

## The Climate over Sri Lanka during the Yala of 2012

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Large parts of the island were under drought this “Yala” which refers to the cultivation season that starts after the April-May rains. Impacts of droughts have led to shortages in drinking water in some areas and wells and rivers drying up and clapped landscapes. The water levels in hydro-power generating catchments dropped precipitously. There have been regular power-cuts affecting household, industrial, services and office work. Farmers have been affected in large swathes of the island particularly in Polonnaruwa, Anurhadhapura, Ampara and Batticaloa districts.

The sowing and harvesting of the principal crop of rice takes place during the two cultivation seasons, Maha (starting in October) and Yala (starting end of April). During “Maha”, the farmlands usually receive sufficient water to cultivate all rice fields whereas during “Yala”, farmlands usually receive only enough water to cultivate about half the fields and farmers are particularly affected by shortfalls in this season.

In this report, we describe the monthly and regional drought characteristics using rainfall observations. We find that the drought was due to an accumulated rainfall deficit in the months preceding the Yala from January to April and significant deficits from June to August. Heavy rainfall in May modulated the drought. There are variations in drought intensity across the island. We also find that the drought was regional across equatorial South Asia; such a drought driven by warmer Indian Ocean sea surfaces is anticipated in several of our publications.

### Data

We use ground observations and satellite derived estimates. Ground observations, while more accurate, are not immediately available and are expensive in Sri Lanka – thus we rely largely on satellite estimated data. We have found that satellite derived data approximately follow the ground observations in the past with a systematic under-estimation of about 10-20% particularly in the hill country. This small systematic deviation is due to reasons such as double cloud cover (affecting satellite readings), wind conditions, topographical features of the region, time of measurement and possible measurement errors of ground data. Until ground readings are collated, quality controlled and made available affordably, we can use satellite data with some confidence.

### Drought across Equatorial South Asia

There were rainfall deficits on a large scale – during April to September – in our region (*Figure 1*). Maldives and Southern Peninsular India (Tamil Nadu, Kerala, Andhra Pradesh, Karnataka) had severe rainfall deficits. This regional drought was due to warmer regional sea surfaces in the tropical Indian Ocean. The first quarter of the year (January-March) showed comparatively wetter conditions for the region whereas the second (April-June) and third (July- September) quarters experienced significant rainfall deficits ranging up to 200 mm specifically in Southern Peninsular India and Sri Lankan regions.

### Island-Wide Rainfall over the last Five Years

The rainfall within Sri Lanka was low for the months leading up to the Yala 2012 (*Figure 2*). Although, April 2012 was wetter than in the past 5 years, it was followed by four months of low rainfall.

