

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Drought in Pakistan

National Drought Monitoring Centre
Pakistan Meteorological Department
Islamabad



Sequence

Defining Drought

Monitoring Drought

Drought Indices

Use of EROS Data in Drought Indices

District Drought Hazard Map of Pakistan

Current Drought Situation

Drought Situation Outlook

Defining Drought

Drought occurs due to lack of rainfall over a prolonged period over an area.

Types of Drought:

- 1. Meteorological drought**
- 2. Agricultural drought**
- 3. Hydrological drought**
- 4. Socio-economic drought**



Monitoring Drought

Drought Alerts/Advisories/Bulletins/Reports are prepared and issued to stakeholders Weekly/Fortnightly/Monthly/Quarterly & annually, based on:

1. Meteorological indices
2. Satellite Indices
3. Water availability in reservoirs
4. Field Reports

Drought Indices

1. Meteorological Indices

- i. Percentage Area Weighted Departure of Rainfall
- ii. Cumulative Precipitation Index
- iii. Percent of Normal of Rainfall
- iv. SPI (Standard Precipitation Index)
- v. Length of Dry period
- vi. Soil moisture Anomaly
- vii. Monthly precipitation/soil moisture outlook
- i. Rainfall Probability

2. Satellite Indices

- i. Normalized Difference Vegetation Index (NDVI)
- ii. Temperature Vegetation Dryness Index (TVDI)
- iii. Land Surface Temperature (LST)

3. Water availability in reservoirs

- i. Tarbela dam
- ii. Mangla dam
- iii. Rawal dam
- iv. Khanpur dam
- v. Simly dam

4. Field Reports



Use of EROS Data in Drought Indices

Drought conditions can vary tremendously from place to place and week to week. Accurate drought monitoring is essential to understand a drought's progression and potential effects, and to provide information necessary to support drought mitigation decisions.

EROS data in use at NDMC, PMD

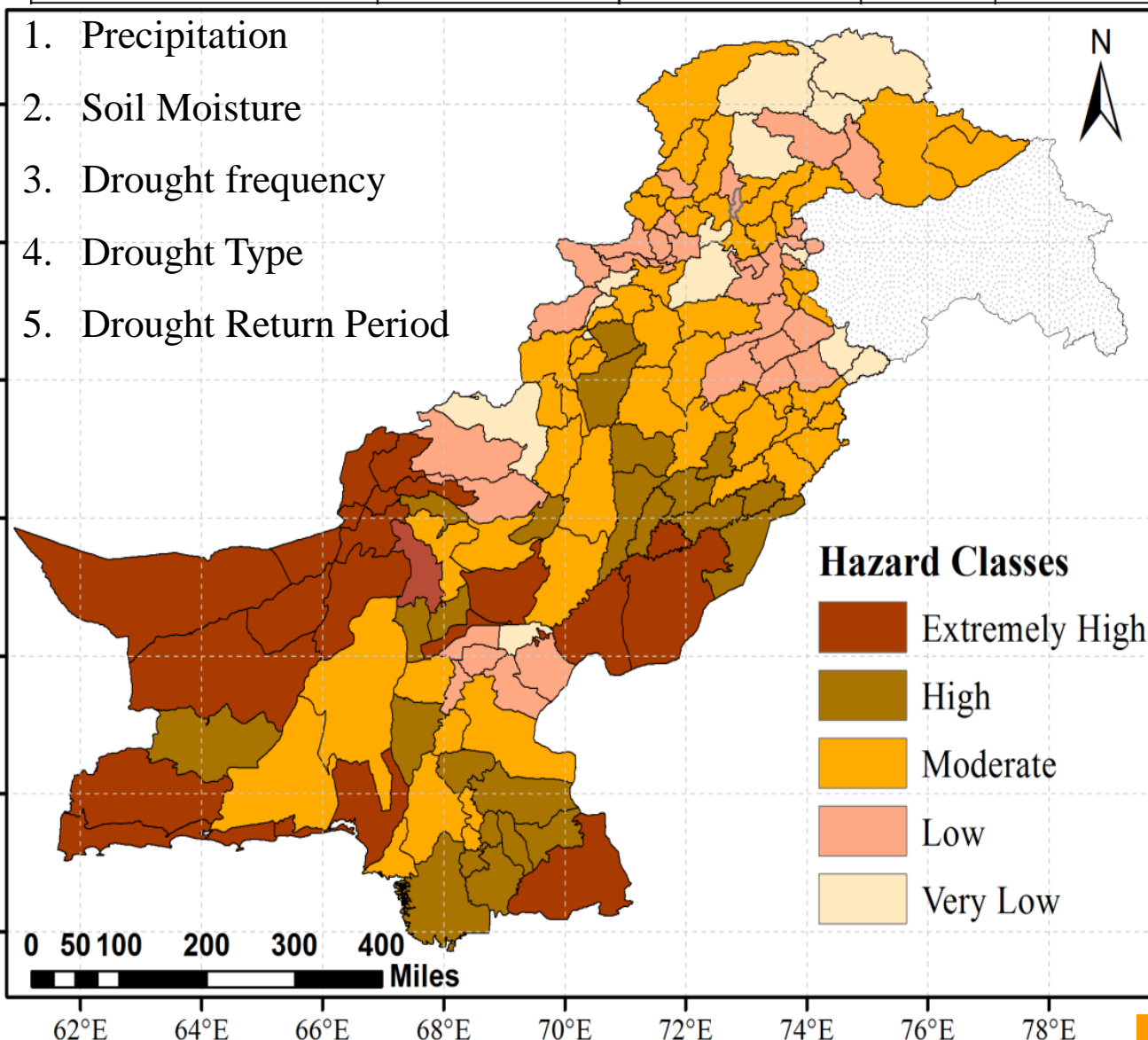
- NDVI (MOD13A2)
- LST (MOD 11A2)
- TVDI



