

# ADRiMP

*Association for Disaster Risk Management Professionals*

## COVID-19

Coronavirus Disease 2019

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## COVID-19 Preparedness: National to Local Engagement with the Focus on DRR Principles

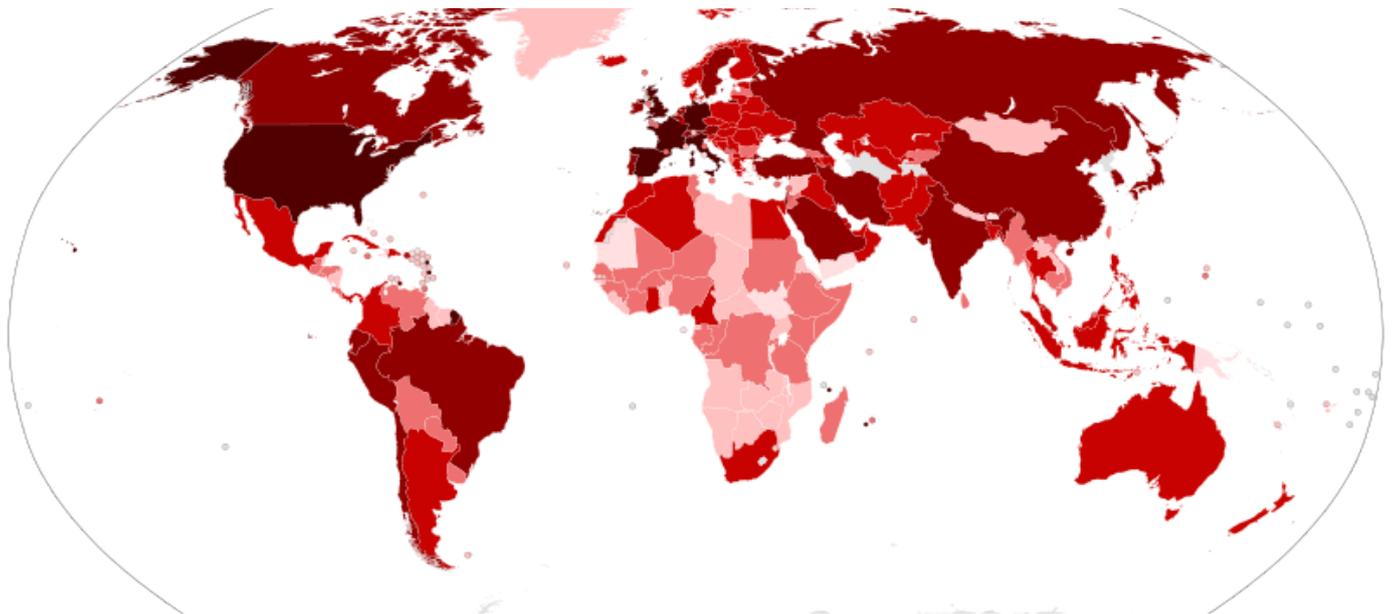
The ongoing COVID-19 outbreak is an unprecedented event in modern human history. The UNDRR (United Nations Office for Disaster Risk Reduction) Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) [1] highlights biological hazards, such as the COVID-19 pandemic, as a major risk for the 21st century. While the World Health Organisation has declared COVID-19 a pandemic, its underlying factors, vulnerabilities and impacts go far beyond the health sector. It is, in fact, an example of systemic risk: when a hazard leads not only to negative effects in parts of the system but also threatens the failure of the entire system. With its cascading and devastating impacts, COVID-19 demonstrates the interconnected nature of risks, highlighting the urgent need for a concerted global effort to accelerate risk reduction activities [2].

Asian countries that started to feel tentative hope that their responses to the coronavirus pandemic have been effective in mitigating their impact, are now facing possible second waves. Preparedness and planning the response where there is no community transmission to date is the key. In responding to the crisis today, we must learn the lessons of yesterday, so countries are better prepared for the days to come. It is clear the world needs a quantum shift in the approach and architecture in pandemic preparedness [4]. National and local governments need to focus on pre-outbreak and outbreak planning, with the most successful preparedness and response plans to have exit strategies and recovery plans in mind.

