 1378 feet while maximum conservation level is 1550 feet while Mangla has a dead level of 1040 feet and maximum conservation level of 1242 feet. Due to good monsoon rains, reservoirs were filled to their capacity. Water situation in reservoirs is comparatively better than

last year the end of July, the water levels in Tarbela and Mangla dams were 1531 and 1209.40 feet amsl, respectively. The sources of water storage in dams are rainfall and snow/glaciers melting from May to September. The water stored during this period is a major factor of irrigation water supply in the next Rabi 2014-15. Water accumulation in Tarbela and Mangla dams reservoirs started in early June 2014. Total water accumulated in both reservoirs is at 8.521MAF

In addition, small dams in various parts of the country were also filled to their capacity that would help boost agriculture and improve socio-economic activities in the country. Percentage of average water level during monsoon 2014 was calculated for both dams are shown below.



V. Water Discharge

| AVERAGE WATER DISCHARGE AT KABUL DURING KHARIF | | |
|-------------------------------------------------------|---------|-----------------------|
| S.No | Years | Water discharge (MAF) |
| 1 | Last 20 | 17.22 |
| 2 | Last 10 | 14.77 |
| 3 | Last 5 | 17.94 |

| AVERAGE WATER DISCHARGE AT TERBELA DURING KHARIF | | |
|---------------------------------------------------------|---------|-----------------------|
| S.No | Years | Water discharge (MAF) |
| 1 | Last 20 | 51.78 |
| 2 | Last 10 | 48.28 |
| 3 | Last 5 | 50.27 |
| 4 | Average | 50.53 |

This discharge indicates that this flow is gradually decreasing

| AVERAGE WATER DISCHARGE AT MANGLA DURING KHARIF | | |
|--------------------------------------------------------|---------|-----------------------|
| S.No | Years | Water discharge (MAF) |
| 1 | Last 20 | 17.01 |
| 2 | Last 10 | 13.78 |
| 3 | Last 5 | 15.51 |
| 4 | Average | 17.28 |

This discharge indicates that this flow is gradually decreasing

5. Agriculture

Agriculture is main livelihood of about 70% population of the country. Due to direct relationship between agriculture and water scarcity/drought, drought mapping data is of vital importance. Efforts are being made to inform farmers of drought information in a timely fashion for better utilization of data.

5.1 Crop Condition:July-2014

The perceptible features of Kharif season 2014 include (a) a cold regime extending into early Kharif season (b) slow down in glacier melts, reducing surface water supplies in the Indus River basin (c) delayed harvest of wheat crop affecting sowing of cotton and other crops and (d) nearly drought like situation of monsoon season up to end July.

Agriculture meteorological condition outlines the prevalent meteorological conditions and its possible impacts on crops in term of crop developments and final productivity. Among various meteorological parameters, temperature regime and rainfall contribute significantly in terms of final yield. We have mainly compared the current season monthly data against the climate normal to delineate the possible impacts on crops evapotranspiration, crop water productivity, irrigation efficiency and others.

Rainfall and maximum temperature among main agriculture districts meteorological stations were mainly considered for July, 2014. This July has proved well below normal in term of cumulative monthly rainfall amount and was coupled with late snow/glacier melting in Northern areas. Effective rainfall remained less suitable for major crops i.e., cotton, sugarcane, rice, maize and other crops. Range of deviation from normal climate is observed for Lahore, Sialkot, Jhelum, Badin, Shorkot, Mianwali, Chhor, Hyderabad, Larkana, Sukkur, Bannu and others.

The perceptible features of Kharif season 2014 mainly include (a) Strong heat wave extending into early season of cotton crop (b) Good pre-monsoon and monsoon rainfall in Punjab with few in Sindh and Balochistan provinces (c) Water shortage may have marginally reduced sown area in major cotton growing districts of Sindh (d) Sugarcane 2013-14 has better prospects in term of area and growing conditions in both Punjab and Sindh and (e) Rice transplantation in Punjab is almost complete while in Sindh some areas are affected by water shortage and are to be planted. Economic Survey of Pakistan for year 2012-13 has been released by Ministry of Finance (MoF). The Agriculture sector is set to account for over 21.4 percent of GDP. The four major crops wheat (2.2%), maize (0.5%), rice (0.6%), cotton (1.5%) and sugarcane (0.7%) account for 5.4 percent on average to GDP. Among them, the three major crops cotton, rice and sugarcane are Kharif crops.