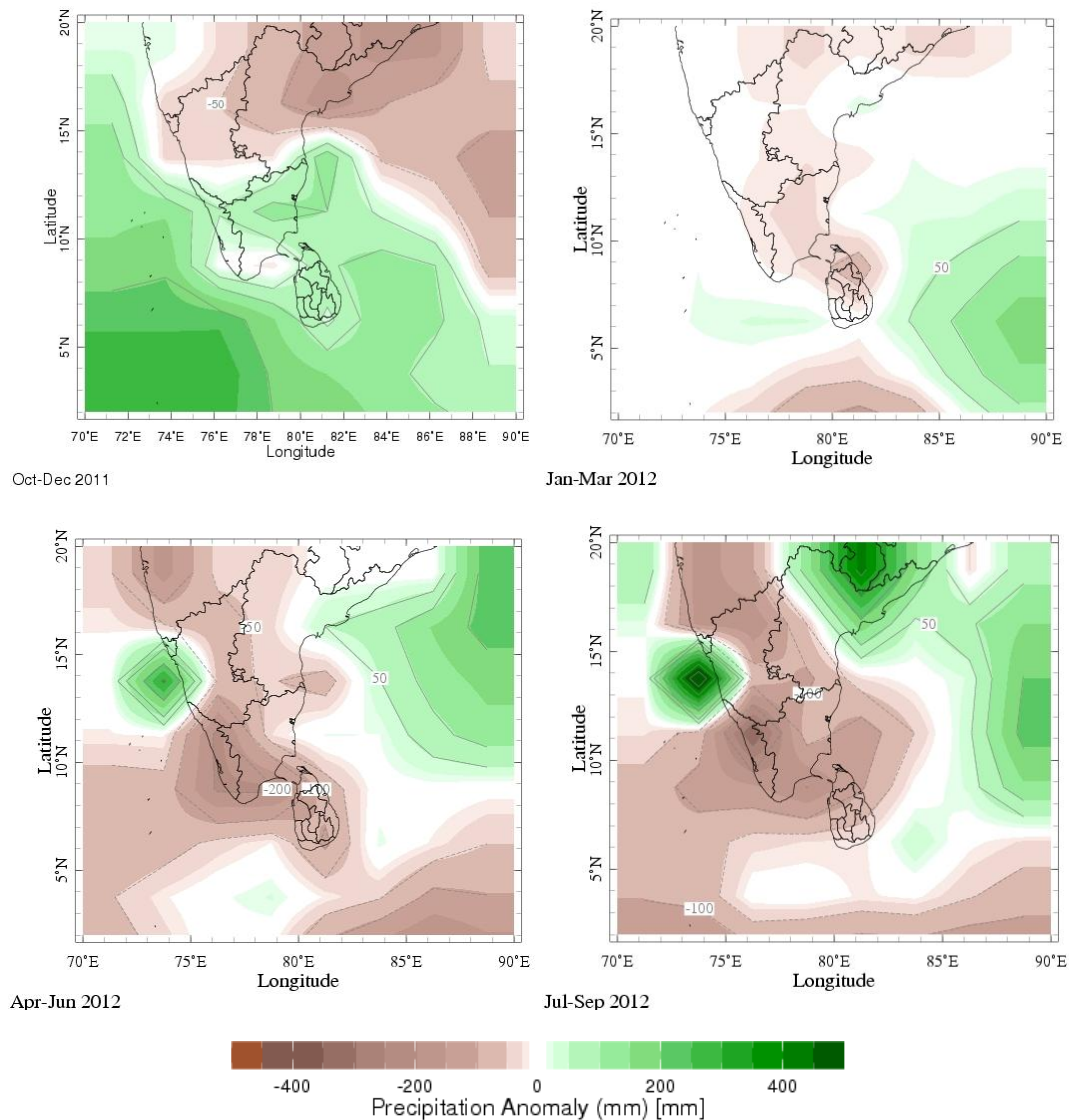
### Recent Rainfall Surpluses/Shortfalls

The severity of drought could be expressed in meteorological terms of magnitude of rainfall-deficits and its duration. In figure 3, the monthly rainfall surpluses and deficits for the last three years with respect to the average for 2002-2011 is shown. Significantly below-average monthly precipitation levels were recorded for May, June, July and August in particular.

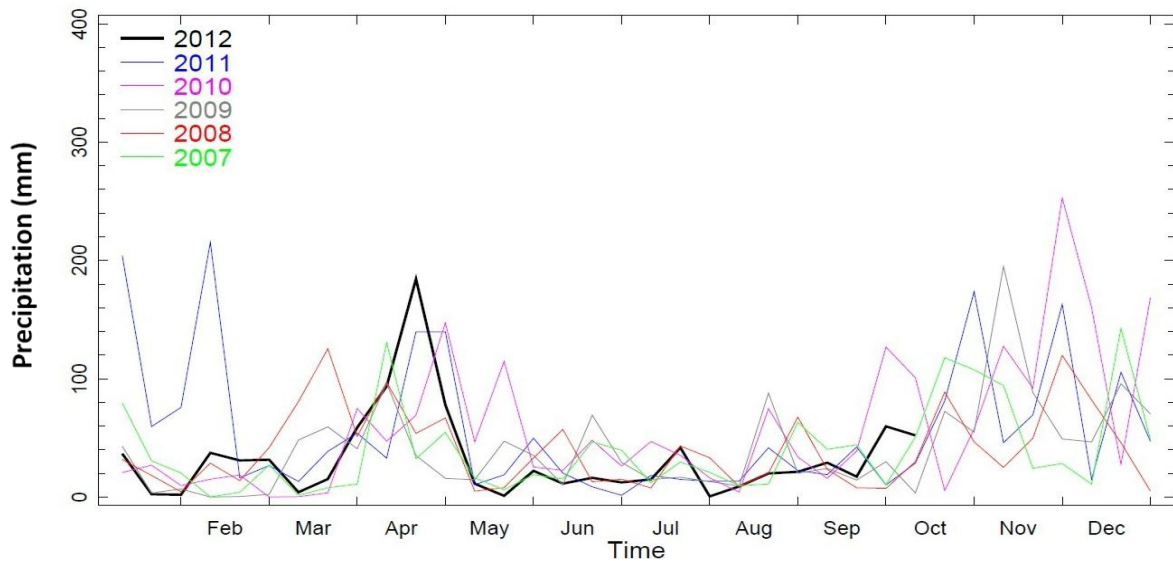
### Comparison of 2012 with Past

The monthly rainfall deficits during 2012 fell to 35, 40, 57 and 50 mm for May, June, July and August respectively (*Figure 3*). The aggregate rainfall for the 5 months (May-September) was 288 mm in 2012 and 418 mm on average for the last 10 years.