Like with many other countries, Sri Lanka too is facing the ongoing viral pandemic of coronavirus disease 2019 (COVID-19). As of 14 April 2020, 219 confirmed cases have been reported in the country with 7 deaths. As of 23 March, forty-five quarantine centres have been built in the country as a preventive measure to tackle the coronavirus pandemic. Nearly 3,500 people have been under quarantine in these 45 quarantine centres. Sri Lankan authorities have tracked down over 44,000 people who had contacted the identified patients and had ordered self-quarantine for such people.

The pandemic preparedness has to be holistic, moving towards national to local resilience that integrates public health and disaster risk management with primary responsibility being health care facilities, front line health staff, and their safety, and also incorporating other functions such as supply chain management, transport planning, resource mobilization, and early recovery planning. There needs to be emphasis for resilient and adaptive health care system. This is core to the pandemic planning and preparedness, together with adequate risk communication, risk perception and risk-informed behaviour of communities at risk [3].

A latest report on DRR and COVID-19 links, identify the following recommendations: Prepare inclusive early recovery plans; identify the most vulnerable and include them in recovery packages; and strengthen community-level preparedness and response methods for pandemic risk assessments, learning from community-based DRR. These recommendations indicate that there need to be guidance and tools developed, and then disseminated to strengthen incorporation of biological hazards in national and local DRR planning, prevention, preparedness and risk management measures into UN Sustainable Development Cooperation Frameworks and joint work plans.



COVID-19 as a biological disaster, there needs to be a better understanding on: how risk works - especially how risk cascades with unexpected consequences and how to build capacities to manage this, and how to prepare for early and better recovery that prevents the emergence of new risk with early and rapid actions from the DRR-related organisations, in line with the SFDRR's call for building resilience for biological hazards and pandemics. Further recommendations include: Awareness raising on the need to incorporate biological hazards planning and preparedness at both national and local level of disaster management planning, so that national and local disaster management agencies will include health preparedness planning in the discussion on disasters as a top priority, alongside earthquakes, floods, storms, and other natural hazards; Awareness raising on the importance of a systemic approach where one risk transform into another, exposing and exacerbating existing vulnerabilities; and multi stakeholder perceive in preparedness planning towards pandemics, which will enable collective examination of impacts, coordination of fiscal, monetary, and social measures and sharing best practices and the lessons learned.

The only solution is prevention. Prevention saves lives. pandemic is global but its prevention and preparedness is local. Mechanisms and strategies for disaster resilience, as outlined in the SFDRR, can enhance preparedness for early and better recovery that prevents the emergence of new risks to epidemics or global pandemics such as COVID-19.:

References:

- [1] Sendai Framework for Disaster Risk Reduction (2015-2030) (2015), United Nations
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- [3] Shaw, R. (2020), "Resilience of local governments: A multi-sectoral approach to integrate public health and disaster risk management", UNDRR-WHO Webinar, April 7, 2020
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- [5] Djalante, R. Shaw, R. & DeWit, A. (2020), Building resilience against biological hazards and pandemics: COVID-19 and its implications for the Sendai Framework, Progress in Disaster Science, Invited Viewpoint, <http://dx.doi.org/10.1016/j.pdisas.2020.100080>

