



Pakistan Monsoon 2022 Rainfall Report

Pakistan Meteorological Department-CDPC
(Contact: info.cdpc@pmd.gov.pk, pmdcdpc@yahoo.com)

Monsoon progress Highlights (1st July to 30th September 2022)

This year monsoon season set on 30th June 2022 over Pakistan, a day earlier of its normal date (1st July) and withdrew during third week of September 2022. However, significant continuous rainfall occurred from 4th July onwards. Pakistan rainfall, for the country as a whole, during the period remained extremely above average (+175%) (Fig. 1a). On regional scale, the rainfall during the period has also been excessively above average over Sindh (+426%) & Balochistan (+450%), largely above average over Punjab (+70%) & GB (+104%), above average over KP (+33%) and near average over AJK (Fig. 1b). A comparative cumulative rainfall of the years 2022 & 2021 versus 'normal' is shown in Fig. 2. The torrential rain caused massive devastating flash floods in eastern & southern Balochistan, Sindh, southwest Punjab and Khyber Pakhtunkhwa (KP) inflicting over 1700 deaths & unbearable huge loss of crops and properties.

Monsoon 2022 rains being unprecedented and exceptional were caused mainly due to the following unusual regional and global atmospheric conditions:

1. Persistent triple-dip La Nina, previously such situation was seen during 2010-2012 which were incidentally excessive monsoon years
2. Neutral IOD (Indian Ocean Dipole)
3. Deepened Heat/seasonal-low pressure area, resulted by abnormally high temperatures during Apr-Jun, over south Pakistan which caused vigorous monsoon currents pull towards the heat-low center.
4. Monsoon axis remained tilted in south (Lat. 22-24°N) compared to its normal/average position (Lat. 28°N or above).
5. 3 Low-pressure areas (LPAs) & 4 Depressions formed over Bay of Bengal moved towards Sindh-Balochistan (Fig. 3) due to northeast-southwest oriented Tibetan /Sub-tropical High-pressure area.
6. Climate change is causing more frequent extreme events like floods, drought, heatwaves, cyclones, sea-level rise & Glacier melting (GLOF)- This year 16 GLOF events in GB & KP have been witnessed against normal 5/6 events yearly.

