



**Sri Lanka**

# **Initial Rapid Assessment on Drought 2016**

**28 December 2016**



# Key Messages



- ♦ Sri Lanka is experiencing a drought at present over most parts of the country from the beginning of the year 2016. Even though Sri Lanka experienced a spell of extremely heavy rain during mid-May, the total cumulative rainfall received to date during 2016 is below normal and highly erratic as both the south west and north east monsoons failed to bring enough rainfall.
- ♦ Considering global model predictions and prevailing weak La-Nina conditions, rainfall during January and February 2017 is likely to be **normal**. However, even if the country receives average rainfall in early 2017, it is highly unlikely that the drought situation will improve until the onset of the inter-monsoon showers in late March– April 2017.
- ♦ The major possible consequences would be expected in the areas of water for drinking, irrigation and hydro-power generation. In addition, meeting the national rice demand, controlling of the food price hikes and meeting the demand for seeds for *Yala 2017* will be challenging.



- ♦ 337 drinking water schemes under the NWSDB, the main sources of drinking water, are functioning with some limitations. Salt water intrusion might cause severe issues in early 2017, as water levels are deepening currently according to irrigation records.
- ♦ Water supply schemes under the local government and community based schemes will also be increasingly affected.
- ♦ Drinking water distribution is immediately needed in affected districts with a contingent financial support to districts.



- ♦ As of 22nd December 2016, the total water capacity reported in 73 major reservoirs was reported at only 29% which is 1,040 Million Cubic Meter (MCM) out of the total capacity of 3,593 MCM. Generally, Maha season requires approximately 2,220 MCM.
- ♦ A significant drop of the water levels in the major and medium scale reservoirs has occurred - 14,500 small scale tanks, 13,300 anicuts and 7,100 small canals have reached critical capacity.



- ♦ Paddy cultivation in the *Maha 2016* cultivation has been seriously affected by the drought and is threatening a significantly lower level harvest in March/April 2017. By the end of November, only 281,910 ha of paddy lands out of 804,830 ha have been cultivated—35 %. This is the lowest cultivation level experienced in Sri Lanka in reported during the last thirty years.
- ♦ The Yala (minor season from May- Aug 2017) cultivation is also at high risk as the carry over capacity of water in the at end of Maha 2016/17 is significantly low which should be generally at 50% of the total irrigation capacity and limited supply of quality seeds.



- ♦ Loss of two consecutive seasons (2016/17 Maha and 2017 Yala) will definitely undermine household food security and resilience. Most of the agricultural holdings will accumulate debts and will experience significantly reduced yields. Therefore, household food security and nutrition status is expected to deteriorate in the coming months .
- ♦ It is recommended to import rice with immediate effect to buffer the market price fluctuations December 2016 to the April 2017.



- ♦ The Power sector is facing many challenges due to the lack of expected rainfall as a result of the dual monsoon failures. Therefore it is not prudent to rely on the existing hydropower capacity of 1350 MW which is 30 % of the 3,900MW of total installed capacity.

- ♦ **The immediate coordinated efforts should be made to address the issues related water for irrigation, drinking water, power generation and food insecurity and livelihood consequences.**



# I. Insufficient rains and consequences

Rainfall received in 2016 followed an erratic pattern; more than half of the total precipitation during the year fell in May 2016 due to a depression formed in the Bay of Bengal, while the other rains arrived during medium level thunder-storms that occurred during October-November inter-monsoon period. In both cases, the poor South-West and North– East monsoons were unfavourable for cultivation, either too late in the season for farmers to take advantage of for planting or cultivation, and overall, in insufficient quantity.

The cumulative rainfall received in the country was approximately 23% less than the 30 year average (1981-2010). Currently, the total water availability in the major reservoirs is only 29% of its total capacity (**this is less than 50% of water required for Maha cultivation**). As a result of the limited water availability, only 35% (281,910 ha of the planned land extent (804,838 ha) has been cultivated as of end of November 2016 which is approximately 60 % lower compared to last ten years average extent cultivated in Maha season. The current enrolment rate remains the lowest enrolment rate reported for last thirty years period.