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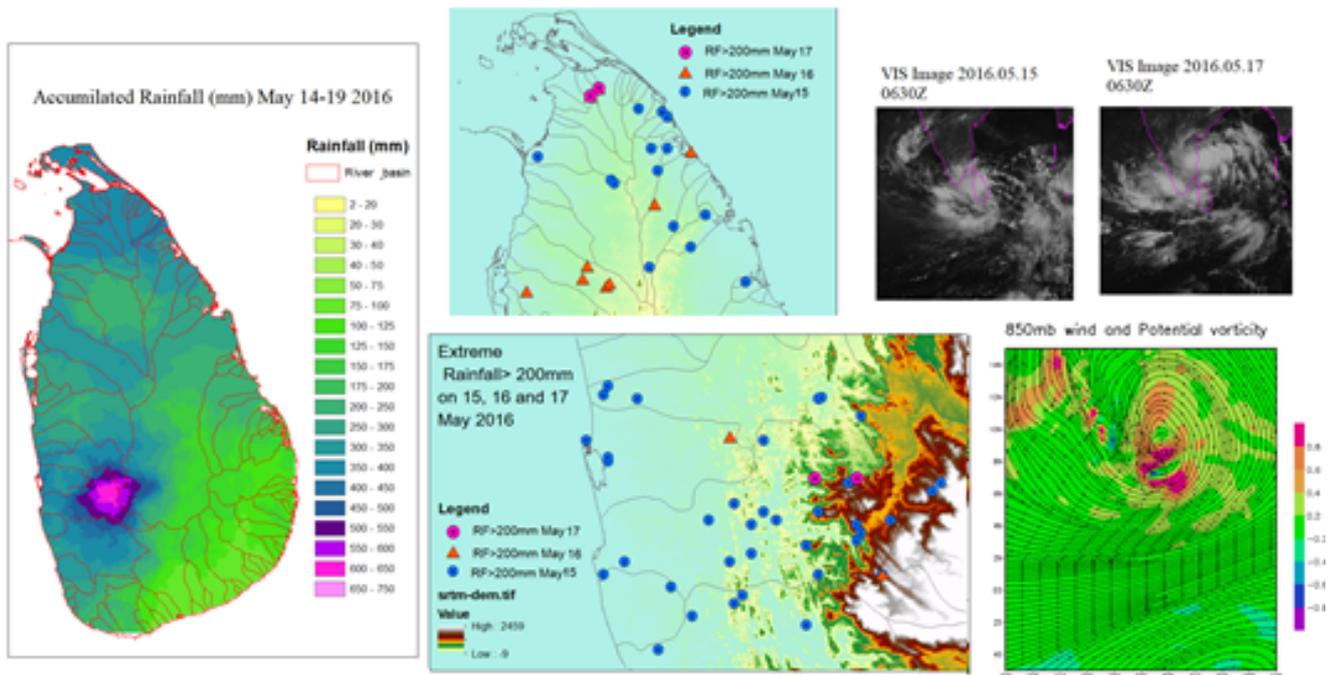
## Comparison of Three Extreme Rainfall Events in May 2016, 2017 and 2018



Southwest Monsoon contributes almost 30% of the total annual rainfall of Sri Lanka while western slopes of central hills receive 60-65% of the annual rainfall from Southwest Monsoon. Seasonal to inter-annual variability of monsoon rainfall, both in amount and distribution, often results in severe droughts or floods, with large-scale impacts on agriculture, infrastructure, economy and livelihoods in the South-Western parts of Sri Lanka. In May 2016 and 2017, 2018 parts of Sri Lanka were hit by heavy rainfall events, which caused severe floods and also horrific landslides posing a significant threat to the economic and social development in Sri Lanka.

Under prevailing COVID-19 pandemic, extreme rainfall events leading to floods and landslides will be a nightmare scenario for a society already dealing with huge challenges of a disrupted social-economic structure with the current lockdown. Here we would like to summarize the extreme rainfall events that occurred with the onset of the Southwest Monsoon in 2016, 2017 and 2018.

## 2016 May Flood/Landslide Event



**Figure 1: Accumulated Rainfall from 14-19 May 2016. Locations of extreme rainfall occurred on 15, 16 and 17 May 2016. Low level circulation (streamlines) averaged from 15-17th May 2016. Visible Images on 15 May 2016 at 0630Z and 17 May 2016 at 0630Z.**

- A low level disturbance initiated in Southwest Bay of Bengal on 10th May intensified to a low pressure area on the 14th and lay over Sri Lanka and adjoining Southwest Bay of Bengal (BoB) from 15th to 16th May, bringing extremely heavy rainfall over most parts of the island (Fig 1).
- This system deepened to a depression and then into a cyclonic storm 'Ronu' over West Central BoB on 19th enhancing South-westerly wind flow over Sri Lanka, bringing heavy rainfall along the western slopes of the Central Hills over Kelani River Basin (Fig 1), severely inundating densely populated downstream areas.
- The Inter tropical Convergence Zone (ITCZ), was in the vicinity of Sri Lanka.



