Weather Synopsis –November 2020.

Intermonsoon condition was established over Sri Lanka during first week. Above or about normal rainfall was reported at most of the principal meteorological stations except Batticaloa, Colombo, Galle, Hambantota, Katugastota, Kurunegala, Maha Iluppallama, Mannar, and NuwaraEliya where below normal rainfall was reported for month of November (Fig 1). Further above normal rainy days were reported from most of the principal meteorological stations except Hambantota.

Below normal rainfall was reported from most of the hydro catchment stations except Ukuwela and Samanalawewa where above normal rainfall was reported.

Highest cumulative rainfall was 682.5 mm at Deniyaya. Highest rainfall received during 24hours, was 198.6mm at Alampil on 09th November.

Fairly widespread thunderstorm activity was reported from 04th to 05thand 08thdue to the formation of northeast southwest oriented trough over Sri Lanka at low levels. Showery conditions were enhanced in Anuradhapura, Trincomalee and Mallaitiv districts with isolated very heavy falls exceeding 150mm due to the presence of a dryline and low level convergence over aforesaid areas on 09th. Fairly widespread thunderstorm activity was reported during 3rd week. While propagating towards Tamilnadu coast, very severe cyclonic storm "Nisarga" skirt northern coast of Sri Lanka bringing strong winds and heavy falls exceeding 100mm over Jaffna peninsula from 23 to 26th. According to Disaster Management Center (DMC), several families were affected by strong winds due to weather systems and locally isolated strong winds probably associated with the downdrafts of cumulonimbus clouds (a downdraft is a small-scale column of air that rapidly sinks toward the ground often bringing strong winds) and heavy rain during November 2020 (Table 3).

The maximum temperatures as well as minimum temperatures were mostly above normal in most places during the month of November 2020. However below normal maximum temperatures were reported at some places on 10th, 16th and from 22nd to 25th of November while some stations such as Tricomalee, Mannar Badulla and Nuwara Eliya reported below average minimum temperatures on 22nd, 27th and

28th. The highest recorded maximum temperature was 36.4^oC at Polonnaruwa on 01st and the lowest recorded minimum temperature was 9.2 ^oC at Nuwara Eliya on 28th for the month of November 2020.

La Niña persisted during November, as indicated by well below-average sea surface temperatures (SSTs) extending from the Date Line to the eastern Pacific Ocean . Ocean Nino Index is -1.2duringSeptember October and November (NOAA Climate prediction Center). Neutral IOD condition was observed during November 2020 (BoM, Australia). Sea surface waters in tropical Indian Ocean are warmer than average (Fig. 5)

The average position of the shear line was laid between $04^{\circ}N50^{\circ}E$, $04^{\circ}N80^{\circ}E$ and $02^{\circ}S120^{\circ}E$. The average position of the Inter-Tropical Convergence zone (ITCZ) was laid between $01^{\circ}S50^{\circ}E$, $01^{\circ}S80^{\circ}E$ and $04^{\circ}S120^{\circ}E$ (Fig 4). Both shear line and ITCZ were fluctuated about 2° north and south of their average position .

Madden-Julian Oscillation (MJO) was weak during the first week, became strong at the phase 8 and 01 during the second week, propagated to phase 2 during 3rd week and weaken during the last week of November (Fig.6).

Weather Systems

October and November are the most vulnerable months for formation of Cyclonic disturbances over the north India Ocean(NIO). In November 2020, 3 cyclones formed over NIO (1 over the Arabian Sea and 2 over the Bay of Bengal). Out of the three (Nivar, Gati, Burevi), two (Nivar & Gati) intensified into very severe cyclonic storms. Further, out of the three, Nivar crossed Tamilnadu coast, Burevicrossed northeast coast of Sri Lanka and Gati crossed Somalia coast(Source : India Meteorological Department).

Very Severe Cyclonic Storm "GATI" over the Arabian Sea (21st – 24th November 2020)

A low pressure area formed over central parts of south Arabian Sea (AS) in the on 19th November. Intensified into a well marked low pressure area in the early morning (0000 UTC) on 21st. then concentrated into a depression over the same region in the midnight (1800 UTC) of 21st. Moving west-southwestwards, it explosively intensified into a deep depression in the early morning (0000 UTC) of 22nd and further into the cyclonic storm "GATI" at 0300 UTC, into a severe cyclonic storm at 0600 UTCand into very severe cyclonic storm in the afternoon (0900 UTC) over southwest Arabian Sea. It

reached it's peak intensity of 75 knots in the same evening (1200 UTC) over the southwest AS. Continuing to move westwards, it crossed Somalia coast near latitude 10.45°N and longitude 51.10°E between 1400 and 1500 UTC of 22nd as a very severe cyclonic storm with estimated wind speed of 130-140 kmph gusting to 155 kmph.