Out of the top-five rice producing districts, four districts have not reached 35% of area under cultivation (Anuradhapura, Polonnaruwa, Kurunegala and Hambanthota). **Further, there is very limited opportunity for increasing the cultivation extent as the planting season has already passed.**

**For the Yala season in 2017, the water level of the reservoirs should exceed 50% of capacity for in order to meet the initial irrigation requirement for a successful Yala . Given current water levels and rainfall forecasts for the months of January to April 2017,** there is a highly negative knock-on effect for the 2017 Yala. Therefore, the estimated extent for Yala 2017 cultivation is 200,000 ha which is approximately 50% of the total cultivable lands in a normal Yala season.

The total extent planned for Other Field Crop (OFC) cultivation is approximately 156,280 ha for the 2016/17 Maha season. Of concern however is that as of end of November, only 44% of land was brought under cultivation for OFC. Cultivation of cowpea, red onion, potato and gingerly remains below 20% which is worrisome.

Dams and reservoirs are the main water harvesting systems in Sri Lanka. More than 14,000 irrigation structures are available in the country especially in the dry and intermediate agro-ecological zones of Sri Lanka. However, the current water capacity of the major reservoirs has decreased significantly and contain around 29% of capacity. Therefore, there will be major issues in meeting the requirements for irrigation, drinking and hydro-power generation.

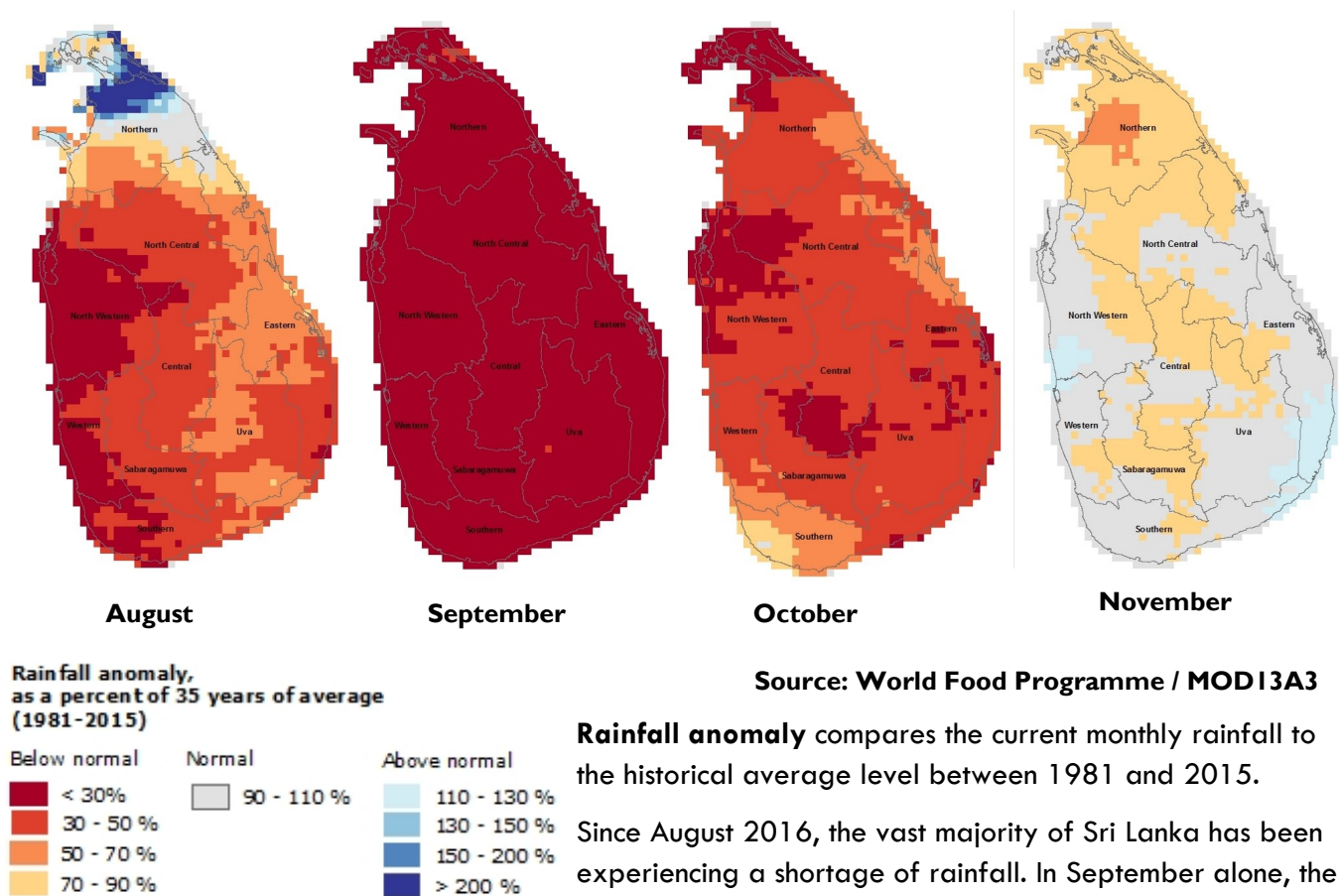
At present, based on the situation reports of DMC, approximately 915,000 people have been affected by prevailing 'droughts in 23 / 25 districts of Sri Lanka. Even though the drought conditions mainly affected the dry zone, people in the wet and intermediate zones have also been impacted due to low availability of water for drinking, domestic use and crop cultivation.