- **Cotton Crop**

Cotton in Pakistan is mainly concentrated in central & southern Punjab along left bank of Indus river in Sindh. The areas in Sindh include southern parts of Mirpur Khas, Sanghar, Umerkot, Khairpur, Sukkur and Shaheed Benazirabad. The early sown cotton crop cultivated during March/April was affected by high temperature during May and was mostly re-sown in Punjab.

Cotton crop has an indeterminate growth pattern and has no distinct stage between vegetative and reproductive stage. This characteristic makes cotton picking a multi-stage picking phenomenon. It has a very dynamic growth response to environment and management. Site-specific management strategies need to be taken into consideration to optimize yields. Furthermore, management strategies should be flexible to allow for changing environmental conditions. Cotton has one of complex insect pest and disease problem throughout main growing area of Punjab and Sindh. Most common are Cotton Leaf Curl Virus (CLCV), bollworms, dusky cotton bug, thrips, armyworm, jassids and others.

Cotton is under stress in some parts of Khairpur, Sanghar and adjoining areas due to high temperature and less rainfall. In Punjab, cotton has been infested by sucking pests like jassids, whitefly, thrips, aphids etc. Farmers have effectively controlled the pest infestations. It is expected that cotton production will be on higher side than last year, if crop acreage and crop growth is not affected by rain/river floods later in the season.

- **Sugarcane Crop**

The sugarcane crop was sown in Sindh on about 75 percent of the area in September, 2013. The rest of the crop in Sindh, and the entire crop of Punjab and KP were sown during February and March, 2014. The crop is at healthy growth stage in most part of the countries due to adequate

water availability. Sugarcane crop is at crop development stage throughout Sindh and Punjab. The overall crop condition is satisfactory in most parts of Punjab and Sindh.

- **Rice Crop**

In Punjab, IRRI (coarse) rice transplantation was completed by early July and has reached heading or panicle formation stage. The basmati crop was under transplantation by end of July and will be completed by mid of August. In Sindh, IRRI rice was mostly transplanted by mid of July and will be completed by end of August. These districts include Jacobabad, Kashmore, Larkana, Shikarpur, Dadu, Qamber Shahdad Kot and Thatta. Given a situation of adequate irrigation water supply from canals, transplantation will be completed by end of August. The overall crop condition was satisfactory in most parts of Punjab and Sindh and production of more than 7 million tons is expected.

5.2 Crop Situation: August, 2014

Agriculture meteorological condition outlines the prevalent meteorological conditions and its impacts on crops in term of crop developments and productivity. Among various meteorological parameters, temperature regime and rainfall contribute significantly in terms of crop yield. The monthly data of current season have been compared to normal pattern to delineate the impacts on crops evapotranspiration, crop water productivity, irrigation efficiency and others.

Rainfall and maximum temperature of meteorological stations were mainly considered for August, 2014. This August has proved well below normal in term of cumulative monthly rainfall amount. Effective rainfall remained less suitable for major crops i.e., cotton, sugarcane, rice, maize and other crops. Range of deviation from normal is observed for Murree, Lahore, Risalpur, Sialkot, D. I. Khan, Hyderabad, Faisalabad, Jhelum, Badin, Shorkot, Chhor, Larkana, Bannu and others. .

- **Cotton Crop**

The month of August is very crucial for cotton crop as picking season starts to kick off in most of Sindh and in some parts of Punjab. Cotton is under stress due to high temperature and less rainfall lead to some local infection of disease and pest in some parts of Khairpur, Sanghar and adjoining area. In Punjab, cotton has been infested by sucking pests like jassids, thrips, aphids etc. Farmers have effectively controlled the pest infestations.

- **Sugarcane Crop**

Sugarcane is a very important cash crop of Pakistan. It is mainly cultivated in central & southern Punjab and along left bank of Indus River in Sindh. In Sindh, the sugarcane crop is mostly sown

during September and the length of the growing cycle is around 12-14 months. In Punjab, it is sown during February and the growing cycle is shorter by two months to that of Sindh. Some parts of central Punjab, especially in Sargodha and surrounding districts, it is reported that crop is infested with red rot disease causing economic losses to the cane farmers. Sugar cane is a high delta crop and this requirement was met. The sugarcane crop is at a mid level stage. Some reduction in sugarcane area has been noted in Punjab with the stable area in Sindh and KPK. In an overall, the crop condition is satisfactory in most parts of the country.

A farmer opinion survey was carried out in Sindh province to delineate the crop production technology of sugar cane. Crop yield data for last year was collected from the farmers which revealed that on an average, the yield remained in the range of 70-90 tons/ ha.