District Drought Hazard Map of Pakistan

Name	Total Districts	Extremly High	High	Moderate
Parameters Used	30	15	5	7

1. Precipitation
2. Soil Moisture
3. Drought frequency
4. Drought Type
5. Drought Return Period



Hazard Classes

- Extremely High
- High
- Moderate
- Low
- Very Low

Extremely high
vulnerable

Very Low
drought

1	1
5	1
18	3
1	3
5	3
6	2
16	2
23	1
24	1
33	13
4	13

stan Kech

6. Khyber
7. Pakhtunkhwa

8. North West Frontier Province

9. 1 Nushki

10. 2 Pishin

11. Qalat

12. Qilla Abdullah

13. Quetta

14. Washuk

15. Ziarat)

Punjab

1. Bahawalpur

2. Lodharn

3. RYKhan

Source: NDMC, PMD

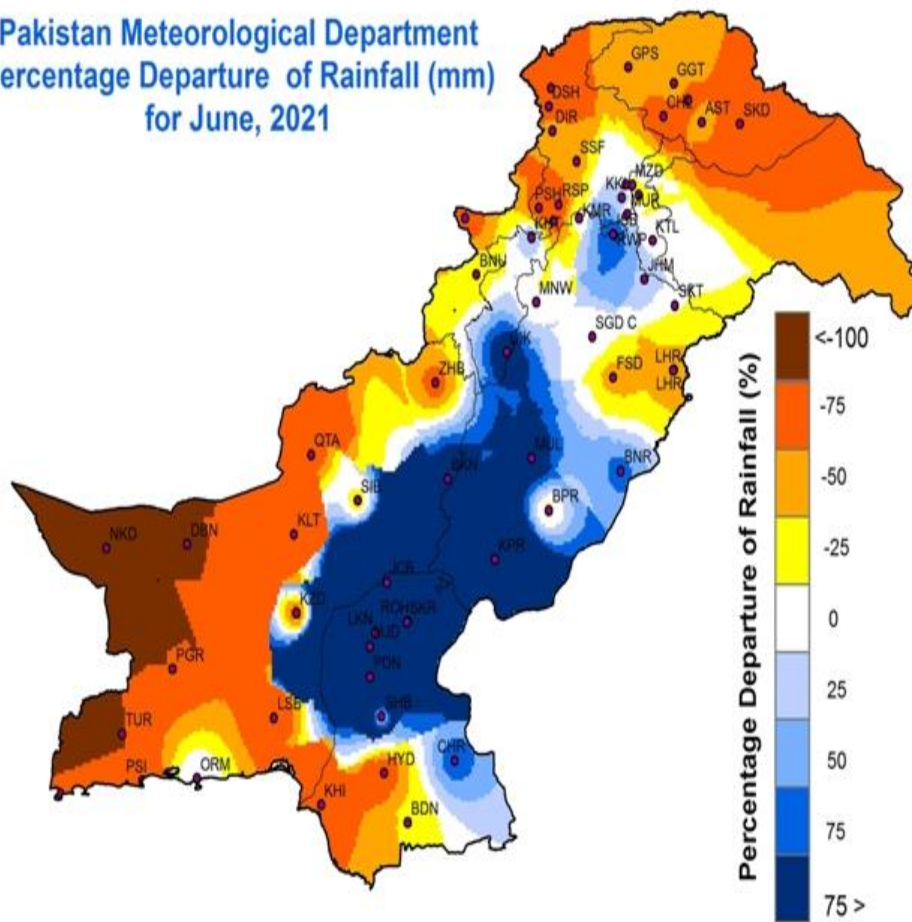
S.No.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