The salient features of GATI are rapid intensification from depression to VSCS within 18 hours (25 knots to 75 knots) and rapid movement with a speed of about 40-45 kmph (Source : India Meteorological Department).

Very Severe Cyclonic Storm "NIVAR" in Bay of Bengal (21st to 27th November)

A Low Pressure Area (LPA) formed over Equatorial Indian Ocean (EIO) and adjoining central parts of south Bay of Bengal (BoB) on 21st Novemberintensified into a Well Marked Low Pressure Area (WML) over southwest & adjoining southeast Bay of Bengal on 22nd November, then concentrated into a depression over the same region in the early at 2100 UTC on 22nd. Mving in west-northwestward direction, it has further intensified into a deep depression in the evening of 23rd and further into the cyclonic storm "NIVAR" in the early morning at 0000 UTC on 24th, then intensified into a severe cyclonic storm in the midnight (2330 hrs IST / 1800 UTC) of 24th and into a very severe cyclonic storm at 0900 UTC of 25th and crossed Tamilnadu & Puducherry coasts near Puducherry (near lat. 12.1°N and long. 79.9°E) between 1800 UTC and 2100 UTC on 25th to 0230 IST of 26th as a very severe cyclonic storm with estimated wind speed of 120 kmph gusting to 135 kmph (Source : India Meteorological Department).

Formation of Depression in EIO and adjoining southeast BoB

A low-pressure area has developed over the southeast Bay of Bengal on 28th November. It has intensified into a depression on 30th November and the system later intensified into cyclonic storm "Burevi".



Fig 1: Monthly Total Rainfall(mm) with 30 years (1961-1990) of their averages at Main Meteorological stations areas during November 2020



Fig 2: Monthly Total Rainfall(mm) with 30 years (1961-1990) of their averages at Hydro catchment areas during November 2020



Fig 3: monthly total no of rainy days with 30 years (1961-1990) of their averages at main Meteorological stations during November 2020



Fig 4: Ocean Surface Winds and Ocean Surface Temperature for November 2020



Fig 5: Sea Surface Temperature anomalies for November 2020



(RMM1,RMM2) phase space for $1 \cdot Nov$ -2020 to $30 \cdot Nov$ -2020

Fig 6: Phase diagram of MJO Index

Surface pressure and winds:The surface pressure was about or above average except from 10th to 18th and 24th to 27th when it was below average. Pressure distribution was even or fairly even during most of November except 02nd, 23rd and 25th when mild pressure gradient was observed and from 24th and 26th when moderate pressure gradient was observed.

The surface wind was calm and variable in direction during most of November month.

Upper winds:

At 850hPa, Northeasterly wind flow is dominated over the island. East-west oriented trough is appeared to the South of Sri Lanka. Anomalous southeasterly wind component is appeared over Sri Lanka at 850mb level (Fig 7).

At 700 hPa, Easterly wind flow is dominated over the island. East-west oriented trough is appeared to the South of Sri Lanka. Anomalous southeasterly wind component is appeared over southeast of Sri Lanka at 700mb level (Fig 8).

At 500 hPa, Easterly wind flow is dominated over the island. Anomalous cyclonic circulation appeared over Sri Lanka providing favourable conditions for formation of thunderstorms.

The 200 hpa the upper tropospheric ridge was laid from 12°N40°E, 14°N60°E, 15°N80°E, and 18°N120°E



Fig. 7 Monthly average wind pattern at 850hpa level during the month of November 2020 (JRA55)



Fig. 8 Monthly average wind pattern at 700 hpa level during the month of November 2020 (JRA55) 500 hPa Mean wind for November 2020 500 hPa Wind Anomaly for November 2020



Fig. 9Monthly average wind pattern at 500hpa level during the month of November 2020 (JRA55)

Temperature Field:

The maximum temperatures in the day were mostly above normal in most places during the month of November 2020. However below normal maximum temperatures were reported at some places on 10th 16th and from 22nd to 25th of November (Fig.10). Highest recorded maximum temperature for the month of November 2020 was 36.4^oC at Polonnaruwa on 01st (Table4a).