## 2017 May Flood/Landslide Event

- A spell of extreme heavy rain associated with the onset of the Southwest Monsoon, induced by a low pressure area in the south central Bay of Bengal, caused severe flooding in southwestern Sri Lanka, during the fourth week of May 2017.
- A low level disturbance that developed in the southeast BoB on 22nd and moved in north-westerly direction, intensified in to a low pressure area on 25th May and later developed in to the tropical cyclone "Mora", which made landfall over Bangladesh on 30th May 2017.
- Floods and landslides caused 213 deaths while 77 people were reported missing (ADRC).
- The most intense and heaviest rain spell exceeding 500mm was confined to a relatively smaller area over the southern slopes of the Sabaragamuwa Rakwana Hills (Fig. 2) on 25th May with a formation of a cluster of convective cells induced by the low pressure system.
- As the intense rain fell over an area where Nilwala, Gin and Kalu rivers and streams originate, downstream areas of these rivers and streams were inundated.
- The Inter tropical Convergence Zone (ITCZ), was in the vicinity of Sri Lanka.

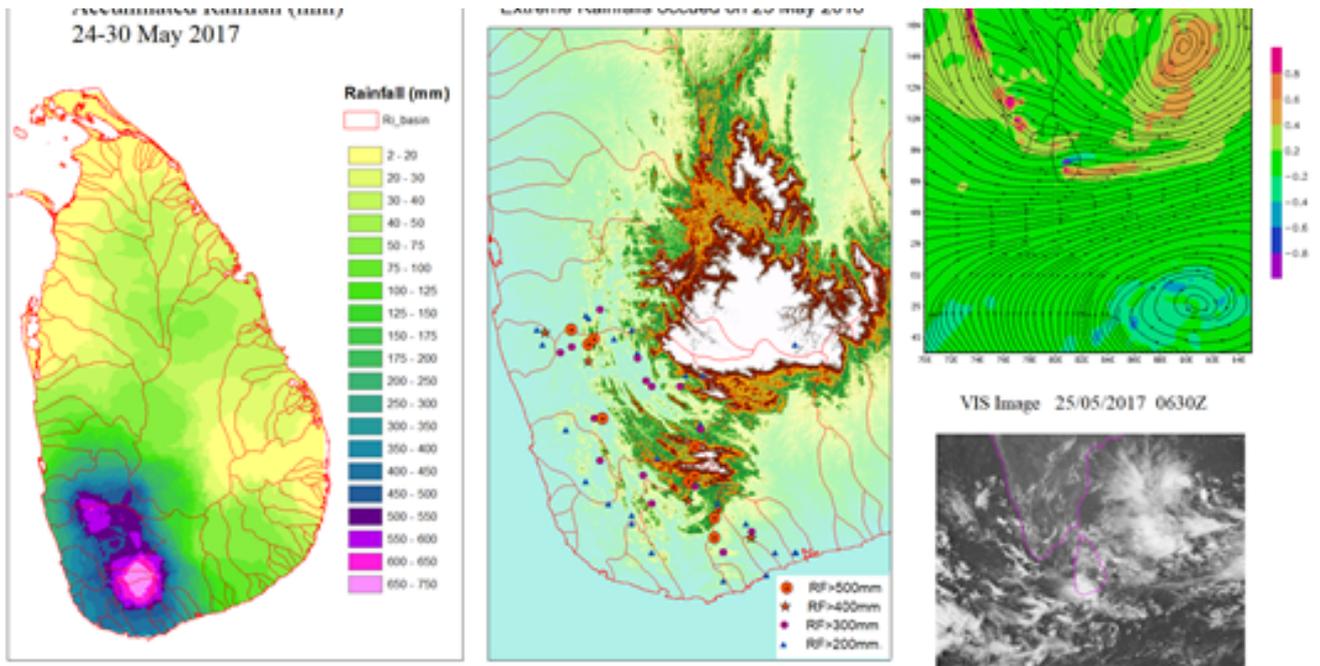


Figure 2: Accumulated Rainfall from 24-30 May 2017. Locations of extreme rainfall occurred on 25 May 2017. Low level circulation (streamlines) averaged from 24-28 May 2017. Visible Image on 25 May 2017 at 0630Z.

### 2018 Flood Event

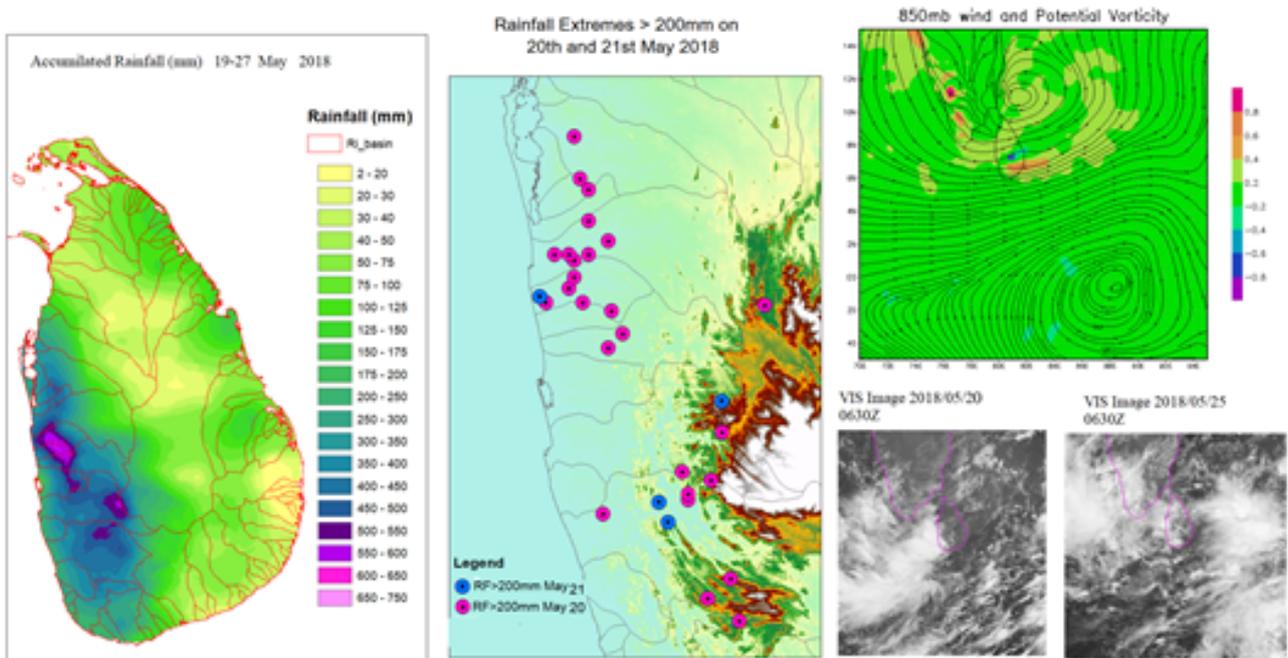


Figure 3: Accumulated Rainfall from 19-27 May 2018. Locations of extreme rainfall occurred on 20-21 May 2018. Low level circulation (streamlines) averaged from 19-25 May 2018, Visible Images on 20 May 2018 at 0630Z and 25 May 2018 at 0630Z.