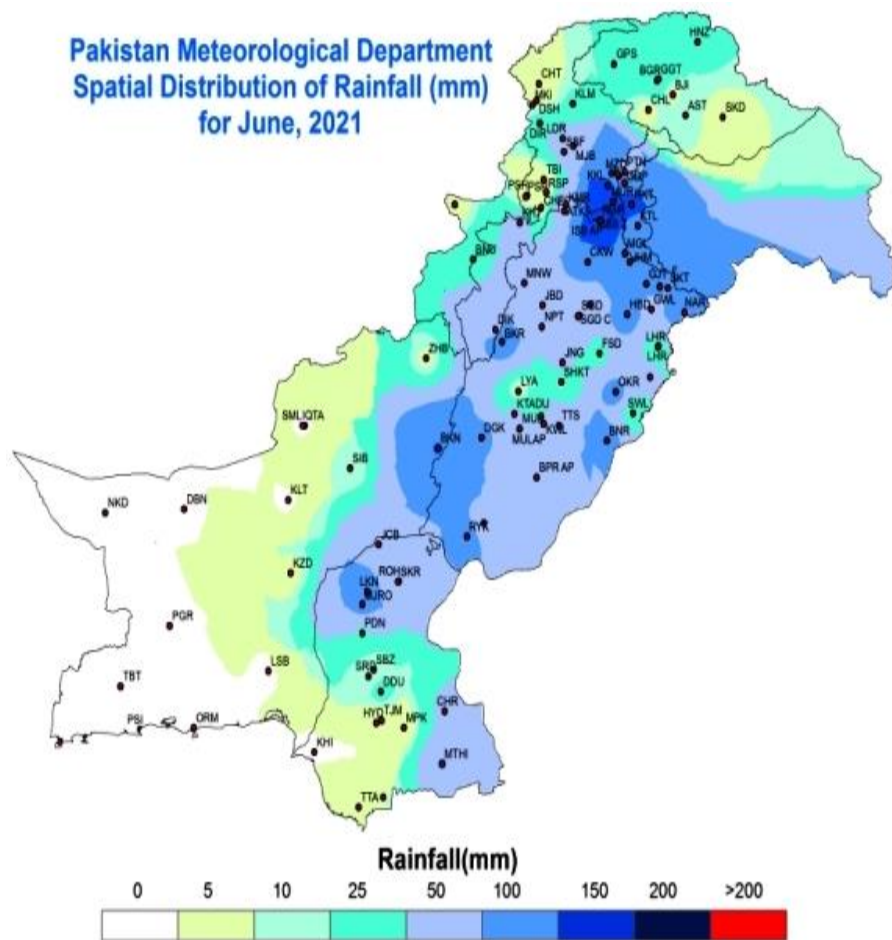
Current Drought Situation

Precipitation Based Analysis

Pakistan Meteorological Department
Percentage Departure of Rainfall (mm)
for June, 2021

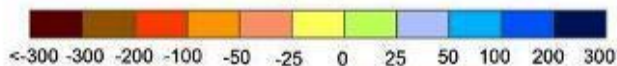
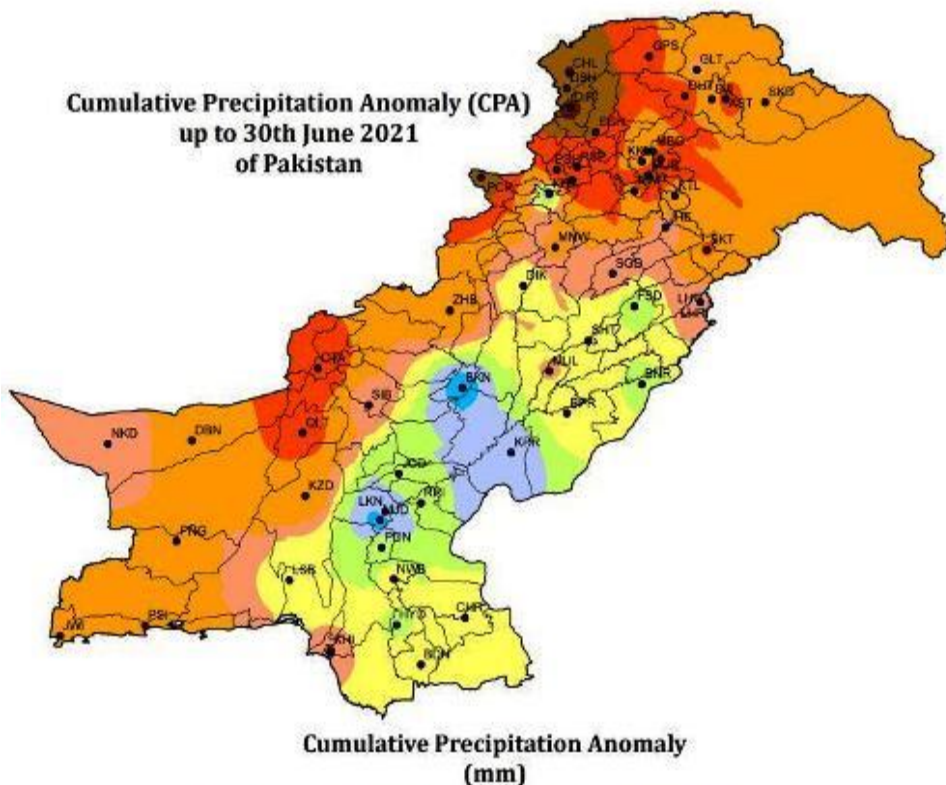