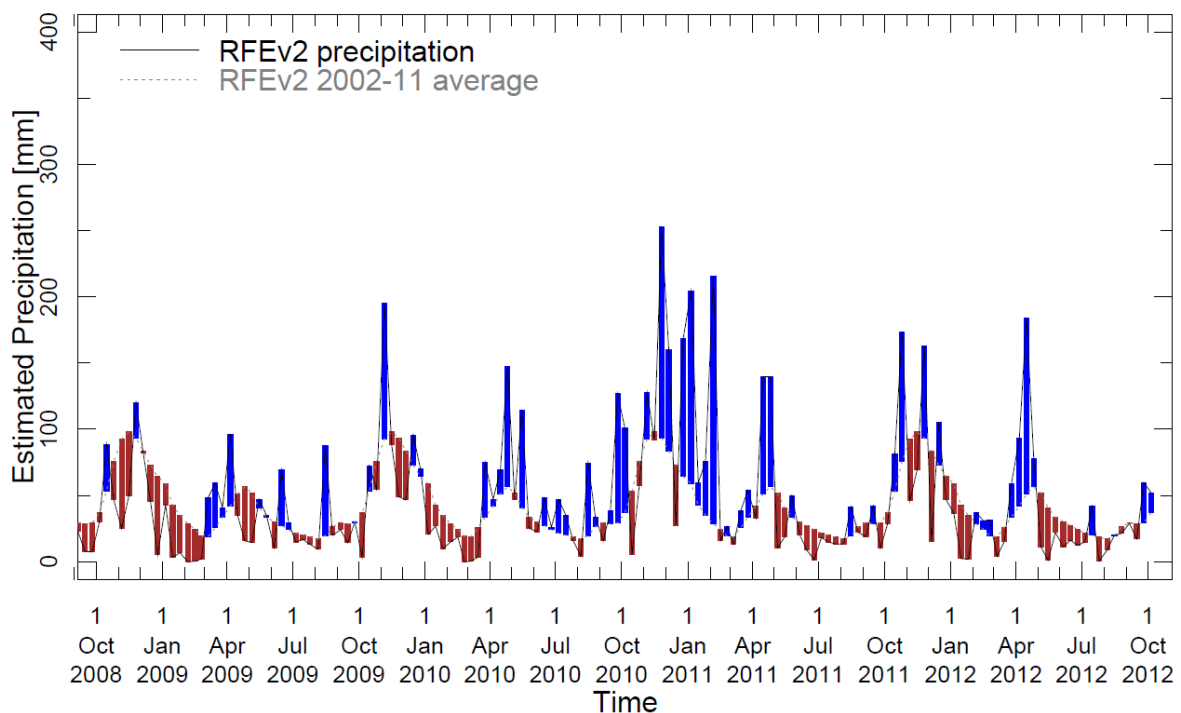
**Figure 1:** Quarterly seasonal rainfall anomalies for the Equatorial South Asian Region for 2011-2012. Rainfall anomalies for October-December (early Maha), January-March (late Maha), and the first (April-June) and second (July-September) half of Yala are shown. The average rainfall is calculated for January 1979-September 2012.



