Climate Service Information for Decision Making

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Department of Hydrology and Meteorology

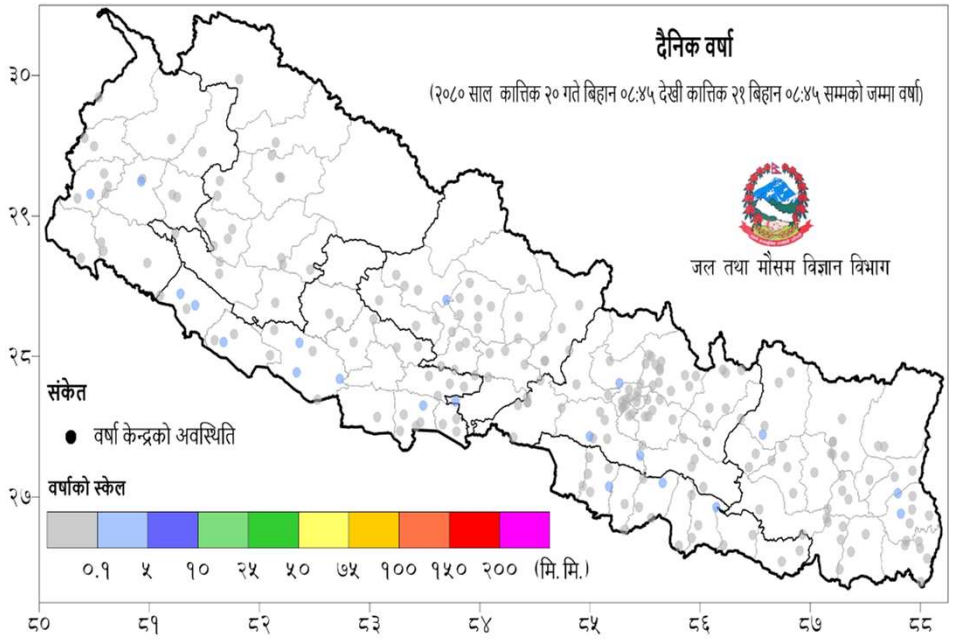
National activities on climate monitoring

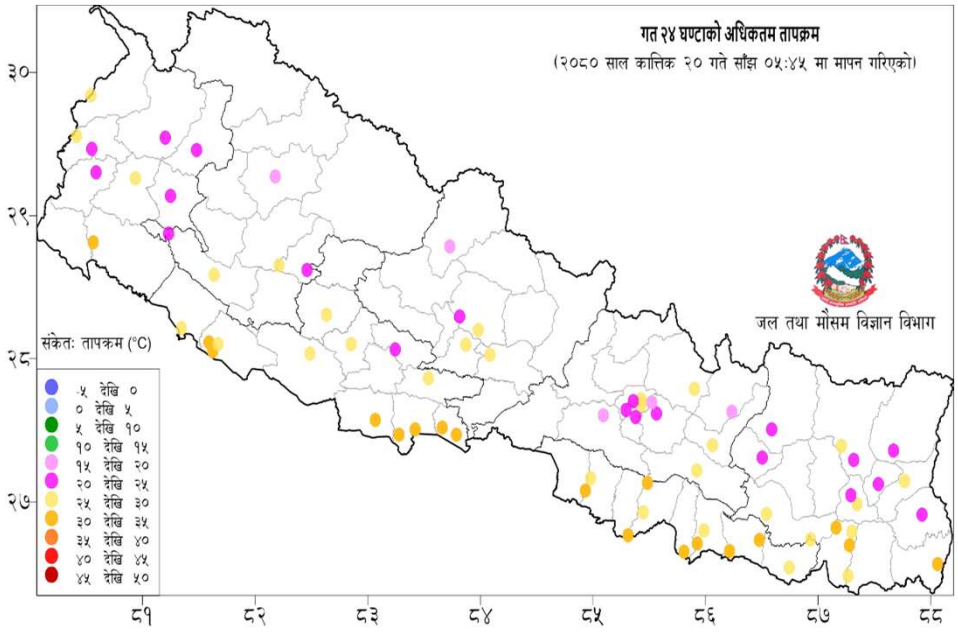
- Daily, Weekly and Monthly Monitoring of Precipitation and Temperature
- Seasonal Monitoring of Precipitation and Temperature
- Drought Monitoring(Percentage of Normal)
- Extreme Record Breaks
- Heat wave/ Hot days

Long range forecasting products and services in the NMHS

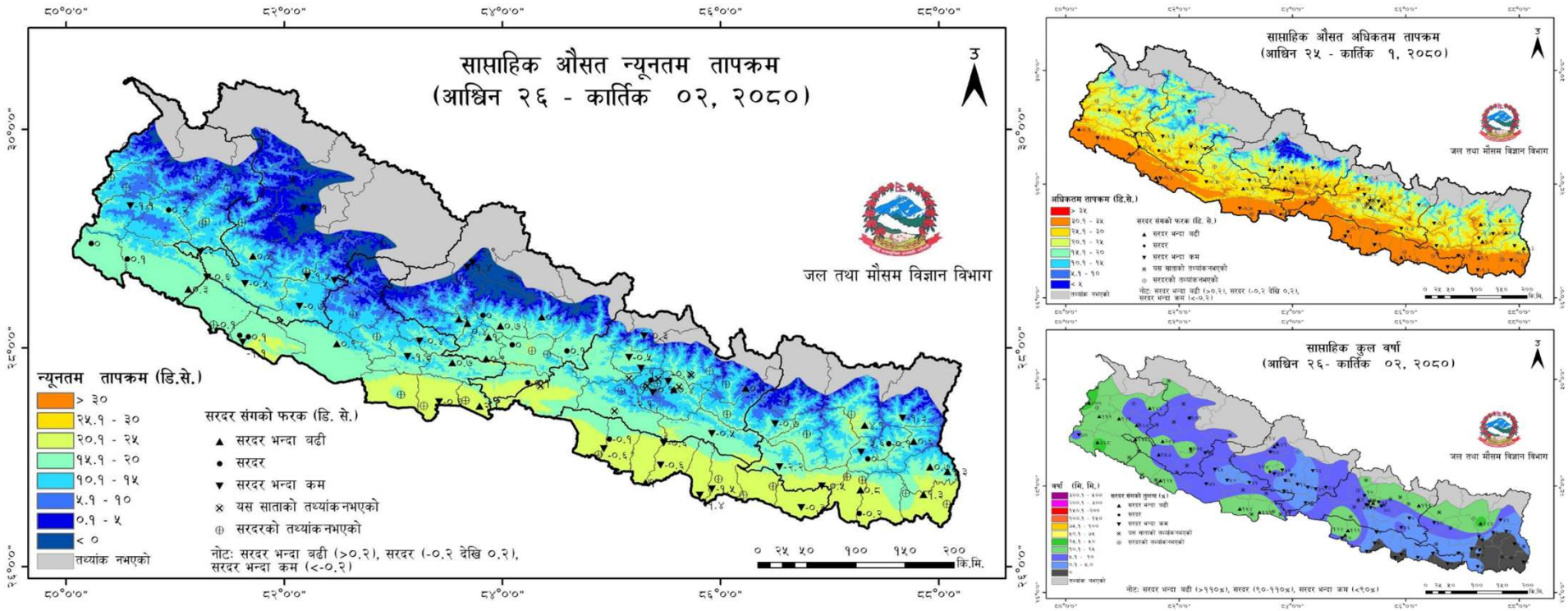
- Seasonal Outlooks(JJAS, OND,DJF)
- National Climate Outlook forum(NCOF)
- SASCOF(South Asian Climate outlook Forum) and CSUF(Climate Service User Forum)

Daily Temperature and Precipitation Reports to Users, NDRRMA





Weekly Temperature and Precipitation for Agriculture Sector



Monthly Preliminary Report of Temperature and Precipitation

Government of Nepal
Ministry of Energy, Water Resource and Irrigation
Department of Hydrology and Meteorology
Climate Division (Climate Analysis Section)
Babarmahal, Kathmandu

19th October 2

Preliminary Precipitation and Temperature Summary
September, 2023

Highlights

Nepal experienced light/moderate thundershowers and increased temperature during September. Isolated he to very heavy rainfall occurred mainly in the eastern and central parts of the country in the fourth week September.

Synoptic Sequences

The Monsoon Trough was along the foothills of the Himalayas and at western end during some days of t week. Cyclonic circulations and low pressure area formed around Uttar Pradesh and adjoining areas, Mad Pradesh and adjoining areas, Jharkhand and adjoining area and around Bay of Bengal influenced the weathe Nepal during the month of September.

Precipitation

Isolated part of Gandaki Province recorded precipitation above 700 mm while northern part of Karnali Provi and north-western part of Gandaki Province recorded precipitation less than 25 mm during September (Fig 1). Some parts of Sudurpaschim province and Lumbini Province and few parts of Bagmati Province, Gand Province and Karnali Province received normal to above normal rainfall while Madesh Province and Ka Province rest of the country received below normal rainfall. (Figure 2).