Pakistan Meteorological Department
Spatial Distribution of Rainfall (mm)
for June, 2021



Precipitation Based Analysis

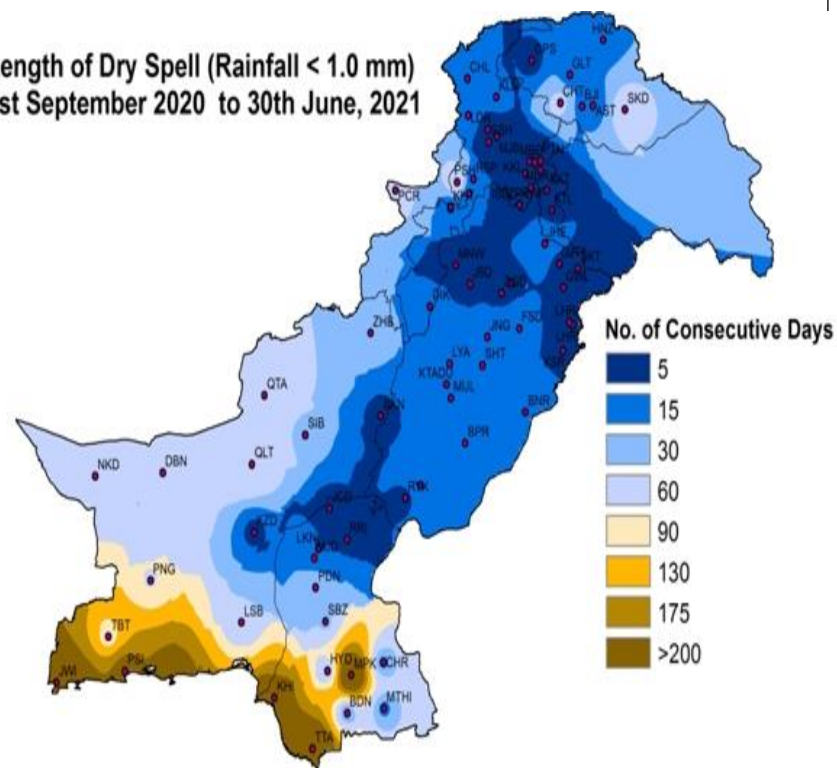
**Cumulative Precipitation Anomaly (CPA)
up to 30th June 2021
of Pakistan**