- **Rice Crop**

Rice is cultivated in all the four provinces of Pakistan. The best Basmati rice is limited to the North Eastern parts of Punjab. The Coarse varieties of rice are sown at different acreage levels in Punjab, right bank districts of Sindh (Badin and Thatta). In Balochistan the major Coarse rice areas are Nasirabad and Jaffarabad. Coarse rice is also grown in different parts of KP, mainly Swat, Mansehra, Upper & Lower Dir and D. I. Khan.

IRRI (coarse) rice in Punjab, has reached a panicle formation stage. The basmati crop was at heading stage by end August. In Sindh, rice is mainly Coarse rice .It mainly grows on the right bank /the delta of River Indus. The transplantation was completed by the end of August. These districts include Jacobabad, Kashmore, Larkana, Shikarpur, Dadu, Qamber Shahdad Kot ,Badin and Thatta. The overall, crop condition is satisfactory in most parts of Punjab and Sindh and production is likely to exceed 7 million tons .

There have been heavy rains in the basmati growing region in Punjab and lesser rains in Sindh, Balochistan and KP districts. Districts of Sialkot, Gujranwala and Lahore have received well above average cumulative rainfall of September from 300–600mm. Most of the districts in Sindh, Balochistan and KP have received less rainfall

5.3 Crop Situation: September, 2014

Major Kharif crops, including cotton, rice and sugarcane are progressing with no serious threat of floods, insects, pests /diseases attack beyond the economic threshold during the month of September, 2014. The weather has generally remained dry during September in the cotton growing

areas and the crop escaped the high humid weather responsible for widespread pests and disease attacks. The cotton crop sown in February– March is at picking stage while that sown in May is at boll opening and picking stage.

The Sugarcane crop is at maturity stage of growth. Harvesting of early maturing varieties may start during November that of mid-season during December while that of late maturing varieties during January. The sugarcane crop benefited from rains during monsoon and is under sucrose translocation and accumulation in the stalk. The rice crop is actively growing and is at different growth stages depending on the type (IRRI and basmati) and locality. Uprooting of standing crop by flood and late transplanting of the basmati crop in Central and North-East Punjab during August were responsible factors affecting crop productivity.

Agriculture meteorological condition, outlines the prevailing meteorological conditions and its possible impacts on crops in term of crop developments and final productivity. Among various meteorological parameters, temperature regime and rainfall contribute significantly in terms of final yield. The current season monthly data in this bulletin were compared against the climate norm.

Spells of heavy rains affected various parts of the country during July- August 2014 resulting in riverine/ flash flood in local nullahs flooding in north-eastern Punjab, hill torrents in South-western Punjab & Balochistan and riverine flood in Indus, Chenab, Ravi and Sutlej rivers. Floods largely remained within the embankments causing damage to crops and infrastructure within the flood plains.

Kharif Crops

- **Cotton Crop**

In Pakistan, the cotton area has shown variability over years depending upon (a) fluctuations in price of seed cotton (b) intensity of pests and diseases especially cotton leaf curl virus and (c) situation of floods and rains. The weather has generally remained dry in September and the crop escaped the humid and hot seasons responsible for wide spread of pests and disease attacks. Overall the crop is generally in marginal condition.

- **Sugarcane Crop**

Crop is at healthy growth stage in most part of the country due to sufficient water availability. Sugarcane crop is at maturity stage in Punjab and Sindh. Significant reduction in sugarcane area has been observed in Punjab while stable acreage in Sindh. Overall, crop condition is satisfactory in most parts of Punjab and Sindh. The production is expected at 75 million tons. Floods 2014 in

Punjab have affected around 725.5 thousand tons of production, which will further reduce production. Major Sugarcane damages were observed in the districts of Jhang, Multan, Chiniot and Muzaffargarh.

- **Rice Crop**

Rice crop in Punjab is different in term of season as well as type as compared to Sindh province. In Punjab, IRRI (coarse) has reached the harvesting stage, while an aromatic basmati crop is at the grain filling stage by end September. In Sindh, mainly right bank of Indus river is characterized by IRRI rice and transplantation has reached the grain filling stage. These districts include Jacobabad, Kashmore, Larkana, Shikarpur, Dadu, Qamber Shahdad Kot and Thatta. Flood 2014 in Punjab has affected around 217 thousand tons of production, which will further reduce production. Major Rice damaged districts are Hafizabad, Jhang, Gujranwala and Chiniot.