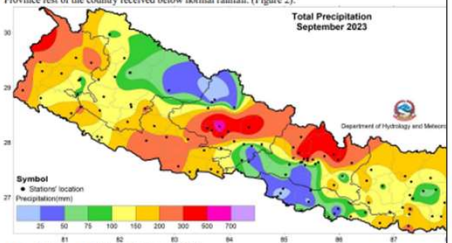


Figure 1: Total precipitation in September 2023.

Lumle station of Kaski district recorded the highest 24-hours precipitation of 119.5 mm on 22nd September 20 The highest monthly total precipitation of 739.7 mm was also recorded at Lumle station of Kaski district w the lowest monthly total precipitation of 14.6 mm was recorded at Parwanipur station of Bara district. Simila the highest (195.8%) and the lowest (6.6%) percentage of monthly normal precipitation were recorde Gothalpani station of Baitadi district and Birganj station of Parsa district respectively (Annex 1). Based on

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average of 96 stations shown in figure 2, Nepal received 66.9% of the normal precipitation of the m general, less than 90% of normal precipitation is considered as below normal, 90 to 110% is considered Gandaki, Bagmati and normal, and more than 110% of normal precipitation is considered as above precipitation for the month.

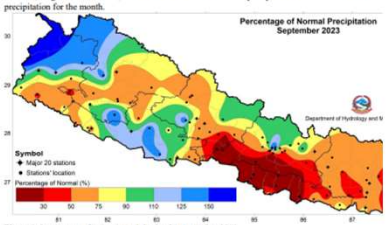

Figure 2: Percentage of normal precipitation in September 2023.

Figures 3 and 4, respectively, show the temporal distribution of monthly and monsoon seasonal cur average of daily precipitation at 20 major stations located as shown in figure 2. The timeseries of preci shows that precipitation was below normal during the month of September.

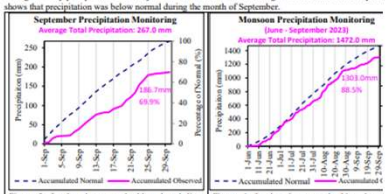

Figure 3: In the above graph, blue dotted line indicates the cumulative average of daily normal precipitation at 20 stations throughout September 2023 and pink solid line indicates the cumulative average of daily observed precipitation.

Figure 4: In the above graph, blue dotte indicates the cumulate average of daily n precipitation of 20 stations during monsoon s and pink solid line indicates the cumulative av of daily observed precipitation.

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Maximum Temperature

Northern part of the country recorded monthly maximum temperature less than 9°C while southern plain recorded above 33°C during September (Figure 5). Most parts of the country recorded above normal maximum temperature while some parts of Karnali Province recorded near-normal to below normal maximum temperature (Figure 6).

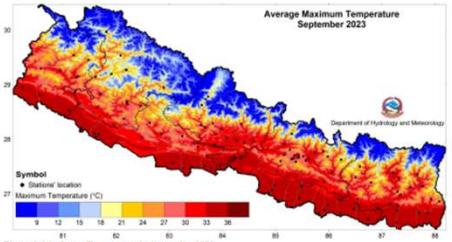

Figure 5: Maximum Temperature in September 2023.

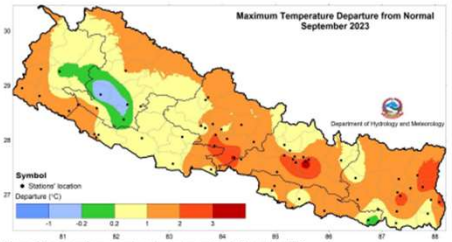

Figure 6: Departure from normal maximum temperature in September 2023.

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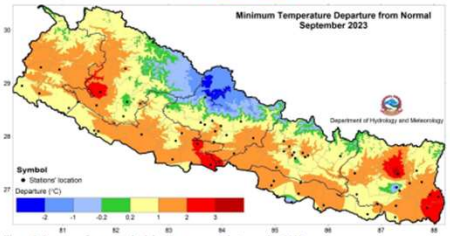


Figure 8: Departure from normal minimum temperature in September 2023.

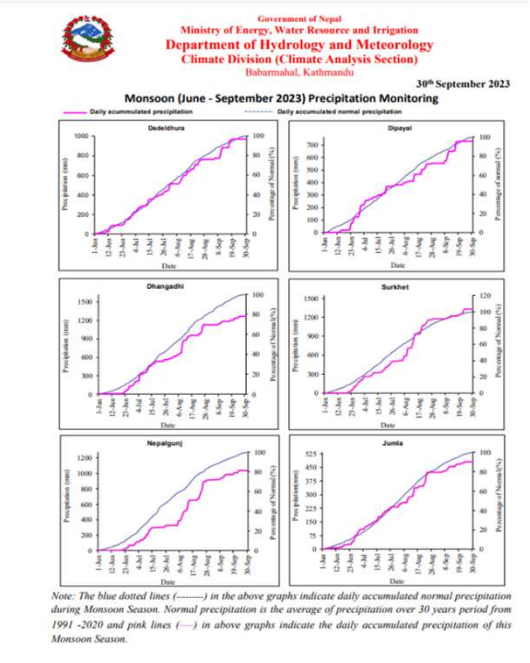
Historical record break

In this September, several stations broke the previous record of September's extremes of temperature and precipitation (Table 2 to 4).

Table 2: List of stations breaking the September's highest daily maximum temperature in September 2023.

S.N.	Station Name	District	Record break maximum temperature (°C)/Date	Previous highest maximum temperature (°C)/Date
1	Bhaktapur	Bhaktapur	35.0/2023-09-13	32.8/2017-09-19
2	Changu Narayan	Bhaktapur	32.5/2023-09-16	31.1/2011-09-01
3	Chapakot	Syangja	36.5/2023-09-16	36.2/2005-09-02
4	Chatara	Sunsari	39.3/2023-09-18	38.0/2015-09-19
5	Darchua New	Darchula	36.0/2023-09-02	35.6/2017-09-17
6	Dhulikhel	Kavrepalanchok	31.0/2023-09-03	30.5/2020-09-20
7	Godavari	Lalitpur	30.5/2023-09-03	29.9/2014-09-05
8	Gorkha (Birenchowk)	Gorkha	34.5/2023-09-16	34.2/2013-09-25
9	Humde	Manang	22.2/2023-09-01	22.0/2020-09-01
10	Janakpur Airport	Dhanusha	38.8/2023-09-18	38.0/1972-09-21
11	Jumla	Jumla	29.6/2023-09-14	29.5/2015-09-10
12	Kanyam Tea Estate	Ilam	28.8/2023-09-29	28.7/1996-09-16
13	Khadbari	Sankhuwasabha	33.5/2023-09-17	32.0/2020-09-20
14	Khumaltar	Lalitpur	32.2/2023-09-06	30.6/1990-09-01
15	Lahan	Siraha	38.0/2023-09-18	37.5/1996-09-12
16	Lete	Mustang	27.3/2023-09-02	24.0/2013-09-18
17	Lumbini	Rupandehi	37.0/2023-09-06	36.5/2015-09-18
18	Lumle	Kaski	34.2/2023-09-06	28.5/2012-09-28
19	Salleri	Solukhumbu	29.0/2023-09-17	28.5/2012-09-28

Seasonal Rainfall Monitoring



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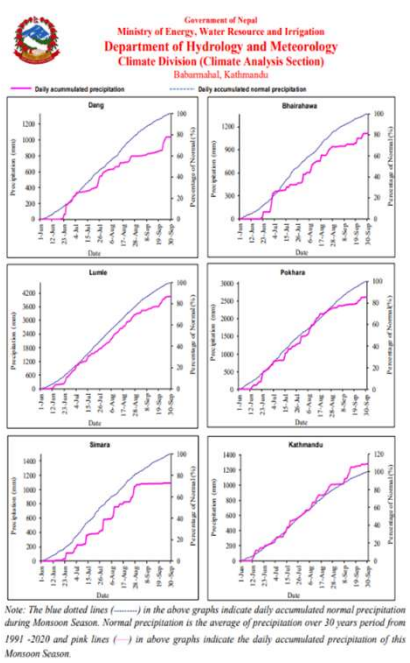
30th September 2023

Monsoon (June - September 2023) Precipitation Monitoring

Daily accumulated precipitation ------- Daily accumulated normal precipitation

Dadeldhura | Dipayal | Dhangadhi | Surkhet | Nepalgunj | Jumla

Note: The blue dotted lines (--------) in the above graphs indicate daily accumulated normal precipitation during Monsoon Season. Normal precipitation is the average of precipitation over 30 years period from 1991 -2020 and pink lines (——) in above graphs indicate the daily accumulated precipitation of this Monsoon Season.



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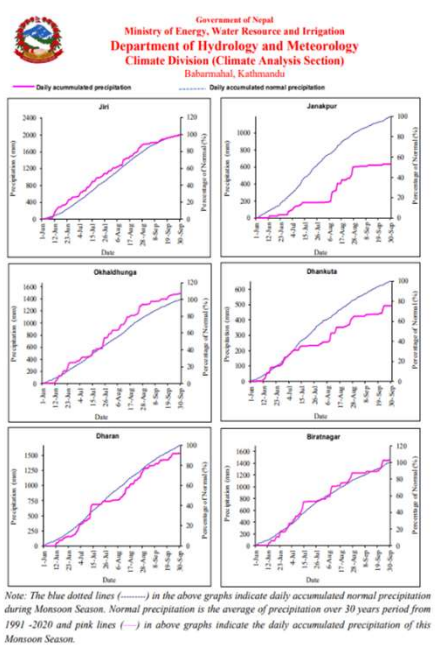
Daily accumulated precipitation ------- Daily accumulated normal precipitation

Dang | Bhairahawa | Lumle | Pokhara | Simara | Kathmandu

Note: The blue dotted lines (--------) in the above graphs indicate daily accumulated normal precipitation during Monsoon Season. Normal precipitation is the average of precipitation over 30 years period from 1991 -2020 and pink lines (——) in above graphs indicate the daily accumulated precipitation of this Monsoon Season.