Night minimum temperatures over most parts were above normal during the month (Fig 11). However some stations such as Tricomalee, Mannar Badulla and Nuwara Eliya reported below average minimum

temperatures on 22nd, 27th and 28th. Lowest recorded minimum temperature for the month of November 2020 was 9.2 ^oC at Nuwara Eliya on 28th (Table 4b).



Maximum and Minimum departures from normal day/night temperature were shown in table 4.

Fig 10 Maximum Temperature anomaly (⁰C) for November 2020



Fig 11 Minimum Temperature anomaly (°C) for November 2020

Above or about normal rainfall was reported at most of the principal meteorological stations except Batticaloa, Colombo, Galle, Hambantota, Katugastota, Kurunegala, Maha Iluppallama, Mannar, and NuwaraEliya where below normal rainfall was reported for month of November (Fig 1). Maximum percentage was reported from Bandarawela (150.5%) while minimum from Pottuwil station (34.3%) (Table 2).

Further above normal rainy days were reported from most of the principal meteorological stations except Hambantota.

Below normal rainfall was reported from most of the hydro catchment stations except Ukuwela and Samanalawewa where above normal rainfall was reported.

Highest cumulative rainfall was 682.5 mm at Deniyaya. Highest rainfall received during 24hours, was 198.6mm at Alampil on 09th November.

The monthly total rainfall and the number of rain days at the principal meteorological stations, total rainfall at hydro catchment areas, are shown in tables 1 and 2.

	Monthly Total rainfall(mm)		Monthly Total No of rainy Days			
Meteorological station	2020-Nov	Average	%	2020-Nov	Average	%
Anuradhapuraya	306.4	229.7	133.4%	21	16	131.3%
Badulla	293.1	253.0	115.8%	23	18	127.8%
Bandarawela	337.6	224.3	150.5%	24	16	150.0%
Batticaloa	284.5	349.6	81.4%	18	16	112.5%
Colombo	142.0	414.4	34.3%	17	15	113.3%
Galle	238.3	321.0	74.2%	16	16	100.0%
Hambantota	101.5	187.5	54.1%	10	13	76.9%
Jaffna	370.9	336.1	110.4%	24	14	171.4%
Monaragala	280.1			23		
Katugastota	135.7	295.6	45.9%	20	16	125.0%
Katunayake	309.8	313.7	98.8%	15	14	107.1%
Kurunegala	262.2	318.6	82.3%	16	15	106.7%
Maha Iluppallama	183.2	250.4	73.2%	21	16	131.3%
Mannar	151.8	235.0	64.6%	13	14	92.9%
Polonnaruwa	284.0	308.6	92.0%	19	13	146.2%
Nuwara Eliya	109.2	221.7	49.3%	21	17	123.5%
Poothuvil	229.2	232.0	98.8%	17	na	
Puttlam	354.8	250.3	141.7%	20	14	142.9%
Rathmalana	317.0	314.7	100.7%	18	16	112.5%
Rathnapura	433.7	371.4	116.8%	21	18	116.7%
Trincomalee	466.7	342.9	136.1%	22	16	137.5%
Vavuniya	251.9	278.2	90.5%	17	16	106.3%
Mattala	208.5			19		

Table 1 :The monthly total rainfall and the number of rain days at the principal meteorological stations

Table-02-Monthly Total Rainfall (mm) with 30 years (1961-1990) of their averages at Hydro catchment areas

Hydro Catchment	Nov2020	Average	% (percentage of average)
Castlereigh	142.2	276.4	51.4%
Norton	168.9	350.5	48.2%
Maussakele	161.8	275.8	58.7%
Canyon	152.8	299.8	51.0%
Laksapana	221.7	390.6	56.8%
Kotmale	220.3	253.1	87.0%
Victoriya	199.9	261.8	76.4%
Randenigala	205.2	315.0	65.1%
Bowatenna	200.0	450.8	44.4%
Ukuwela	267.6	272.1	98.3%
Samanala Wewa	517.0	342.4	151.0%
Maskeliya	245.7	261.4	94.0%
Neboda		397.8	

Note that the meteorological day in this text is reckoned as the 24hr period from 08.30hrs to 08.30hrs following day