Source: Pakistan Meteorological Department

Note: CPA has been calculated since January, 2021

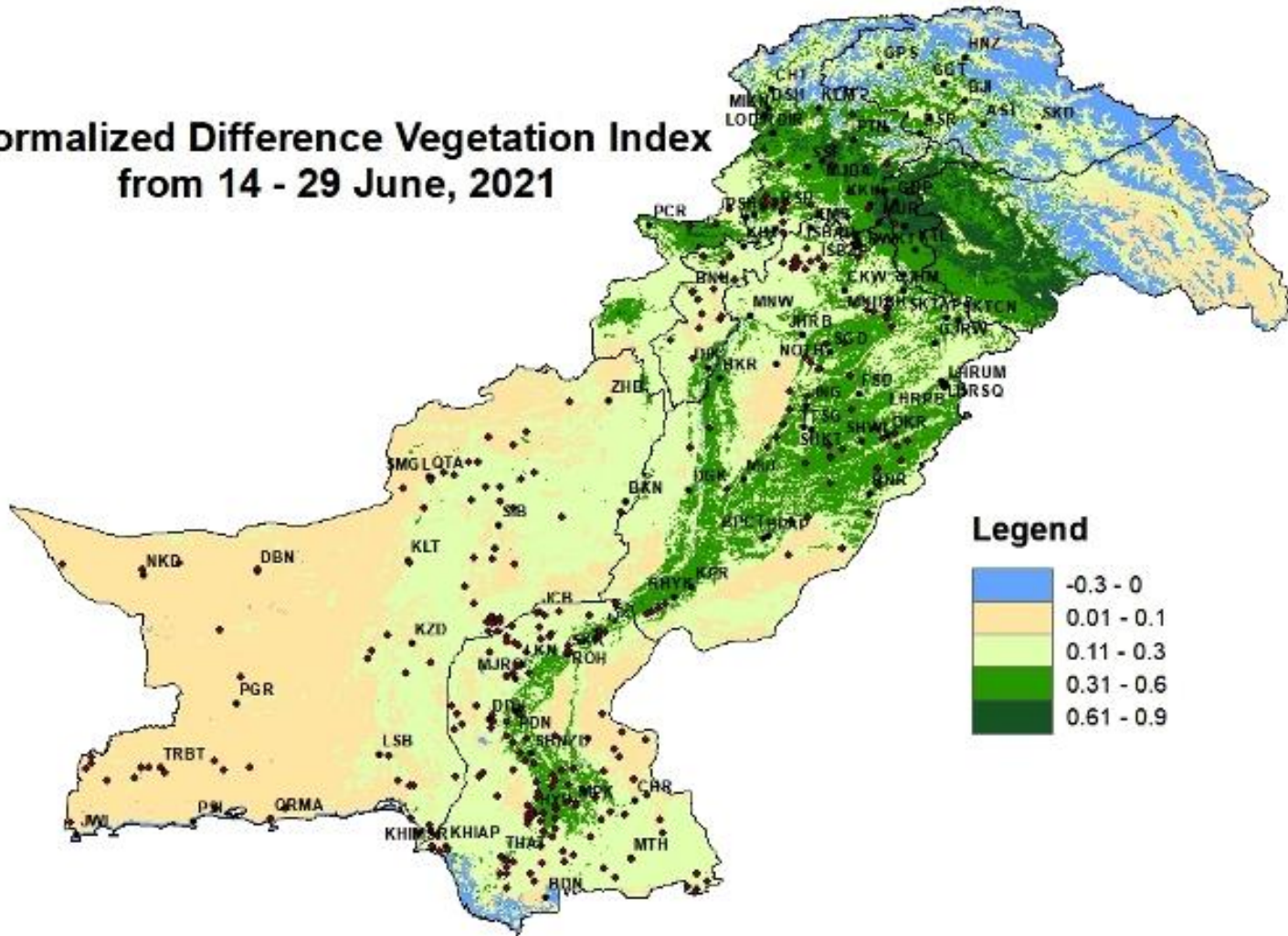
**Max Length of Dry Spell (Rainfall < 1.0 mm)
from 1st September 2020 to 30th June, 2021**