- Low level disturbance to north east of Sri Lanka, and ITCZ located over Sri Lanka provided favourable condition to develop extreme rainy conditions over western parts of Sri Lanka (Fig 3).
- Very heavy downpours exceeding 200mm fell over Mi Oya, Deduru oya and Maha Oya river basins on 20th and 21st May 2018 (Fig 3). Isolated very heavy rainfalls also occurred over western slopes of Central Hills as well as southwestern slopes of the Rakwana Mountain Range.

## Common Meteorological Conditions that Appeared in All Three Events

### 1 Inter Tropical Convergence Zone (ITCZ)

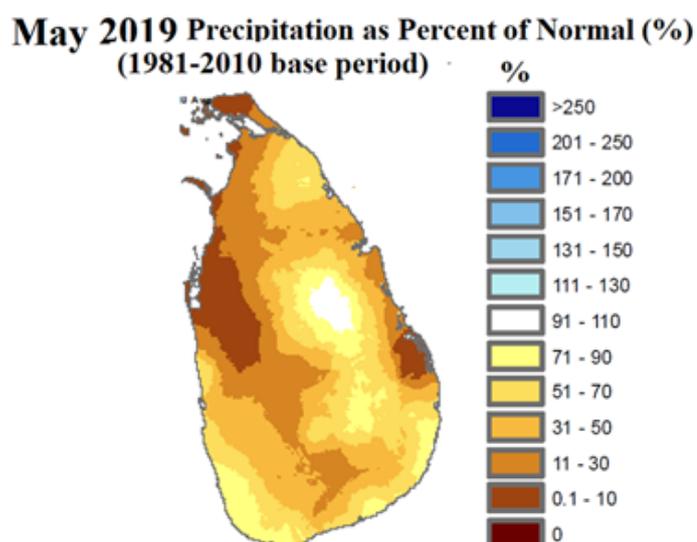
- The Inter tropical Convergence Zone, known also as the doldrums or ITCZ, is the main focal point for showers and thunderstorms in the tropics.
- The reason for this is that north-easterly trade winds to the north of the ITCZ meet south-easterly trade winds from the south.
- The piling up of air near the surface due to the converging winds forces the warm, humid air over the tropical oceans to rise (N. Jeyadharushan and V. Nandakumar, 2012).
- During the three events ITCZ was in the vicinity of Sri Lanka.

### 2 Low level disturbance over Southwest Bay of Bengal

- All 3 extreme rainfall are characterized by association with the formation of low-pressure areas/depressions in the southwest/central Bay of Bengal and lower tropospheric vortices in the vicinity of Sri Lanka.
- However, the location of low level disturbance differed at each event producing extreme rainfall over different locations such as Western slopes of central hills and northern part of Sri Lanka (2016 event); Southwest slopes of Rakwana/Sabaragamuwa mountain range (2017); and low lying areas in northwestern parts (2018).
- Further, in 2016 and 2017, the flood events are associated with initiation of low level vortex in the vicinity of Sri Lanka, which later developed in to a tropical cyclone (Ronu (2016)) or severe cyclonic storm (Mora, 2017). Unlike extreme rainfall associated with tropical cyclones, extreme rainfalls associated with initial low level vortex is very difficult to predict due to the disorganized structure of the weather system at the formation stage. Further, the complex nature of topography of southern and Central Hills also aggravates the uncertainty of the prediction.

## What Happened in May 2019?

- May 2019 received well below average rainfall over entire Sri Lanka (Fig 4).
- However a tropical disturbance, which later developed in to the tropical cyclone 'Fani' formed over Southeast BoB on 26th April 2019. This system intensified in to a depression and moved to south west BoB on 28th April bringing dry northerly north-westerly wind flow at 850 mb level and north-easterly wind flow at 700 mb level across Sri Lanka (Fig 5).
- As low level mean wind, which flowed over the north Indian ocean region during latter part of April 2019 was dominated by easterly winds during the formation of this tropical disturbance, unlike 2016, 2017 and 2018 events, strengthening of south westerly wind flow over Sri Lanka was not evident (Fig 5).
- Accumulated rainfall derived from Climate Hazards Group Infra-Red Precipitation with Station data (CHIRPS) rainfall data from 28th to 29th April was limited to 25 mm over south-western parts of Sri Lanka (Fig 5).
- Tropical cyclone Fani made landfall on Puri, Odisha on 3rd May. There was no tropical disturbance formed over BoB during rest of May 2019.