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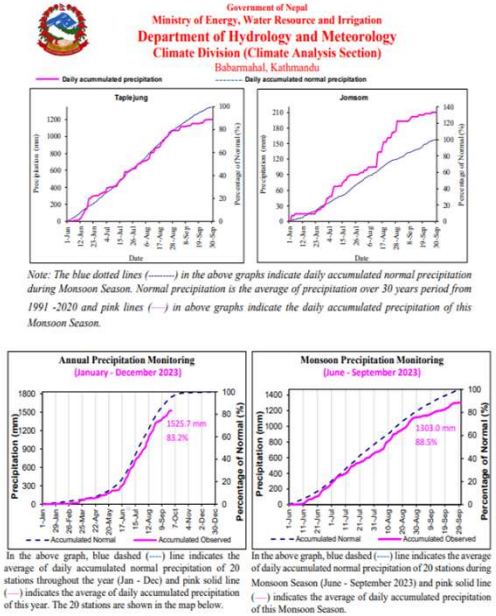
Daily accumulated precipitation ------- Daily accumulated normal precipitation

Jiri | Janakpur | Okhaldhunga | Dhankuta | Dharan | Biratnagar

Note: The blue dotted lines (--------) in the above graphs indicate daily accumulated normal precipitation during Monsoon Season. Normal precipitation is the average of precipitation over 30 years period from 1991 -2020 and pink lines (——) in above graphs indicate the daily accumulated precipitation of this Monsoon Season.



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Daily accumulated precipitation ------- Daily accumulated normal precipitation

Taplejung | Jomsom

Note: The blue dotted lines (--------) in the above graphs indicate daily accumulated normal precipitation during Monsoon Season. Normal precipitation is the average of precipitation over 30 years period from 1991 -2020 and pink lines (——) in above graphs indicate the daily accumulated precipitation of this Monsoon Season.

Annual Precipitation Monitoring
(January - December 2023)

Precipitation (mm) | Percentage of Normal (%)

1525.7 mm
83.2%

Accumulated Normal — Accumulated Observed

In the above graph, blue dashed (----) line indicates the average of daily accumulated normal precipitation of 20 stations throughout the year (Jan - Dec) and pink solid line (——) indicates the average of daily accumulated precipitation of this year. The 20 stations are shown in the map below.

Monsoon Precipitation Monitoring
(June - September 2023)

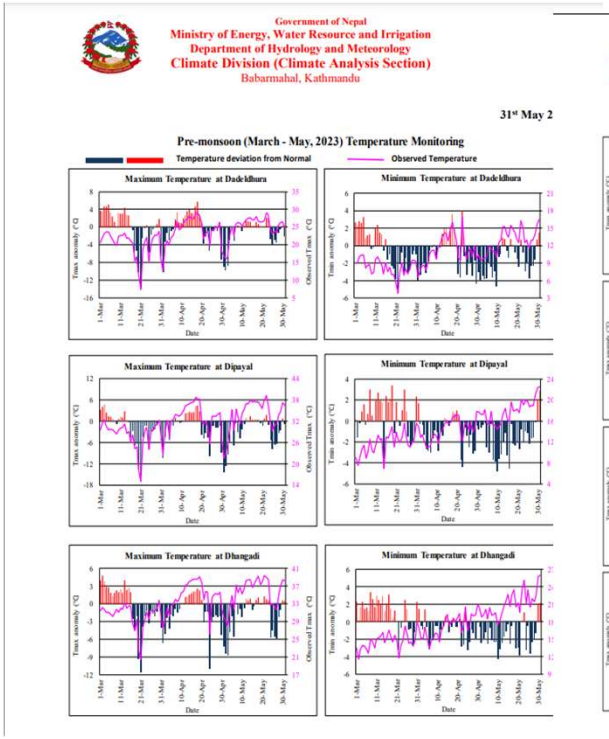
Precipitation (mm) | Percentage of Normal (%)

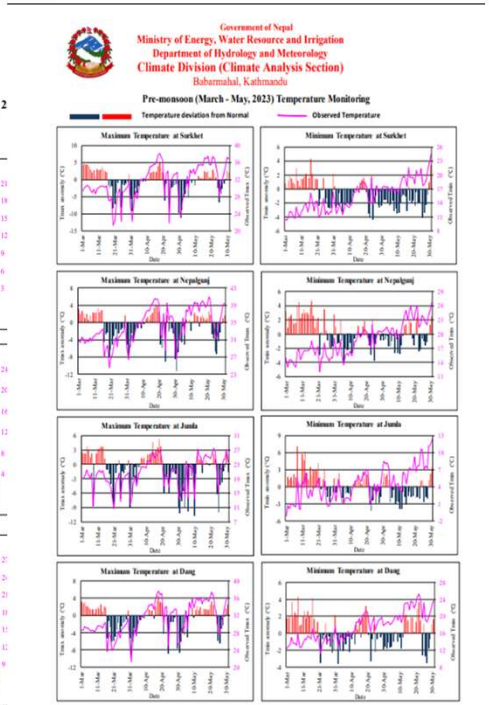
1303.0 mm
88.5%

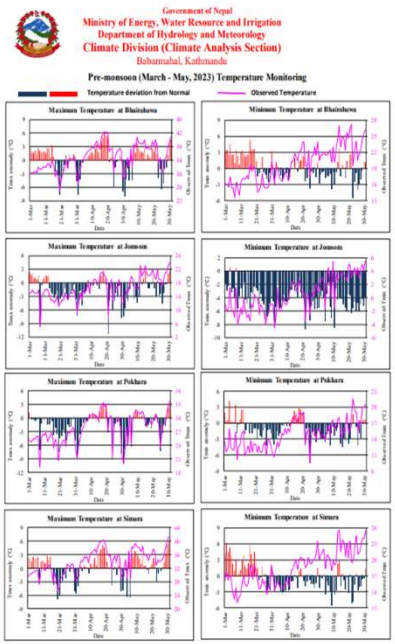
Accumulated Normal — Accumulated Observed

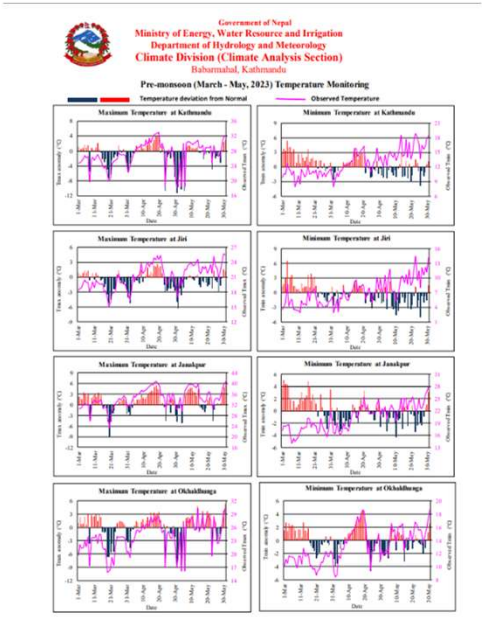
In the above graph, blue dashed (----) line indicates the average of daily accumulated normal precipitation of 20 stations during Monsoon Season (June - September 2023) and pink solid line (——) indicates the average of daily accumulated precipitation of this Monsoon Season.

