



# Pakistan Monsoon 2022 Rainfall Report

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## Monsoon progress Highlights (1<sup>st</sup> July to 30<sup>th</sup> September 2022)

This year monsoon season set on 30<sup>th</sup> June 2022 over Pakistan, a day earlier of its normal date (1<sup>st</sup> July) and withdrew during third week of September 2022. However, significant continuous rainfall occurred from 4<sup>th</sup> 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. Negative 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 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.

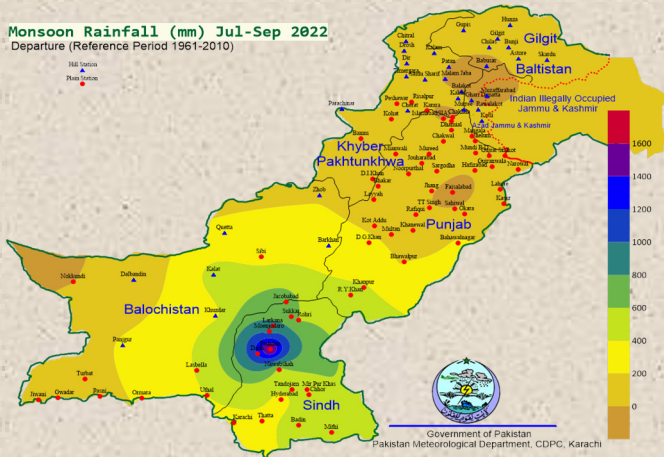


Fig. 1(a). Rainfall departure (%) during 2022

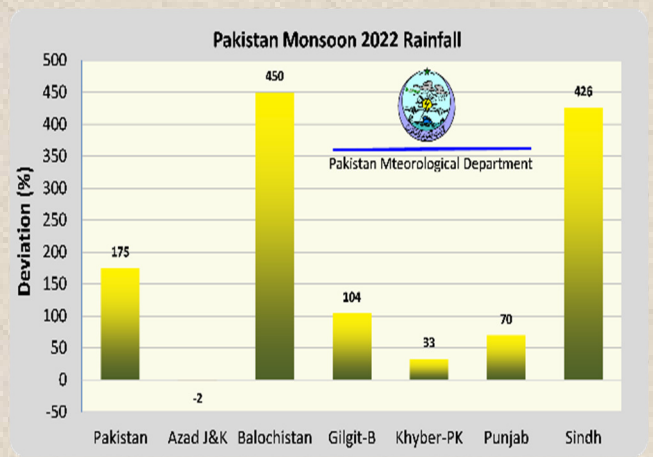


Fig. 1(b). Rainfall departure (%) region-wise

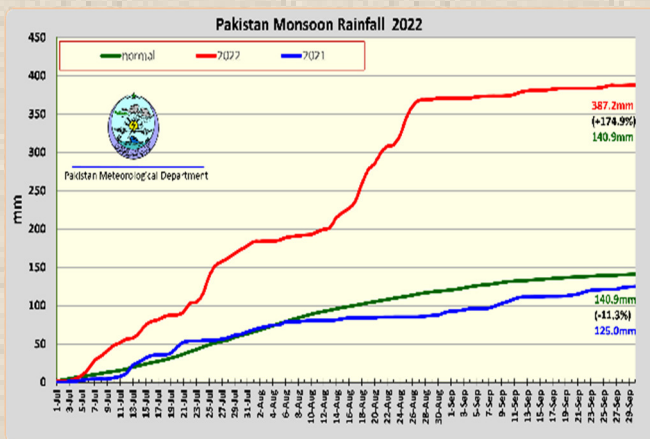


Fig. 2. Comparative cumulative rainfall (2022 & 2021) vs Normal

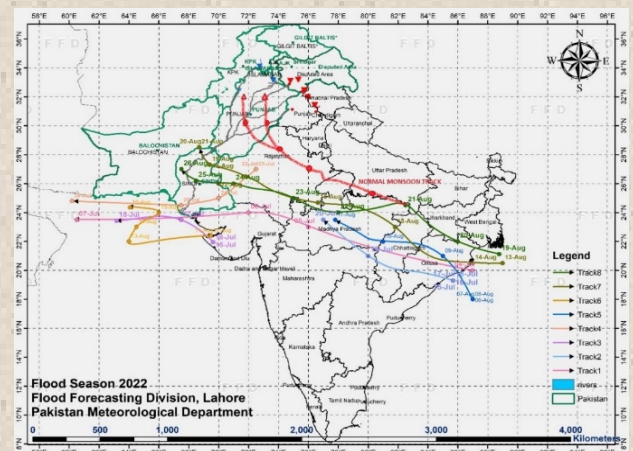


Fig.3. Monsoon LPAs tracks during Jul-Aug 2022

### September 2022

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)

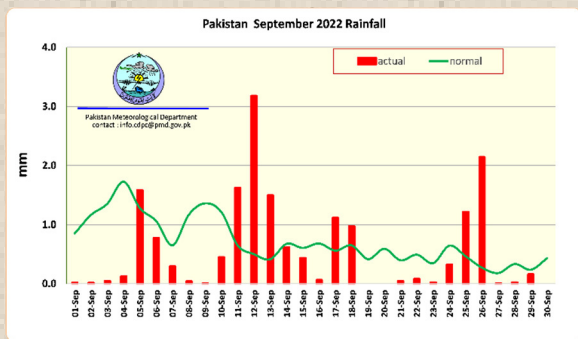


Fig. 4. September 2022 daily rainfall

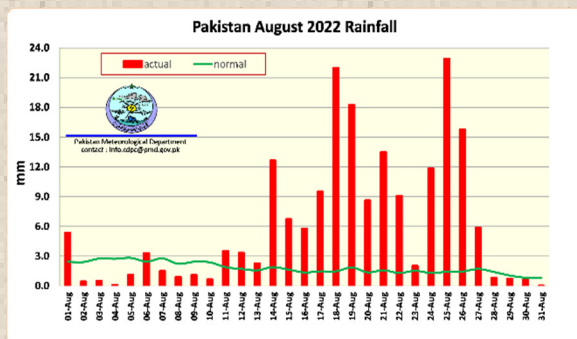


Fig. 5. August 2022 daily rainfall

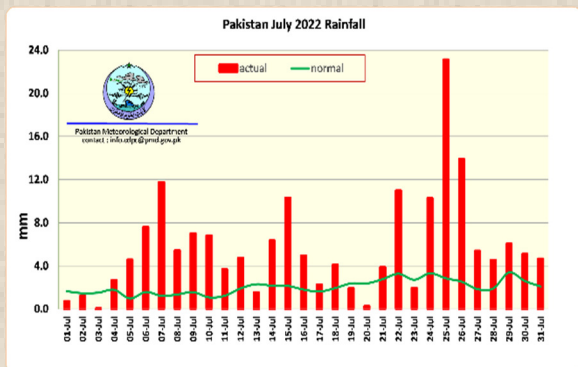


Fig. 6. July 2022 daily rainfall

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