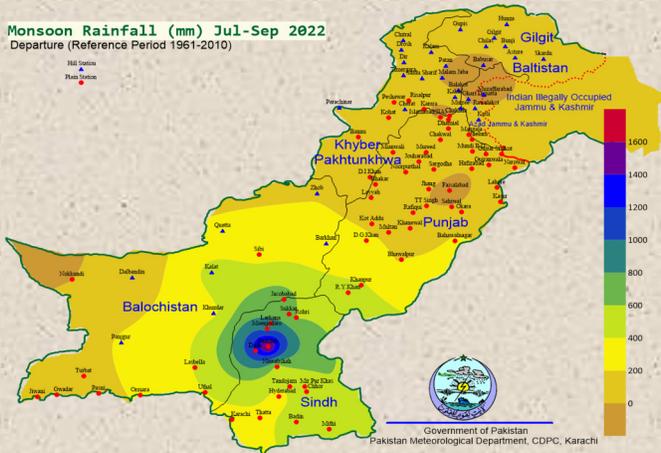


Fig. 1(a). Rainfall departure (%) during 2022



Fig. 1(b). Rainfall departure (%) region-wise

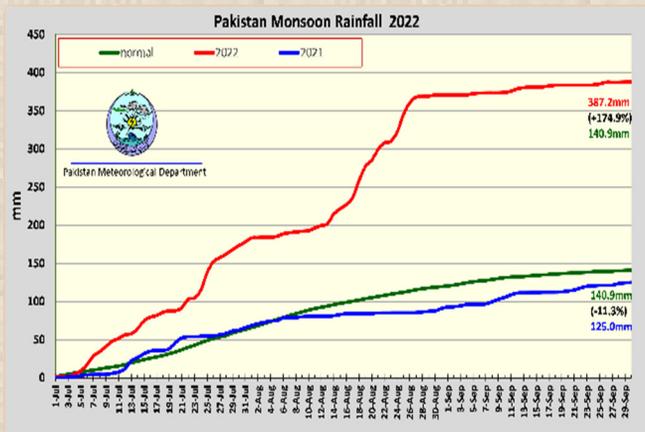


Fig. 2. Comparative cumulative rainfall (2022 & 2012) vs Normal

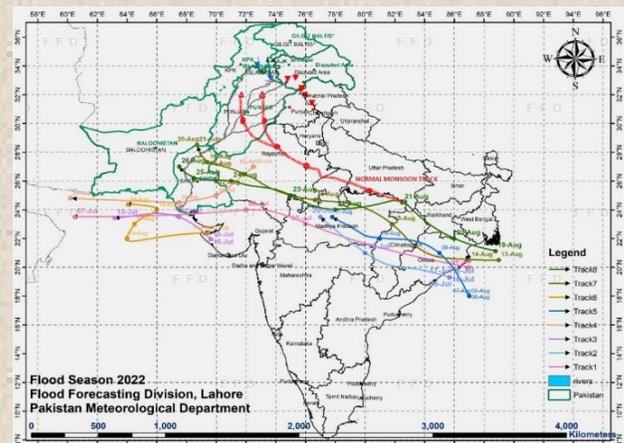


Fig.3. Monsoon LPAs tracks during Jul-Aug 2022

September 2021

During the month the national rainfall was below average (-21%) across Pakistan as a whole. The situation was more or less similar in all regions i.e., Balochistan (-59%), GB (-19%), KP (-16%), Punjab (-21%) and Sindh (-22%) except AJK which was slightly above average (+16%). The daily rainfall during the month is depicted in Fig. 4.

August 2022

The rainfall situation in August was more vigorous than July. National rainfall as a whole in August was excessively above average (+243%) with extremely above average over Sindh (+726%), Balochistan (+590%) & GB (+233%), above average over KP (+58%) & Punjab (+52%) and near average in AJK. Daily rainfall analysis shows that the almost entire month of August remained wetter especially incessant heavy rainfall from 11 to 27 Aug (Fig. 5).

July 2022

National rainfall in July was excessively above average (+181%) as a whole with excessively above average over Sindh (+307%) & Balochistan (+450), largely above average over Punjab (+116%), above average over KP (+30%) & GB (+32%) and near average in AJK. July's daily rainfall too exhibited continuous wetter conditions with 3 major spells; 4-12 July, 14-18 July & 21-31 July (Fig. 6)

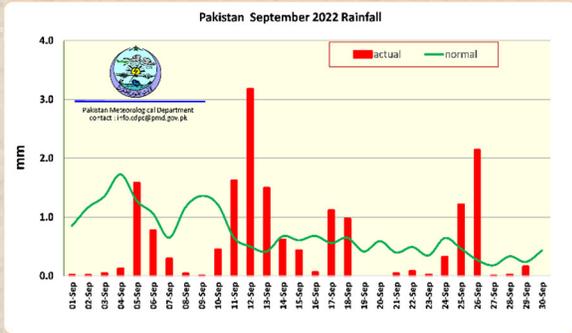


Fig. 4. September 2022 daily rainfall

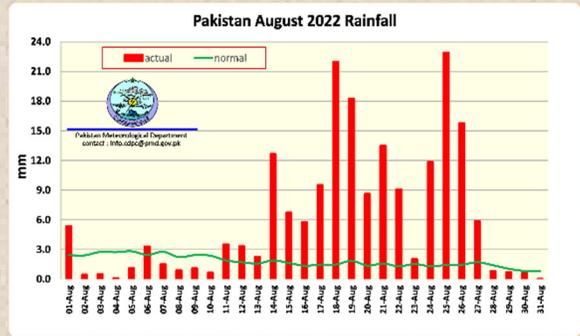


Fig. 5. August 2022 daily rainfall

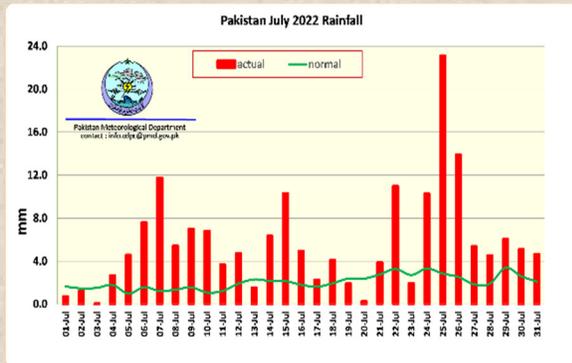


Fig. 6. July 2022 daily rainfall

MONSOON 2022 RAINFALL UPDATE				
	Rainfall (% Deviation)			
	Jul	Aug	Sep	Jul to Sep
Pakistan	181	243	-21	175
Azad J&K	-7	-3	16	-2
Balochistan	450	590	-59	450
Gilgit-B	32	233	-19	104
Khyber-PK	30	58	-16	33
Punjab	116	52	-21	70
Sindh	307	726	-22	426

Table 1. Monthly & seasonal rains departures, Pakistan & Regions