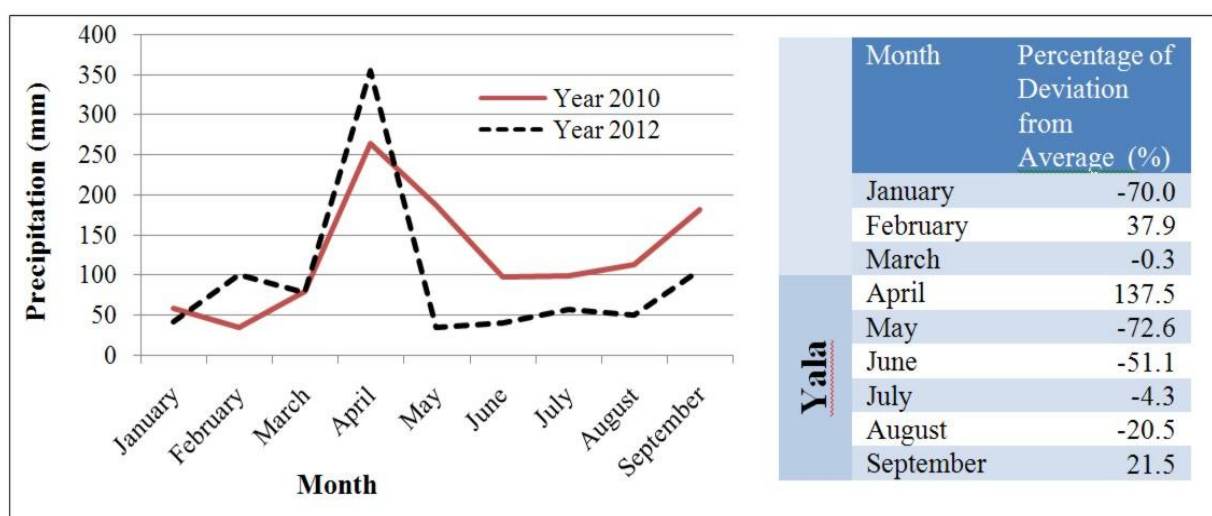
**Figure 2: Multi-year decadal (10-day) precipitation comparison.** The average rainfall for each dekad (roughly 10days) over Sri Lanka, estimated from satellites and ground observations is shown for the last 6 years as a line in a separate colour over a common January – December axis with 2012 in bold black.



**Figure 3: Dekadal precipitation and 2002-2011 average.** The smoother curve shows the average over 2002-2011 – this annual cycle is reproduced for each year in the above figure. The departures from this average are shown in blue when wetter and in brown when dryer for each month for the last three years. A dekad refers roughly to 10 days or more accurately as each month divided into three.



**Figure 4: Average monthly precipitation comparison**



Month	Percentage of Deviation from Average (%)
January	-70.0
February	37.9
March	-0.3
April	137.5
May	-72.6
June	-51.1
July	-4.3
August	-20.5
September	21.5

### Monthly Rainfall by Sub-District

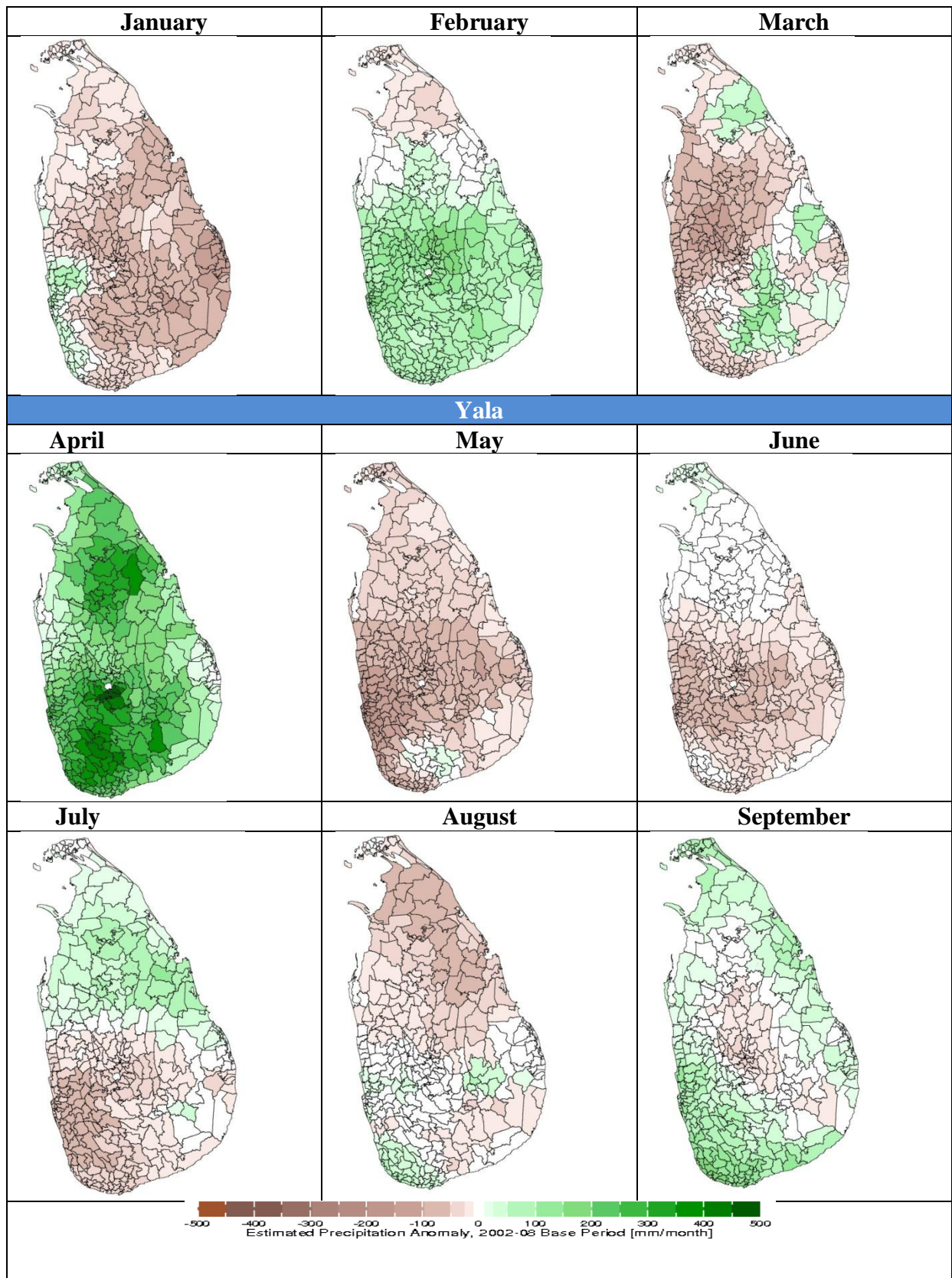
Anomalies – departures from the average for each month and sub-district – are shown in *Figure 5*. The average rainfall has been calculated for the base period 2002-2008. Wetter than normal rainfall conditions are shown in green while dryer than normal is in brown.