An Inter-Ministerial Committee called by Honourable Minister of Disaster Management, has recommended to conduct a desk-review of current dry status of the country using the available primary & secondary data in order to develop a drought response plan. The inter-ministerial committee was convened on 20th December 2016. Further a technical committee was appointed under the Ministry of Disaster Management comprised with Department of Meteorology, Disaster Management Centre (DMC) , National Disaster Relief Services Centre (NDRSC), IWMI, Ministry of Agriculture, Ministry of Irrigation and Water Board.

The technical team agreed to submit the first version of the assessment report by 28 December 2016 with the technical leadership of WFP, which will be submitted to the Cabinet of Ministers on early January 2017, through the cabinet sub-committee chaired by the Honourable Minister of Disaster Management.

## 2. Current meteorological drought conditions

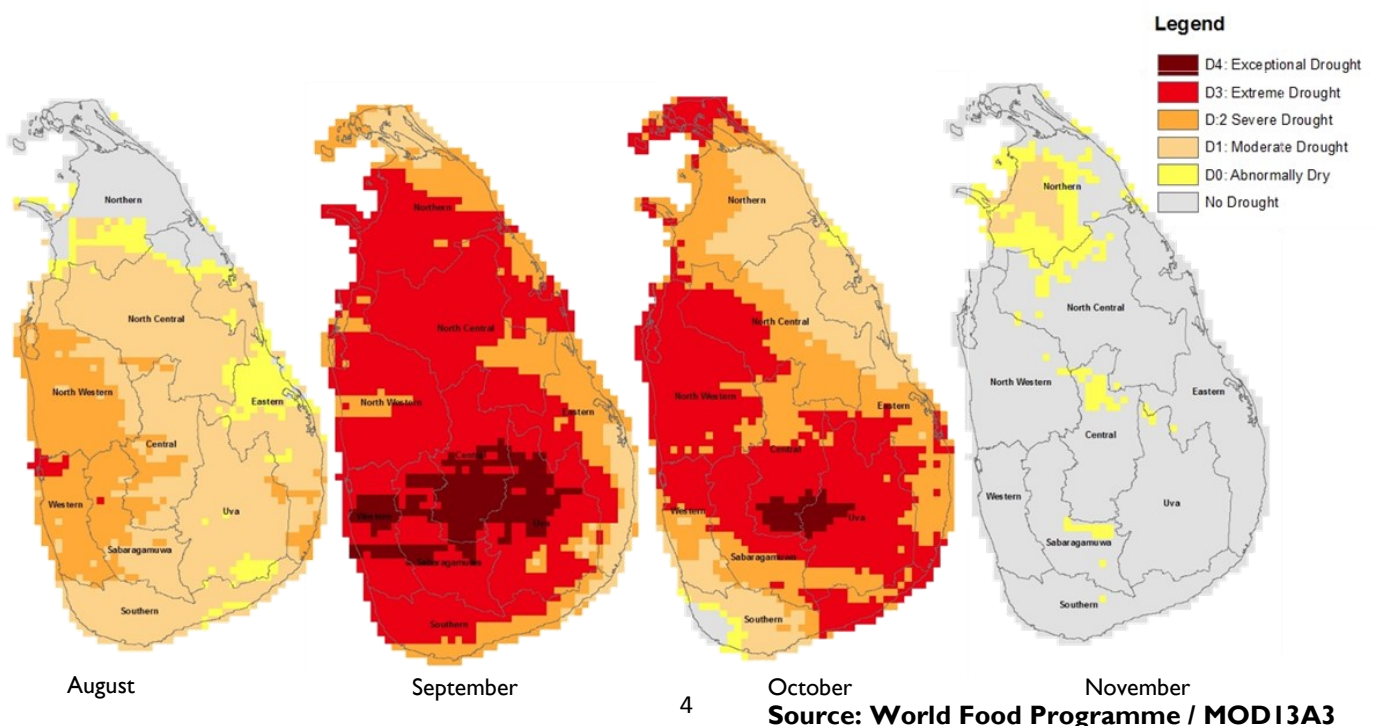
**Figure 01: Rainfall anomaly, as a percentage of the long-term average, Aug-Nov 2016**