Source: National Drought Monitoring Center-PMD-Islamabad

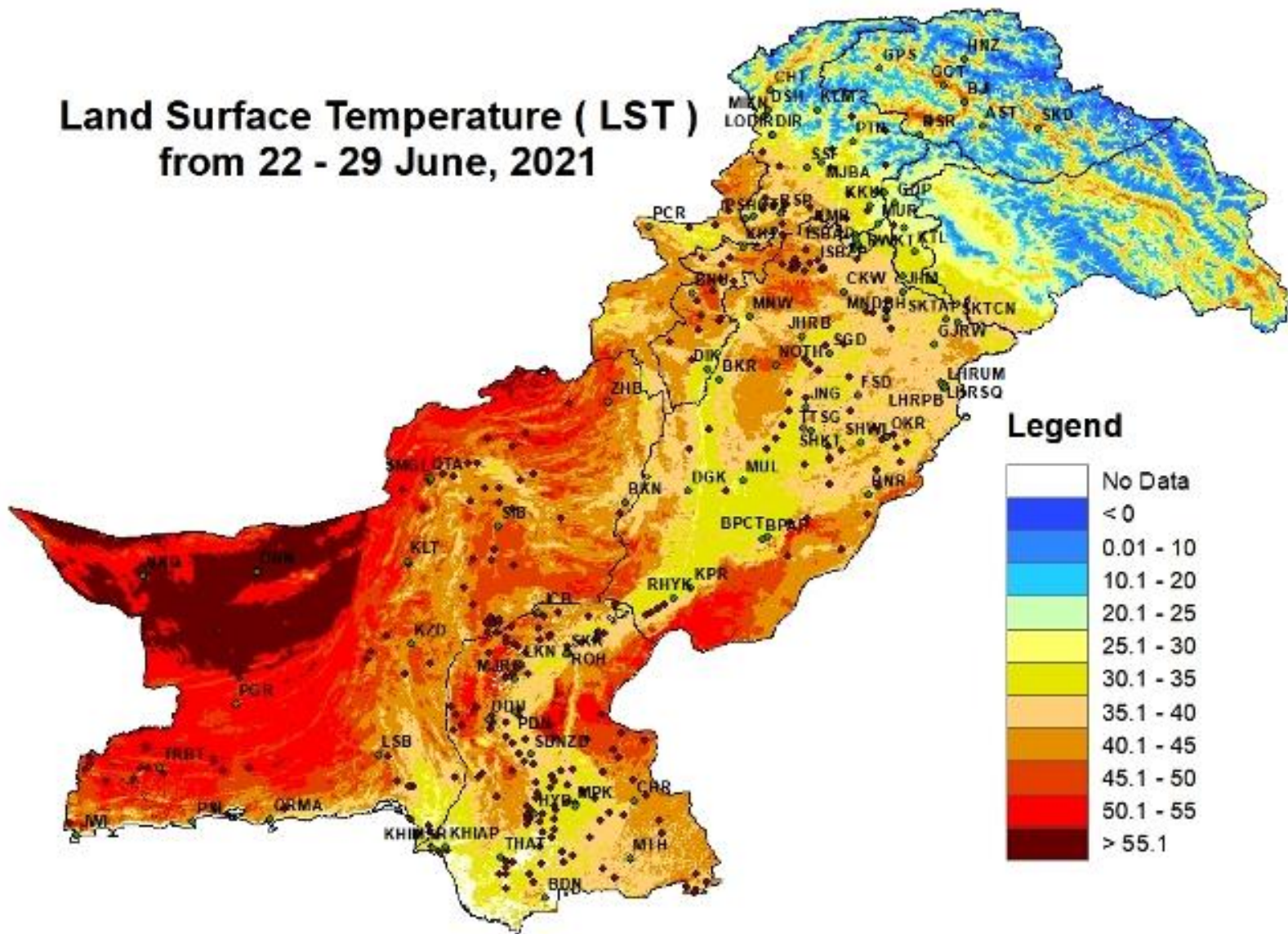
Satellite data Based drought Indices

Normalized Difference Vegetation Index
from 14 - 29 June, 2021



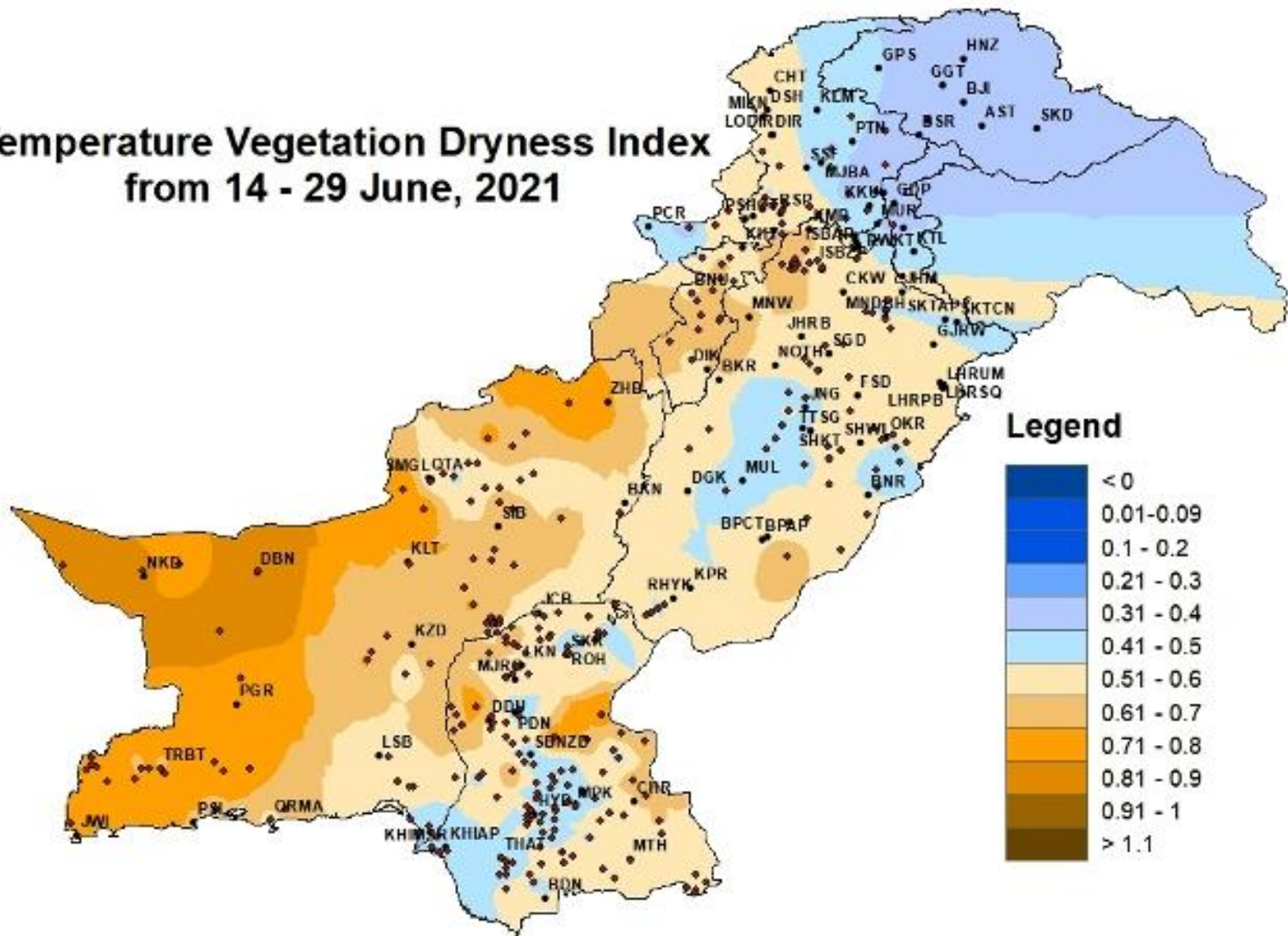
Satellite data Based drought Indices

**Land Surface Temperature (LST)
from 22 - 29 June, 2021**



Satellite data Based drought Indices

Temperature Vegetation Dryness Index
from 14 - 29 June, 2021





Pakistan Meteorological Department
National Drought Monitoring Centre (NDMC)
Meteorological Headquarters
Islamabad, Pakistan

Islamabad, 3rd June, 2021



DR-4/WEEKLY/DROUGHT/BULLETIN/2021-22
GOVERNMENT OF PAKISTAN
PAKISTAN METEOROLOGICAL DEPARTMENT
(National Drought Monitoring Centre)
Post Box No. 1214, Sector H-8/2
ISLAMABAD

Drought Alert-II

Subject: Drought Conditions are Exacerbating in Balochistan and Sindh.

As predicted by Pakistan Meteorological Department (PMD), the country overall received below normal (-36.1%) rainfall during (Oct-20 to May-21). The main thrust was in Sindh (-64.5%) and Balochistan (-59.5%) and while it remained above normal during November throughout the country. The rainfall departure (%) detail is as follows:

Table-1 Area weighted rainfall departure (%) during October 2020 to May, 2021

	2020			2021			Cumulative		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jan-21 to Mar-21
Sindh	-100.0	60.9	-55.5	-86.8	-100.0	-69.5	-16.0	-32.8	-65.9
Balochistan	-100.0	97.6	-73.4	-100.0	-96.2	-51.8	-28.6	41.4	-61.0