**Table 1: Monthly rainfall summary for Yala.** The average rainfall was calculated using precipitation values from 2002-2012. All monthly values are calculated using satellite derived dekadal (10-day average)

Month	Monthly Rainfall for 2012 (mm)	Monthly Average 2001-2011 Rainfall (mm)	Descriptive Summary
<b>April</b>	356	150	Entirety of the island recorded above average rainfall. Most of the regions receiving over 150 mm rainfall, though it was mainly due to isolated and intermittent stormy conditions.
<b>May</b>	35	126	Parts of Galle, Matara, Ratnapura and Hambantota districts experienced slightly above average rainfall, with a surplus as low as 30 mm. Rest of the country experienced below average rainfall .
<b>June</b>	40	82	Some parts of Puttalam, Mannar, Kilinochchi, Jaffna, Anuradhapura and Trincomalee districts experienced slightly above average rainfall, with a surplus below 20 mm. Rest of the country experienced below average rainfall.
<b>July</b>	57	60	Northern and Southern regions showed contrasting rainfall anomalies. Apart from Moneragala district, below- average rainfall was observed in the Southern half, particularly in the Western and South Western regions. In the Northern half, above average rainfall was recorded particularly in Trincomalee.
<b>August</b>	50	63	Above average rainfall was observed by Western, South Western regions and parts of Badulla and Ampara districts. Rest of the island experienced below average rainfall.
<b>September</b>	106	87	Apart from Central and South Eastern regions, rest of the island received above average rainfall with higher values recorded in Western, South Western regions and Jaffna peninsula.



**Figure 5: Monthly precipitation anomalies for 2012 by sub-district (DSD)**



## What caused the drought?

The drought was largely due to natural seasonal climate fluctuations that were compounded by long-term changes – rising demand for water due to population increases, urbanization that leads to reduced infiltration of water, and intensification of water use for irrigation.

During the last Yala, El Nino conditions were near-neutral in the Pacific Ocean but warmer than seasonal oceanic surface conditions persisted to the South-West of Sri Lanka. Both El Nino and warm Indian Oceans have led to drought in Sri Lanka more often than not (Zubair and Chandimala, 2006, Chandimala and Zubair, 2007). Drought can be predicted with confidence that varies by season and the lead-time of the predictions (Lyon et al., 2009). At FECT, we are working towards more systematic drought monitoring and predictions for Sri Lanka, Maldives and other Indian Ocean Islands.

Now, however El Nino has set in and the Indian Ocean Dipole is in a positive mode and we expect that there is a wetter than normal 2012/2013 Maha season to follow.

## Further Information

Technical details are provided in a series of research papers published in the International Journals and available via [www.climate.lk](http://www.climate.lk). Our seasonal and weekly updates are available at <http://fectsl.blogspot.com>

## References

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