Seasonal Temperature Monitoring





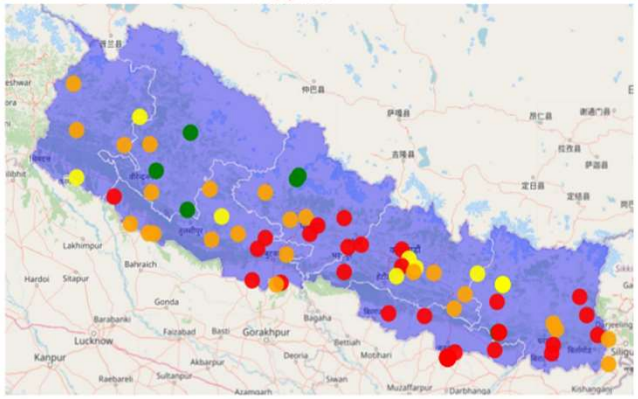




Heat Wave Bulletin 9th June 2023

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय
जल तथा मौसम विज्ञान विभाग
बबरमहल, काठमाडौं

Issue: HWB-2023-2



नक्सा १: २०८० जेठ २५ गतेको अधिकतम तापक्रममा आधारित तातो, धेरै तातो र अत्यधिक तातो दिनको चेतावनी नक्सा

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय
जल तथा मौसम विज्ञान विभाग
बबरमहल, काठमाडौं

Issue: HWB-2023-2

मिति: २०८०/०२/२६
समय: दिउँसो ०३:०० बजे

तातो दिन तथा लू (Hot days & Heat Wave) सम्बन्धी बुलेटिन

गत केहि दिन देखि देशका अधिकांश स्थानहरुमा अधिकतम तापक्रम वृद्धि भईरहेको छ। तराईका धेरै जसो भू-भागहरुमा अधिकतम तापक्रम ४० डिग्री सेल्सियस भन्दा बढी मापन भएको छ भने बाँके, चितवन, पर्सा, बारा, सर्लाही लगायतका जिल्लाहरुमा ४२ डिग्री सेल्सियस भन्दा बढी मापन भएको छ (नक्सा:२ देखि ६, अनुसूची १)।

देशका तराई, भित्री मधेश, पहाडी उपत्यका तथा खोंचहरु साथै पहाडी भू-भागका धेरै स्थानहरुमा विगत केहि दिन देखि अधिकतम तापक्रम तातो दिन (Hot day), धेरै तातो दिन (Very hot day), अत्यधिक तातो दिन (Extreme hot day) को सिमा भन्दा बढी लगातार तिन दिन वा सो भन्दा बढी मापन भई हल्का (Mild), मध्यम (Moderate) तथा विषम (Extreme) वर्गको लू (तातो हावाको बहाव) देखिएको छ (नक्सा १, तालिका:१ देखि १८, अनुसूची ३)। मध्यम तथा विषम वर्गको लू को कारणले मानव स्वास्थ्यमा नकारात्मक असर पार्न सक्ने सम्भावना रहेकोले सो बाट बच्न आवश्यक सतर्कता अपनाउनुहुन अनुरोध छ।

तालिका १५: पोखरा विमानस्थल केन्द्रमा मापन गरिएको विगत ७ दिनको वर्षा तथा तापक्रमको विवरण

Parameter	Alert	Threshold	Observations						
			2023-06-03	2023-06-04	2023-06-05	2023-06-06	2023-06-07	2023-06-08	2023-06-09
24 hr Precipitation (mm)	No Alert	Heavy = 60.6 Very Heavy = 87.2 Extreme = 152.474	0	0	0	0	0	0	0
48 hr Precipitation (mm)	No Alert	Heavy = 96.8 Very Heavy = 132.65 Extreme = 220.08	0	0	0	0	0	0	0
72 hr Precipitation (mm)	No Alert	Heavy = 130.2 Very Heavy = 170.4 Extreme = 270.5	0	0	0	0	0	0	0
Maximum Temp (deg C)	Extreme Hot Day Severe Heat Wave	Hot = 32.5 Very Hot = 33 Extreme Hot = 34.1	33.9	34.5	33.3	34.9	35	35.9	35.7

Monsoon Outlook(JJAS)

नेपाल सरकार
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जल तथा मौसम विज्ञान विभाग
बबरमहल, काठमाडौं

मितिः २०८०/०२/२४

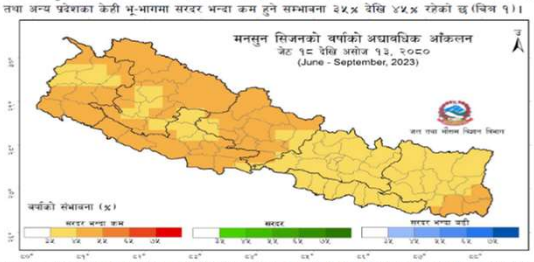
मनसुन सिजन (June - September 2023) को हावापानीको अद्यावधिक आँकलन
(२०८० जेठ १८ - असोज १३)

सारांशः

यस मनसुन सिजनमा देशभर सरदर भन्दा कम वर्षा हुने सम्भावना ३५ देखि ५५ रहेको छ। अधिकतम तापक्रम देशभर सरदर भन्दा बढी हुने सम्भावना ३५ देखि ६५ रहेको छ। त्यसैगरी न्यूनतम तापक्रम पैरेजसो भू-भागमा न्यूनतम तापक्रम सरदर भन्दा बढी हुने सम्भावना ३५ देखि ४५ रहेता पनि सुदुरपश्चिम प्रदेशका मध्य भू-भाग, कर्णाली प्रदेशका मध्य-पश्चिमी भू-भाग, गण्डकी प्रदेशका मध्य भू-भाग, लुम्बिनी प्रदेशका मध्य-दक्षिणी भू-भाग, बागमती प्रदेशका मध्य-पूर्वी भू-भाग र मधेश प्रदेशका पश्चिमी तथा मध्य भू-भागमा न्यूनतम तापक्रम सरदर हुने सम्भावना ३५ देखि ४५ रहेको छ।

वर्षाको आँकलनः

यस वर्षको जेठ १८ देखि असोज १३ सम्मको चार महिनाको मनसुन सिजनमा देशभर सरदर भन्दा कम वर्षा हुने सम्भावना रहेको छ। यद्यपी सरदर भन्दा कम वर्षा हुने सम्भावना स्थान विशेष फरक रहेको छ। सुदुरपश्चिम, कर्णाली, लुम्बिनी तथा गण्डकी प्रदेशका पैरेजसो भू-भाग र कोशी प्रदेशका दक्षिण-पूर्वी भू-भागमा सरदर भन्दा कम वर्षा हुने सम्भावना ४५ देखि ५५ रहेको छ। त्यसैगरी बागमती प्रदेश, मधेश प्रदेश र कोशी प्रदेश तथा अन्य प्रदेशका केही भू-भागमा सरदर भन्दा कम हुने सम्भावना ३५ देखि ४५ रहेको छ (चित्र १)।



चित्र १: २०८० को मनसुन सिजनको वर्षा (सरदर भन्दा कम वा सरदर वा सरदर भन्दा बढी) को सर्वाधिक सम्भावना (highest probability) (५)

पो. ब. नं. ४०६, बबरमहल, काठमाडौं, नेपाल
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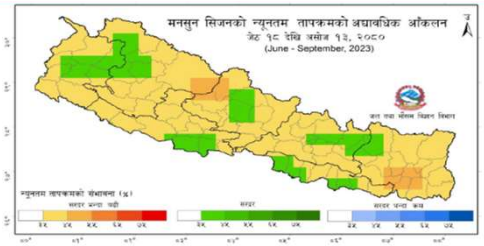
www.hydrology.gov.np

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय
जल तथा मौसम विज्ञान विभाग
बबरमहल, काठमाडौं



चित्र ३: २०८० को मनसुन सिजनको न्यूनतम तापक्रम (सरदर भन्दा कम वा सरदर वा सरदर भन्दा बढी) को सर्वाधिक सम्भावना (highest probability) (५)

आँकलनको आधारहरुः

ऋतुगत जलवायु विभिन्न सामुन्द्रिक, वायुमण्डलिय, भूमण्डलिय, हिममण्डलिय र जैविकिय प्रणालीमा निर्भर रहन्छ। यस आँकलन विश्व मौसम संगठनको विश्वभर तथा क्षेत्रीय स्तरको जलवायु सूचना उत्पादन गर्ने केन्द्हरुको हावापानी प्रारुपहरुको आँकलन र जल तथा मौसम विज्ञान विभागको हावापानी आँकलन गर्ने प्रविधिको आधारमा तयार गरिएको छ। साथै यस आँकलन तयार गर्दा नेपालको मनसुन सिजनको जलवायुमा प्रभाव पार्ने पूर्वी प्रशान्त महासागरमा विकसित हुने एन्सो (El Nino and Southern Oscillation: ENSO) तथा हिन्द महासागरमा विकसित हुने दुई धुवीय प्रणाली (Indian Ocean Dipole: IOD) को हालको अवस्था तथा जलवायु प्रारुपहरुको मनसुन सिजनको आँकलन, युरोप तथा एशियामा गत हिउँद तथा प्रि-मनसुनको सिजनमा पैरेको हिउँ, अन्तरऋतु परिवर्तनशिलताका कारकहरुलाई समेत मध्यनजर गरिएको छ। हाल एन्सो तरस्ट (Neutral) अवस्थामा रहेको छ र आगामी मनसुन सिजनमा एल-निनों (El-Nino) को अवस्था विकसित हुने अन्तराष्ट्रिय प्रारुपहरुको आकलन रहेको छ। त्यसैगरी हिन्द महासागरमा विकसित हुने दुई धूविय सामुन्द्रिक तापक्रम सूचक हाल तटस्थ रहेको र आगामी मनसुन सिजनमा धनात्मक हुने आँकलन गरिएको छ। तथापि ऋतु परिवर्तन हुने समयमा विद्यमान जलवायु प्रारुपहरुले यस्ता प्रणालीको सतप्रतिशत रुपमा पूर्वानुमान गर्न नसक्ने तथ्य मनन गर्नुपर्ने देखिन्छ।

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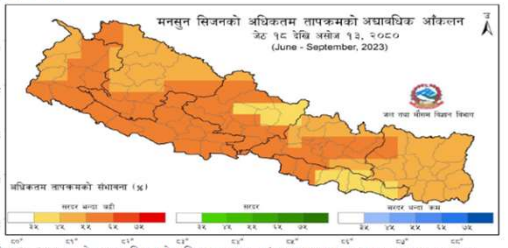
जल तथा मौसम विज्ञान विभाग
बबरमहल, काठमाडौं