GB/Kashmir	-100.0	24.0	-18.1	-1.1	-66.6	-14.3	-40.0	-74.7	-38.9
KP	-94.8	240.2	-30.0	-78.0	-71.5	7.2	-21.8	-4.5	-29.3
Punjab	-100.0	142.2	-14.4	13.4	-93.6	3.8	-47.4	57.7	-19.9
Pakistan	-98.3	142.7	-43.7	-56.9	-84.8	-15.6	-32.7	2.4	-39.1

Note: Normal period (1981-2010)

2. The rainy season in west to south-west districts of Balochistan is over now and no significant rainfall is expected until November, 2021. Due to consistent deficiency of rainfall since October, 2020, the moderate drought has been further intensified into severe drought especially in the southwestern Balochistan and southeastern Sindh. The drought affected districts are shown in table-2;

Table-2 Drought affected districts of Sindh and Balochistan

S.No.	Sindh		Balochistan	
	Severe	Moderate	Severe	Moderate
1	Badin	Dadu	Chagi	Harnai
2	Mirpur Khas	Khairpur	Gawadar	Mastung
3	Umerkot	Karachi	Kharan	Nushki
4	Sanghar	Larkana	Kech	Pishin,
5	Tharparkar	Neushero Feroz	Panjgur	Kalat
6	Thatta	Shaheed Benazirabad	Washuk	Quetta
7	Sajawal	Sukkur		

3. Keeping in view the climatology and current seasonal forecast of PMD for these areas, drought conditions may further affect the agriculture and live stocks. So, It is advised to all stakeholders to take pre-emptive measures for disaster prone districts. Farmers/agriculturists are advised to keep themselves updated from PMD website <http://www.pmd.gov.pk>.
4. NDMC is continuously monitoring the drought situation over the country to keep the stakeholders and general public updated on weekly, fortnightly and monthly basis.