Table-02- total rainfall and the number of rain days at the principal meteorological stations recorded in the month against the respective averages (1961-1990).

able 3	hazards caused duringNovem	ber 2020	
Date	Lightning	Strong Winds and Heavy Rain	Cutting
			failure
01	Dimbulagala	EmbilipitiyaVerugal	
02	Bibila	Badulla Monaragala Rathnapura Muthur	
03	Kalawana Ruwanwella	Thanamalvila Medagama Embilipitiya	
	MawanellaKatuwana	PemadullaMawanellaWeeraketiyaWalasmulla	
	Walasmulla		
04	Rideemaliyadda	Haldummulla RideemaliyaddaKiriella	
	Akurana	Uwaparanagame Weligepola Bulathkohupitiya	
		Galigamuwa Akurana Delthota	
05	DehiovitaWarakapola	KahawaththaKiriella Ruwanwella Dehiovita	
	Galigamuwa Medirigiriya	Rambukkana Kegalla Medirigiriya Pujapitiya	
		Gangaihalakorale	
06	Mawanella Dehiovita	Welimada Passara	
		DehiovitaYatiyantotaMahawewaPasbage Korale	
07	Beliatta	Mawanella KatuwanaAmbalanthota Beliatta	
		Gangawatakorale Pathadumbara	
08	Beliatta	Beliatta Nawagattegame Tumpane Kolonnawa	
09	PemadullaThangalle	Seruwila Minipe Welimada Badulla Kalawana	
	C C	PemadullaKahawaththaNivitigala Welioya	
		WeeraketiyaTissamaharamaya	
		SuriyawewaMahawewaPuttalama	
10		Kahawaththa	
11		Nikaweratiya Kotawehera Poojapitiya	
		Akurana Harispattuwa PelmadullaUdunuwara	
12		PolgahawelaHatharaliyadda	
13		Yatinuwara	
14		Kuliyapitiya West Walapane Kolonna	
14	Mahawewa	Angunukolapelessa Katuwana Beliatta	
		Nawagatthegama GomarankadawalaGodakawela	
15	Eheliyagoda	Nallur Kopay Tangalle AnamaduwaGanga Ihala	
	Nivithigala	Korale Udunuwara Ududumbara Kolonna	
16		Tellippalai Point Pedro SandilipayWeeraketiva	
		Tangalle SooriyawewaKalpitiya Akurana	
		Harispattuwa Udunuwara Godakawela Weligepola	
		Opanayake KiriellaWalapane	
17	Hambantota	Karaveddy Sooriyawewa	
		WanathawilluwaUdunuwara	
18		Kayts Thumapane	

Table 3hazards caused duringNovember 2020

19	Deltota
21	Haaliela Minipe
22	Meegahakiula UdunuwaraAkurana
23	Pointpedro Beleatta Thamankaduwa Minipe
	Kinniya Morawewa
24	Pointpedro Kayts Karainagar Karaveddy
	Chankanai Kandawalai Karainagar Tellippalai
	KopayGanga Ihala Korale HatharaliyeddaDeltota
	Thambalakakam
25	Pointpedro Tellippalai Uduvil Maruthankerny
	Manmunaipattu Maritimepattu Karaveddy
	Kayts Chavakachcheri KopayKanthale Delft
	Minipe
26	Pointpedro Uduvil ChavakachcheriKopay
	Seruwila Poonakary KaytsNallur Delft
	Sandilipayjaffna Velanai
27	Pointpedro Nallur Delft Morawewa
	Karachchi Poonakary
28	Kuchchaveli
29	Tellippalai

Table 4(a) - Extremes of Maximum Temperatures			November	2020
	Maximum			
		Offsets		Highest
	Value	(-)	(+)	Std.Div
Value	36.4 ^o C	4	5.2	2.41
Station	Polonnaruwa	Anuradhapuraya	Maha Iluppallama	Vavuniya
Date	01/11	23/11	03/11	
Table 4(b) -Extremes of Minimum Temperature November 2020				
	Minimum			
		Offsets		Highest
	Value	(-)	(+)	Std.Div
Value	9.2C	3.2	3.9	1.17
Station	NuwaraEliya	Trincomalee	Kurunegala	NuwaraEliya
Date	28/11	28/11	02/11	

Prepared by National Meteorological Centre (NMC)