अधिकतम तापक्रमको आँकलनः

लुम्बिनी प्रदेश, सुदुरपश्चिम तथा कर्णाली प्रदेशका पूर्वी तथा दक्षिणी भू-भाग, गण्डकी प्रदेशका पश्चिमी तथा दक्षिणी भू-भाग, बागमती प्रदेशका मध्य तथा दक्षिण-पश्चिमी भू-भाग र मधेश प्रदेशका पश्चिमी भू-भागमा अधिकतम तापक्रम सरदर भन्दा बढी हुने सम्भावना ५५ देखि ६५ रहेको छ। त्यसैगरी सुदुरपश्चिम प्रदेशका पश्चिमी भू-भाग, कर्णाली प्रदेशका मध्य तथा उत्तरी भू-भाग, बागमती प्रदेशका उत्तरी भू-भाग र कोशी प्रदेशका अधिकांश भू-भागमा अधिकतम तापक्रम सरदर भन्दा बढी हुने सम्भावना ४५ देखी ५५ रहेको छ भने गण्डकी प्रदेशका उत्तर-पूर्वी भू-भाग र मधेश प्रदेशका पूर्वी भू-भागमा सरदर भन्दा बढी हुने सम्भावना ३५ देखि ४५ रहेको छ (चित्र २)।



चित्र २: २०८० को मनसुन सिजनको अधिकतम तापक्रम (सरदर भन्दा कम वा सरदर वा सरदर भन्दा बढी) को सर्वाधिक सम्भावना (highest probability) (५)

न्यूनतम तापक्रमको आँकलनः

पैरेजसो भू-भागमा न्यूनतम तापक्रम सरदर भन्दा बढी हुने सम्भावना ३५ देखि ४५ रहेको छ। तथापी सुदुरपश्चिम प्रदेशका मध्य भू-भाग, कर्णाली प्रदेशका मध्य-पश्चिमी भू-भाग, गण्डकी प्रदेशका मध्य भू-भाग, लुम्बिनी प्रदेशका मध्य-दक्षिणी भू-भाग, बागमती प्रदेशका मध्य-पूर्वी भू-भाग र मधेश प्रदेशका पश्चिमी तथा मध्य भू-भागमा न्यूनतम तापक्रम सरदर हुने सम्भावना ३५ देखि ४५ रहेको छ (चित्र ३)।

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Drought Based on Percentage of Normal

Precipitation

Large part of Madhesh Province, Bagamati Province, Lumbini Province and Karnali Province, eastern and central part of Koshi Province and some isolated parts of Gandaki Province and Sudurpaschim Province recorded below normal precipitation during July. However, remaining parts of the country including large part of Gandaki Province and Sudurpaschim Province recorded near-normal to above normal precipitation (Figure 1).

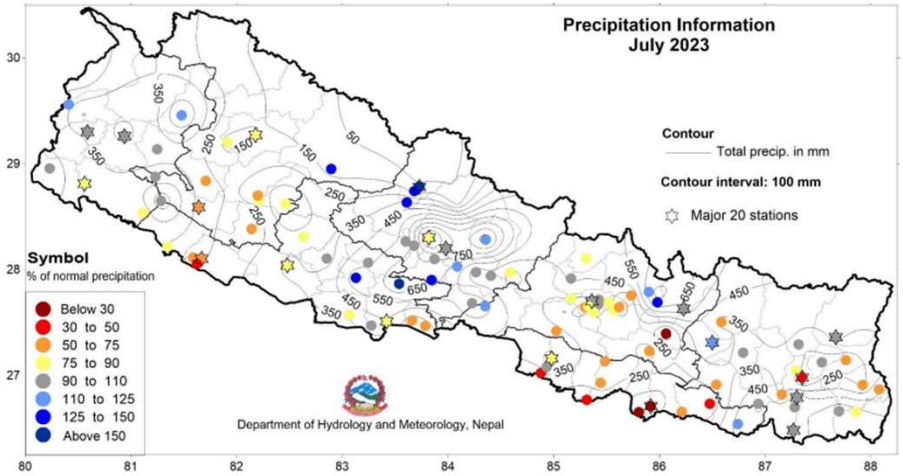


Figure 1: Precipitation in July 2023. Contour lines indicate the total precipitation in mm and coloured circles indicate the percentage of monthly normal precipitation at the meteorological stations.

Extreme Weather

1. Drought

Moderate to severe drought condition has been observed over large part of Madhesh Province, eastern part of Koshi Province, southern part of Karnali Province and isolated part of Bagamati Province and Lumbini Province in July. Manthali, Jaleshore and Janakpur Airport stations recorded below normal precipitation by 70% indicating extreme drought over the region (Annex 1). Similarly, Nepaljung, Birganj, Lahan, Dhankuta and Gaur stations recorded below normal precipitation by 50% indicating severe drought condition in this July. However, wet condition has been observed over large part of Gandaki Province.

Drought has been categorized based on the observed precipitation compared to normal. A drought is defined as moderate, severe and extreme as given in the table below.

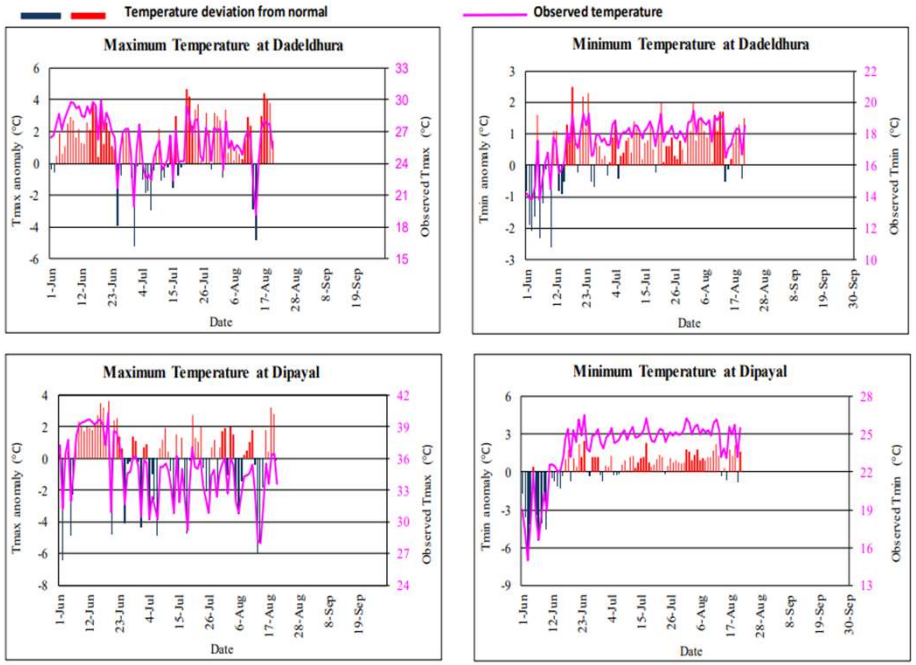
S.N.	Percentage of normal precipitation (%)	Drought category
1	50 - 75	Moderate drought
2	30 - 50	Severe drought
3	< 30	Extreme drought

Daily Temperature and Precipitation Monitoring

Government of Nepal
Ministry of Energy, Water Resource and Irrigation
Department of Hydrology and Meteorology
Climate Division (Climate Analysis Section)
Babarmahal, Kathmandu

21st August 2023

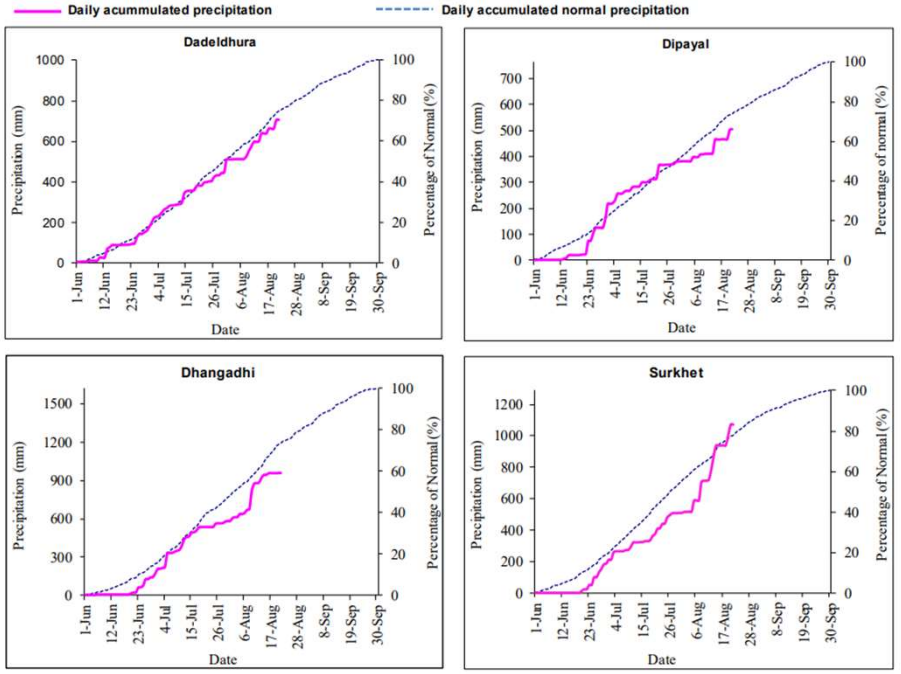
Monsoon (June-September, 2023) Temperature Monitoring