Jan Muhammad Khan
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Dated: 07 June, 2021

ہفتہ وار خشک سالی کی اطلاع

گذشتہ ہفتے صوبہ سندھ اور بلوچستان کے چند مقامات پر بلکی سے معتدل بارش ریکارڈ کی گئی ہے۔ سندھ کے خشک سالی کے شکار کچھ مقامات پر اس بارش سے تھوڑی بہتری آنے کی توقع ہے۔

01 سے 07 جون، 2021 کے دوران صوبہ سندھ اور بلوچستان کے مقامات پر ریکارڈ کی گئی بارش درج ذیل ہے۔

01 سے 07 جون، 2021 کے دوران ریکارڈ کی گئی بارش (ملی میٹر)					
نمبر شمار	صوبہ سندھ کے مقامات	بارش کی مقدار (ملی میٹر)	نمبر شمار	صوبہ بلوچستان کے مقامات	بارش کی مقدار (ملی میٹر)
1	مونجو داڑو	45.0	1	پارکھان	13.0
2	پڑعیدن	21.0	2	سبی	8.0
3	روہڑی	12.0	3	ژوب	3.0
4	لاڑکانہ	6.0	4	خضدار	0.8
5	سکرند	6.0			
6	شہید منظر آباد	6.0			
7	سکھر	1.0			

پیشگوئی کا دورانیہ: 08 سے 14 جون، 2021

موسمیاتی صورتحال کے مطابق اگلے ہفتے صوبہ سندھ اور بلوچستان کے چند علاقوں میں بارش کا امکان ہے تاہم پہلے سے خشک سالی کے شکار سندھ اور بلوچستان کے اضلاع میں مجموعی طور پر خشک سالی کی صورتحال بدستور برقرار رہے گی۔

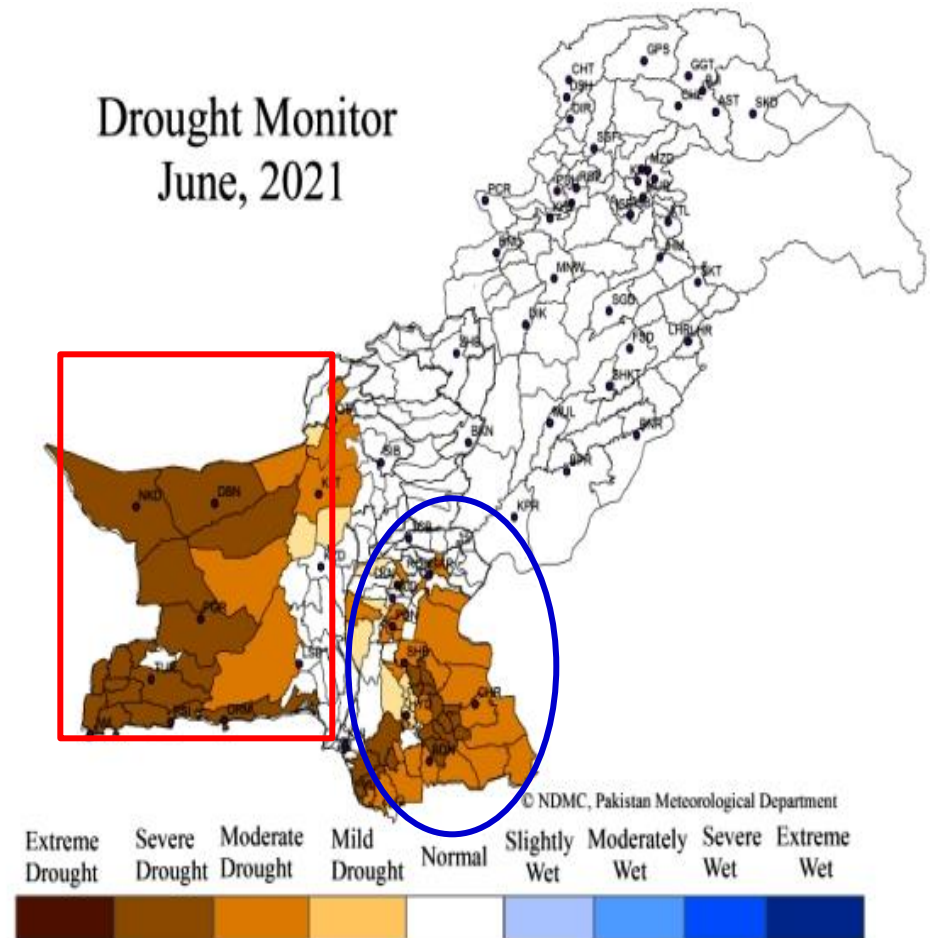
Drought Situation outlook(June-Aug,2021)

- Below normal rainfall is expected in the southern half of the country especially drought prone areas of Balochistan and Sindh.

Impact

- In Southern Balochistan, the prevailing moderate to severe drought conditions may further intensify.
- In Sindh, Moderate to Severe drought conditions may subside in the coming pre-monsoon and monsoon and will provide significant relief to drought prone districts.

Drought Monitor
June, 2021



NDMC is continuously monitoring the drought situation. Updates are being issued regularly

THANKS

For Further details: <http://www.ndmc.pmd.gov.pk/index.htm>
or contact: National Drought Monitoring Centre,
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