*Figure 4 : May 2019 monthly rainfall as a percentage (%) of climatology of May rainfall (1981-2010 base period)*

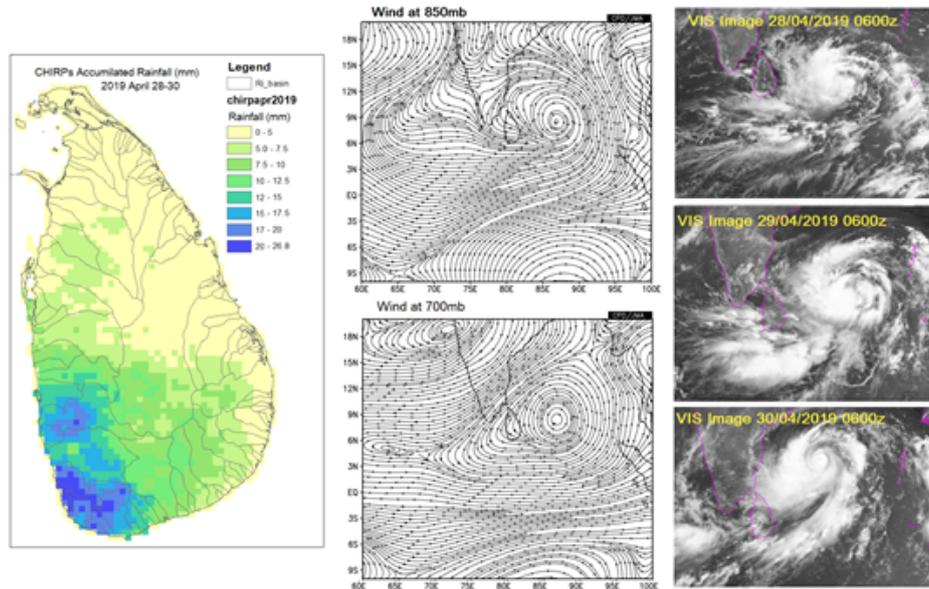
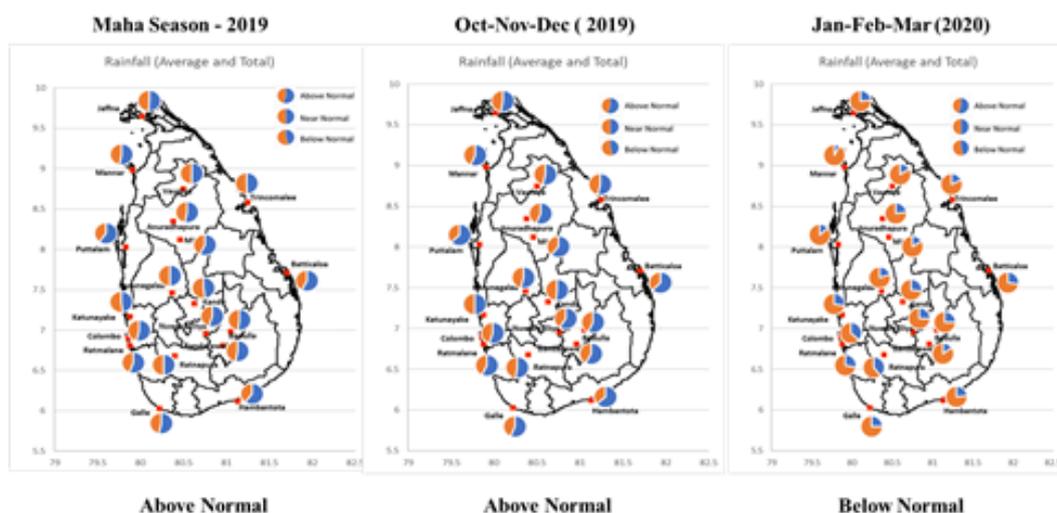


Figure 5 : Accumulated Rainfall from 28-30 April 2019 (CHIRPS data). Low level circulation at 850mb and 700mb (streamlines) averaged from 28-30 April 2019, Visible Images on 28 April, 29 April and 30 April at 0600Z.