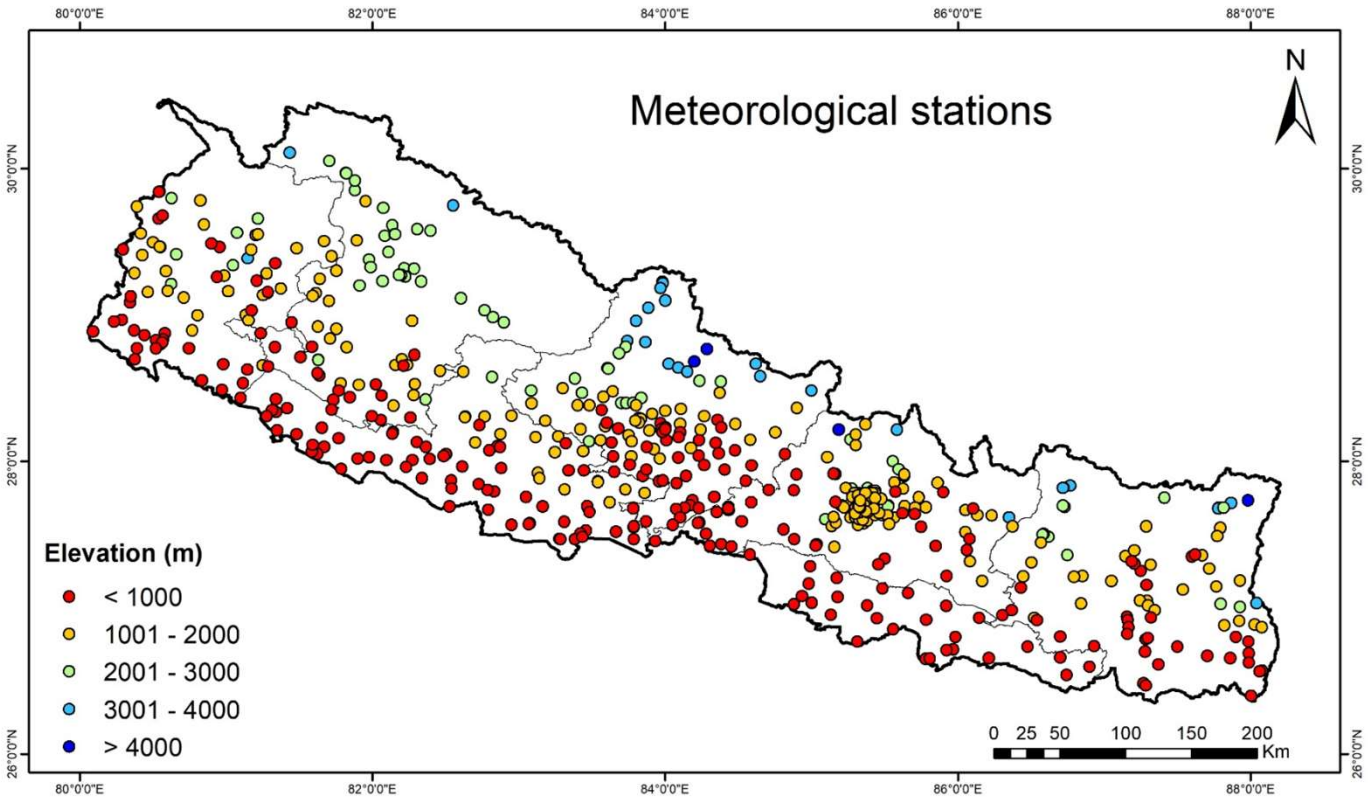
Government of Nepal
Ministry of Energy, Water Resource and Irrigation
Department of Hydrology and Meteorology
Climate Division (Climate Analysis Section)
Babarmahal, Kathmandu