6. Rains/Flood 2014: Rapid Crop Damage Assessment

At inception of monsoon 2014, the rainfall during July and August was lower by 40 % than last year, expecting El-nino effect. The fusion of monsoon with westerly winds between 2-6 September resulted in tormenting rains. The cumulative rainfall during this period was reported maximum in Lahore 557 mm, Sialkot 523 mm, Islamabad 345 mm, Mangla 345 mm, Gujranwala 336mm, Gujrat 310 mm and rest of met stations in Punjab received less than 300 mm rain. In Azad Kashmir maximum cumulative rain was 507 mm at Rawalkot, whereas in KPK Kakul 154 mm, in Sindh Badin received rains of 50 mm and in Balochistan Barkhan have maximum cumulative rain of 34 mm.

These rains have resulted in extraordinary river flows, particularly in river Chenab. In Punjab 18 districts were affected. The crop damages were, rice 116.7 thousand ha, cotton 64.4 thousand ha and sugarcane 12.8 thousand hectares. The damages in terms of crop production are: rice 217 thousand tons, cotton 250 thousand bales and sugarcane 726 thousand tons.

7. District wise impact of drought

Due to wetter than normal season, no negative impacts of drought have been reported from any part of the country. Early two months of monsoon seasons below normal rainfall observed, which creates drought likes conditions in **Sindh (Qamabar Shadadkot, Dadu, Thatta and Tharparkar districts and southwest parts of Balochistan**. There is no significant rainfall occurred during September which proved to be helpful to reduce the drought conditions in Tharparkar. Damages to

crops, infrastructure and livestock have been reported in northeastern and south Punjab due to flash and urban flooding.

8. Government reactions to drought

All functionaries of the state machinery remained engaged in providing relief to flood affective of Punjab and drought regions of Sindh. There is the significant impact of drought during the quarter in **western and southeastern districts of Sindh** like **Dadu, Qamabar Shadadkot, Thatta, Tharpakar** and **Umerkot** etc.. Intervention was made at official level these districts. NDMC continued its monitoring activities and drought monitor was regularly updated on a fortnightly basis at the PMD website <http://www.pmd.gov.pk/ndmc/index.htm>

9. Seasonal Advisory/Outlook

Synthesis of the latest model forecasts for Oct-Dec, 2014 (OND), current synoptic situation and regional weather expert's judgment indicates that slightly above normal precipitation is expected all over the country with above average during December and normal during October and November. Slightly above average night temperature is likely to occur during whole predicted period with higher values over eastern parts of the country.

“Slightly average precipitation is expected during the season all over the country with slightly above normal temperature.”

- Above average precipitation is expected during last phase of predicted month (December).
- Normal to slightly below normal precipitation is expected during October.
- In October, below average precipitation is expected all over the country whereas slightly above average rainfall over southern parts (Sindh) of the county. Night temperatures are likely to be above normal (about 1°C) all over the country with higher value over eastern and central parts of the country.
- Two rainy spells, one during 1st week and second on 3rd week, are expected during October.
- Normal precipitation is expected over all the provinces except Kashmir. Normally, November is dry month all over the county.
- Night temperature will be on higher side all over the country with higher values over central and eastern parts of the country.
- No heavy or moderate rainy spells are expected during all over the country. Light rain is expected over isolated places of the country during the month.
- Slight rainy spell are expected over KP and FATA provinces during second decade of October.

- Above normal precipitation is expected during December. Snowfall over Northern hilly areas may start during the month of December.
- Above normal precipitation is expected over Balochistan and Sindh.
- Expected Minimum temperature will be slightly below normal during December with higher values over North-western parts of the country.

Pakistan Meteorological department closely watching the weather condition and update its advisories, monthly and seasonal outlook whenever required. It is therefore advised to keep you update by log on to www.pmd.gov.pk or <http://www.pmd.gov.pk/ndmc/index.htm>

10.Recommendations

Natural disaster could not be stopped. Each disaster gives us a lesson to do better planning, management and taking some precautionary measures to minimize its impacts in future. Following are some recommendations to cope with the floods and droughts in Pakistan

- Pakistan dam's water storage capacity is much less than the neighboring countries like India. Therefore it is the need of the hour to built large and small dames in catchments areas especially the rainfall water during monsoon period.
- Manage the floods and storage the water
- The stored water will protect food security especially fulfill the water requirements of crops during drought period in the country.
- The water will also be helpful in generating hydropower electricity which is essential requirement of country and reduce the unemployment in the country.

11.Acknowledgement

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