## Dry Zone and Intermediate Zone

- Formation of low level disturbances (around mid-May) and ITCZ in the vicinity of Sri Lanka during pre-monsoon season are essential to provide quite good amount of rainfall even in the dry and intermediate zones.
- During 2019 Maha season ( 2019 October to March), most places in Sri Lanka received above normal rainfall, especially during the early part of Maha season (October to December 2019). But the rainfall during 2020 January to March (latter part of Maha season) was below normal and hence the dry zone is now experiencing water scarcity (Data Source: DoM, <http://www.meteo.gov.lk/>)
- At present, dry and Intermediate zone did not receive a good amount of First Inter-monsoon rain and the situation will be further aggravated as there will not be any appreciable rain till mid-September, because even if the southwest monsoon comes with full strength, dry and intermediate zone do not receive a good amount of rainfall. Only the possibility of getting a good amount of rainfall to the dry and intermediate zones is with the active Inter-Tropical Convergence Zone (ITCZ) or possible pre monsoon rainfall associated with a development of low-pressure area in the vicinity of Sri Lanka.
- Therefore, implementation of better water management and climate smart agriculture practices will benefit agriculture and food security as there is a possibility for a food crisis after the COVID-19, due to been a global pandemic



## Conclusion

It is important to understand that holistic analysis and continuous monitoring and analysis is necessary for decision making with the present pandemic situation. It is clear that the location of the low pressure area, which developed during 2016-2019, and other atmospheric and oceanic systems such as MJO, Rossby Wave and the ITCZ highly impacted the Monsoon in Sri Lanka. It is important to pay attention to the present situation and Southwest monsoon outlook issued by the Department of Meteorology for the next few months.

1. Possible flood in 2020 with the onset of southwest monsoon and its impacts
2. Continue the prevailing dry weather condition in the dry and intermediate zone and possible impacts for the food security

### Reference

- Jeyadharushan, N., and Nandakumar, V., 2012, The Influence of the Inter Tropical Convergence Zone on Sri Lanka Climate, The Second International Symposium, May 25-27, 2012
- ADRC, Asian Disaster Preparedness Centre

### Prepared and Written by:



## ADRIIMP's Proposed Role in COVID-19 Response

- Focus on the cascading events of the crisis taking into consideration the Monsoon rain, which may start in early May. The committee also emphasized about a possible drought condition in the dry zone. This can make a big impact to the crop production and to the food security. The committee further highlights the responsibility of the community and about a possible dengue outbreak with the rainy season.
- ADRIIMP will develop a set of guidelines for the post COVID-19 situation and focus on the recovery phase of the crisis, considering social and economic factors.
- ADRIIMP will also focus on Health Hazard Preparedness and about disseminating the information to the community level.
- Leverage possible funding opportunities for a potential research project on COVID-19 crisis.

### Key Link:

**Common Ground Between** the Paris Agreement and the Sendai Framework: Climate Change Adaptation and Disaster Risk Reduction - Informed by the country approaches of Ghana, Peru and the Philippines, in addition to a review of relevant literature, this report examines the potential for increased coherence in approaches to climate change adaptation and disaster risk reduction across levels of government and sectors.

[https://www.oecd-ilibrary.org/sites/3edc8d09-en/1/3/1/2/index.html?](https://www.oecd-ilibrary.org/sites/3edc8d09-en/1/3/1/2/index.html?itemId=/content/publication/3edc8d09-en&_csp_=8d7fe96fcbc0ad554dc42a70774e2b7e&itemIGO=oecd&itemContentType=book#table-grp-d1e5112)

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