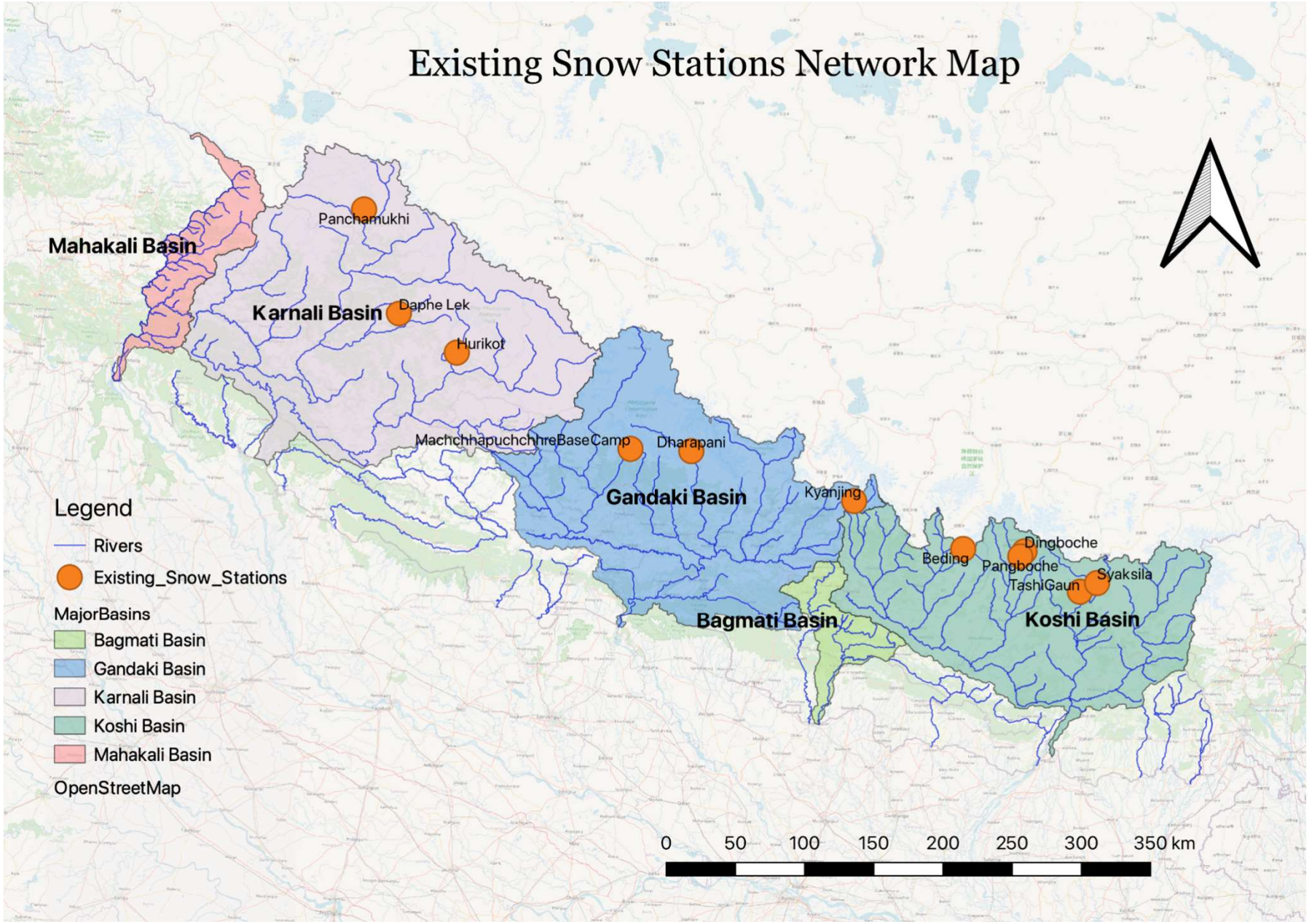
21stAugust 2023

Monsoon (June - September 2023) Precipitation Monitoring

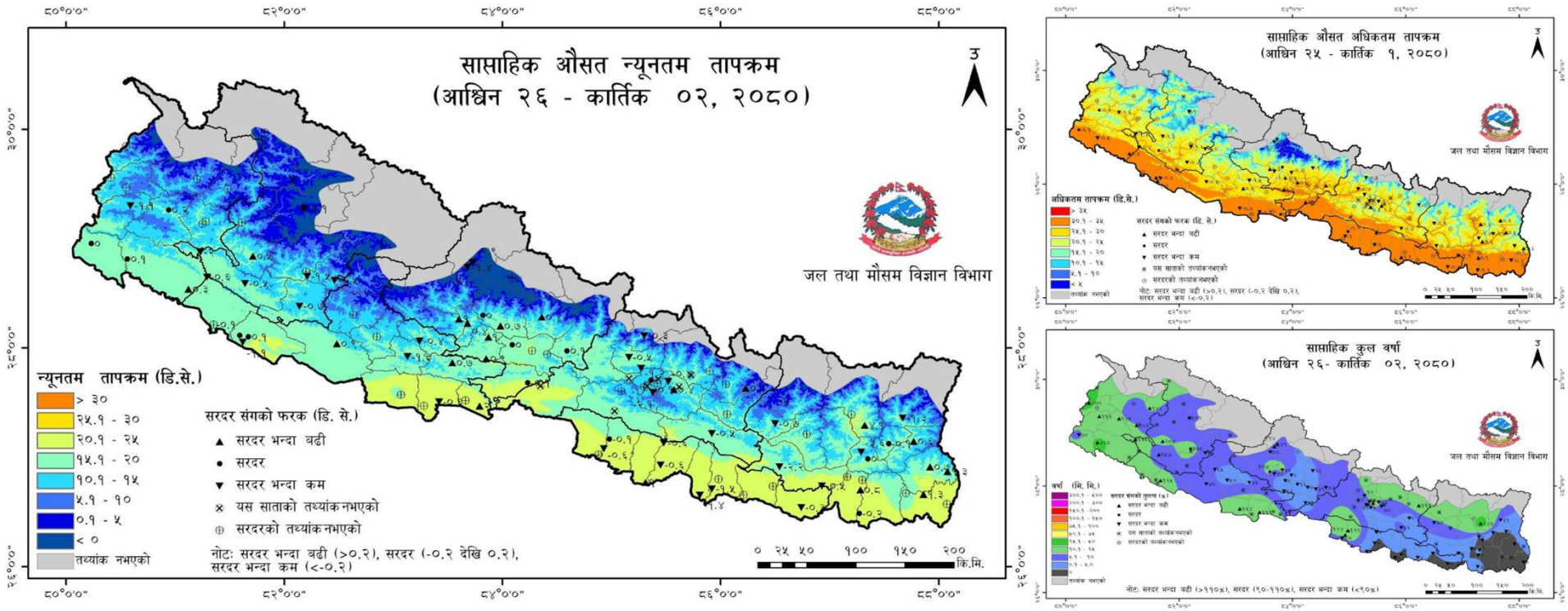


Meteorological Stations at various Elevations




Existing Snow Stations Network Map
Mahakali Basin
Karnali Basin
Gandaki Basin
Bagmati Basin
Koshi Basin
Panchamukhi
Daphe Lek
Hurikot
MachchhapuchchhreBaseCamp
Dharapani
Kyanjing
Beding
Dingboche
Pangboche
TashiGaun
Syaksila
Legend
Rivers
Existing_Snow_Stations
MajorBasins
Bagmati Basin
Gandaki Basin
Karnali Basin
Koshi Basin
Mahakali Basin
OpenStreetMap
0
50
100
150
200
250
300
350 km

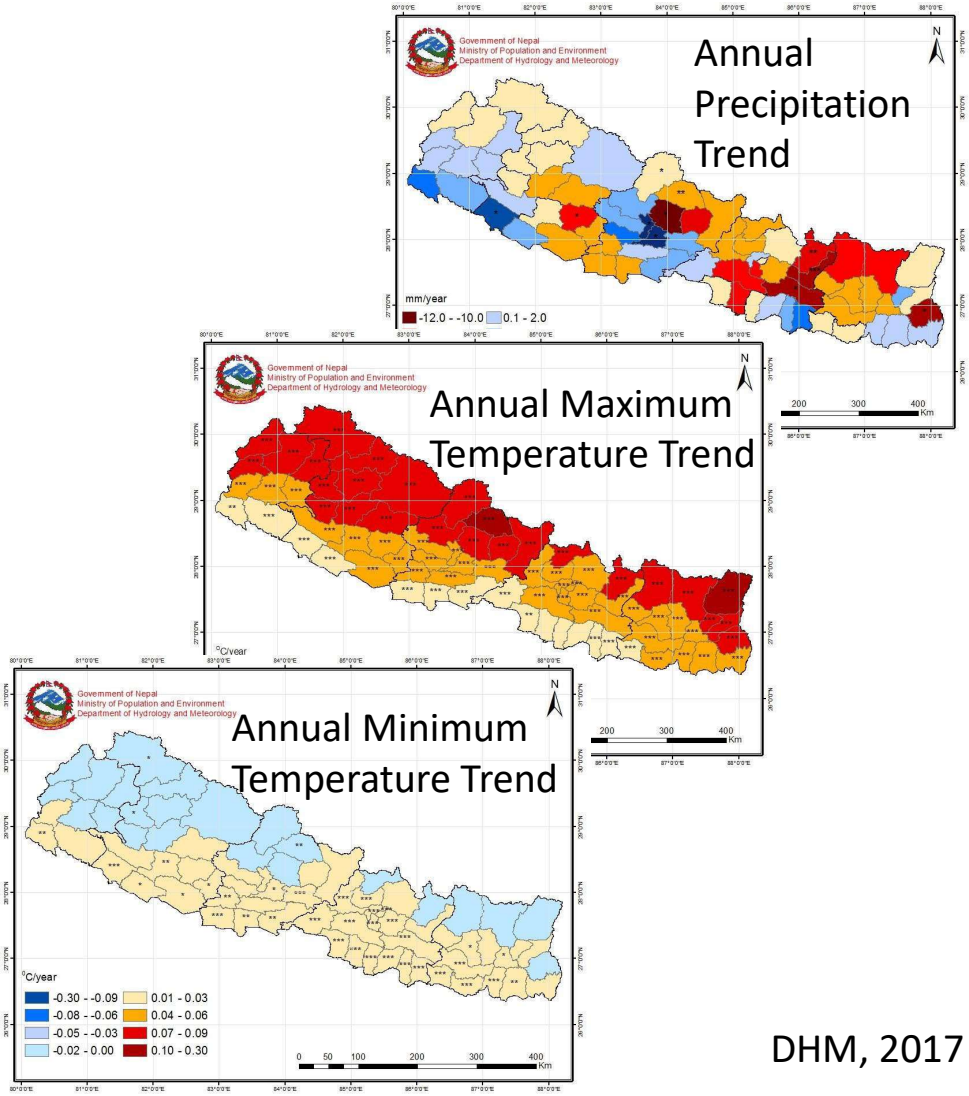
No climate data in high altitude region



PRECIPITATION AND TEMPERATURE TRENDS

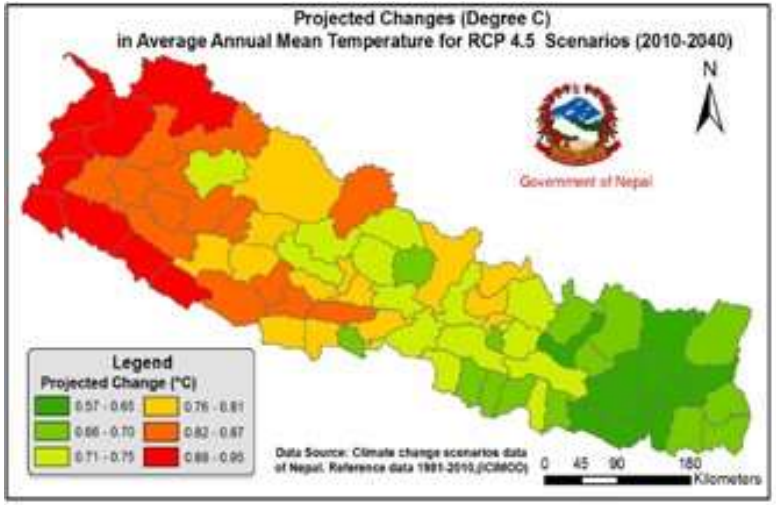
Physiographic Regions	Precipitation		Maximum Temperature		Minimum Temperature	
	α	Trend (mm/yr)	α	Trend (°C/yr)	α	Trend (°C/yr)
Tarai	0	0.49	***	0.021	***	0.018
Siwaliks	0	-1.48	***	0.03	***	0.016
Mid Mountain	0	-1.58	***	0.052	*	0.01
High Mountains	+	-3.17	***	0.068	0	-0.005
High Himalayas	+	-1.46	***	0.086	+	-0.015

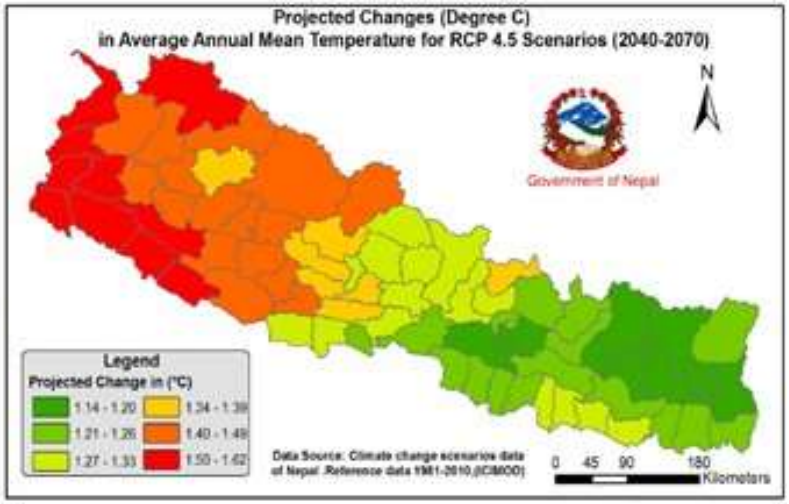
Significance level (α) : Significant: * 95% CL, ** 99% CL and *** 99.9% CL ; insignificant at 95% CL : + , 0

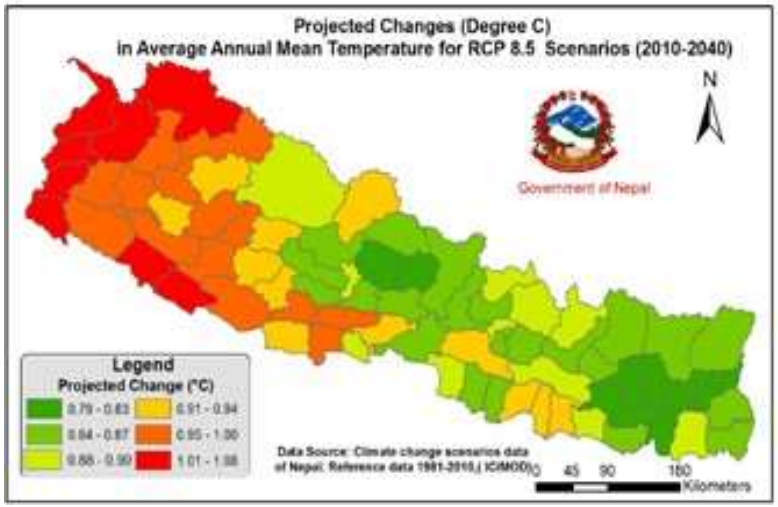


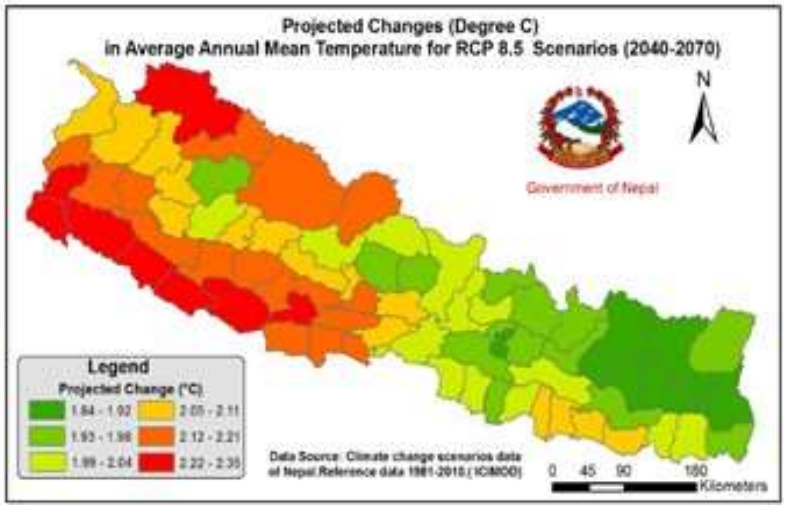
DHM, 2017

Projected Average Annual Mean Temperature





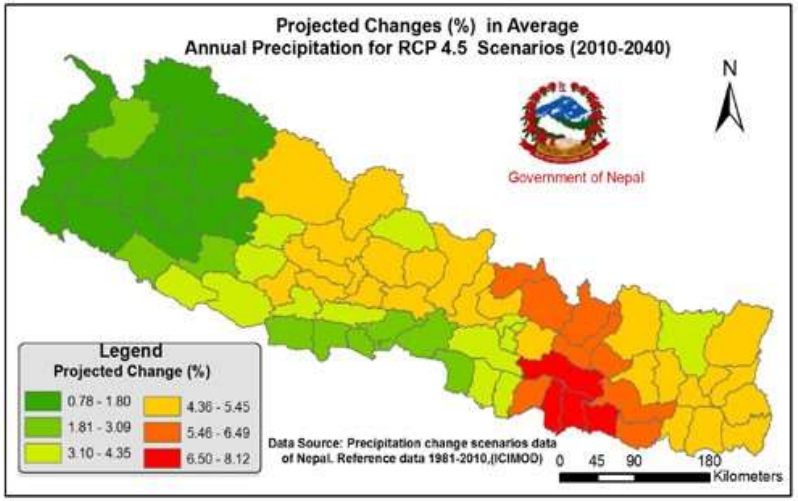


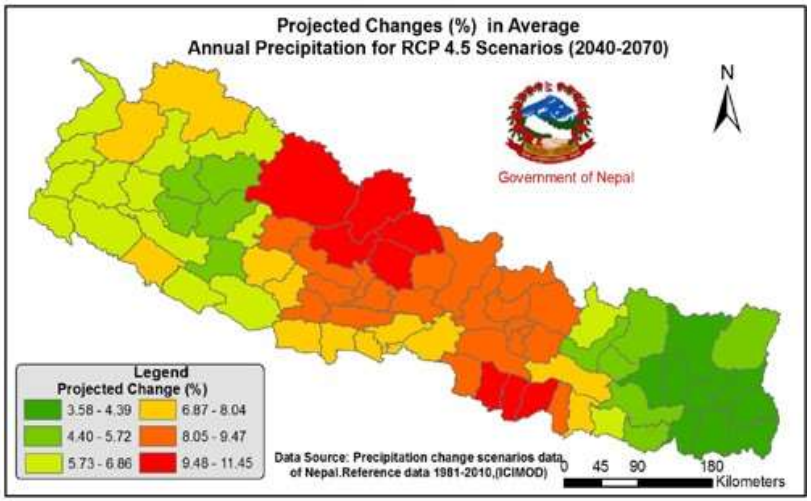


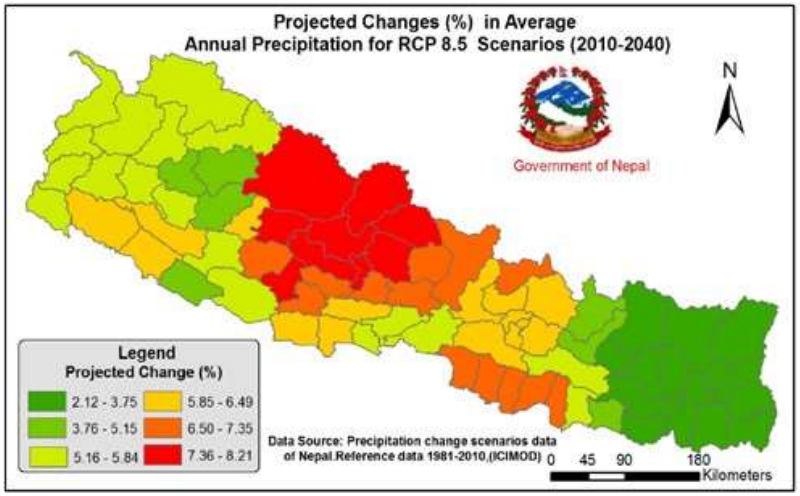
Mean of change in temperature in the medium- and long-term periods for Nepal compared to the reference period 1981-2010

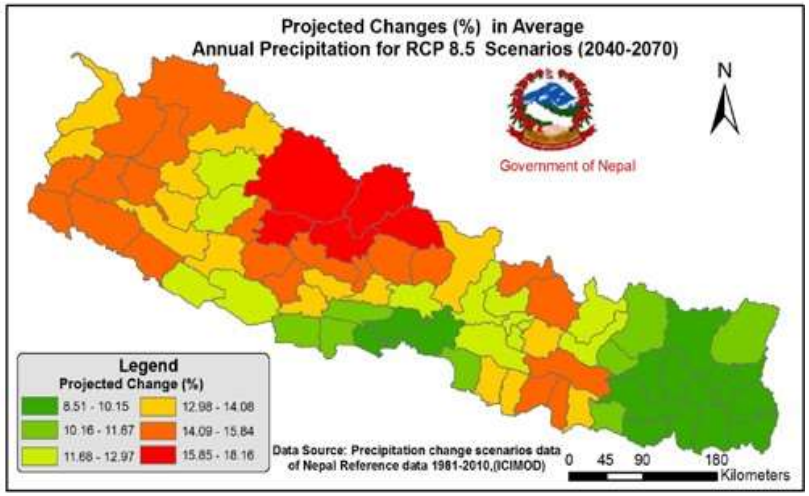
Scenario		Change in temperature (°C)
Medium-term (2016-2045)	RCP- 4.5	0.92
	RCP- 8.5	1.07
Long-term (2036-2065)	RCP- 4.5	1.3
	RCP- 8.5	1.82
End of the century (2071-2100)	RCP- 4.5	1.72
	RCP- 8.5	3.58

Projected Average Annual Rainfall









Mean of change in precipitation in the medium- and long-term periods for Nepal compared to the reference period 1981-2010

Scenario		Change in Precipitation (%)
Medium-term (2016-2045)	RCP- 4.5	2.1
	RCP- 8.5	6.4
Long-term (2036-2065)	RCP- 4.5	7.9
	RCP- 8.5	12.l
End of the century (2071-2100)	RCP- 4.5	10.7
	RCP- 8.5	23

Priority sectors for Climate Service Information

- Aviation
- Agriculture
- water
- Energy
- Health
- Disaster Risk reduction

Climate Product and Services

- Seasonal/Subseasonal Products
- Climate projections
- NFCS to be included in master plan and policy
- Coproduction of climate derived products,

Existing gaps and needs

- Research & product identification,
- limited resources
- Infrastructure
- Capacity Development

Thank you