**Rainfall anomaly** compares the current monthly rainfall to the historical average level between 1981 and 2015.

Since August 2016, the vast majority of Sri Lanka has been experiencing a shortage of rainfall. In September alone, the whole country received less than 20% of the rainfall in a normal year. However, the situation improved slightly in October and by the end of November, as rainfall levels in most of the country reached at least 70% -90% of the historical average for these two months. Despite recent improvements, water levels in the reservoirs essential for irrigation stand at less than 50% irrigation requirements for the Maha season due to shortage of total precipitation received in year 2016.

**Figure 02: Standardized Precipitation Index (SPI) based on CHIRPS data**





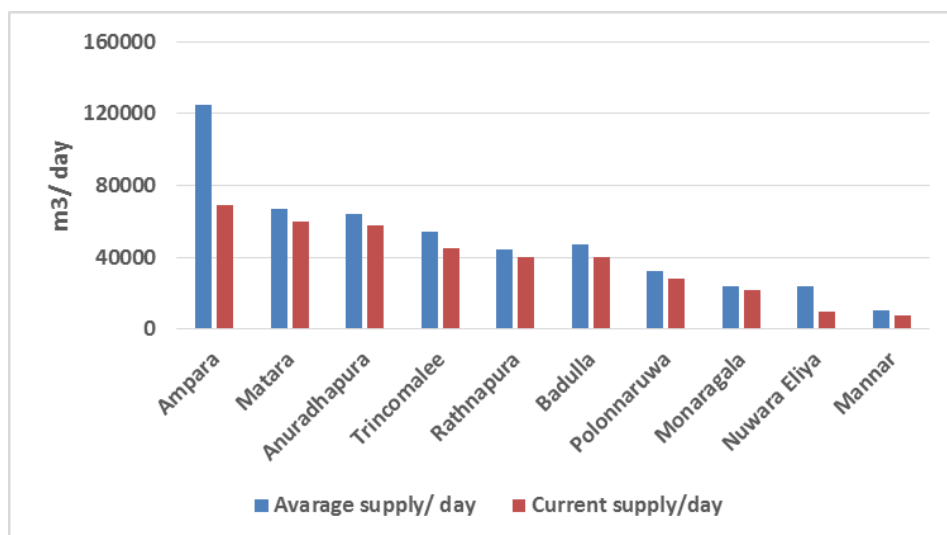
### Standardized Precipitation Index (SPI) :

SPI is a proxy indicator to evaluate the severity of the drought by looking at the rainfall level and is considered as one of the key indicators used to monitor droughts. It's a normalized index representing the probability of occurrence of an observed rainfall amount when compared with the rainfall climatology over a long-term period. Negative SPI values represent rainfall deficit, whereas positive SPI values indicate rainfall surplus.

The country experienced a prevalent drought impact caused by rainfall shortage since August 2016.



Figure 03: Current water supply status for drinking



### Status on drinking water

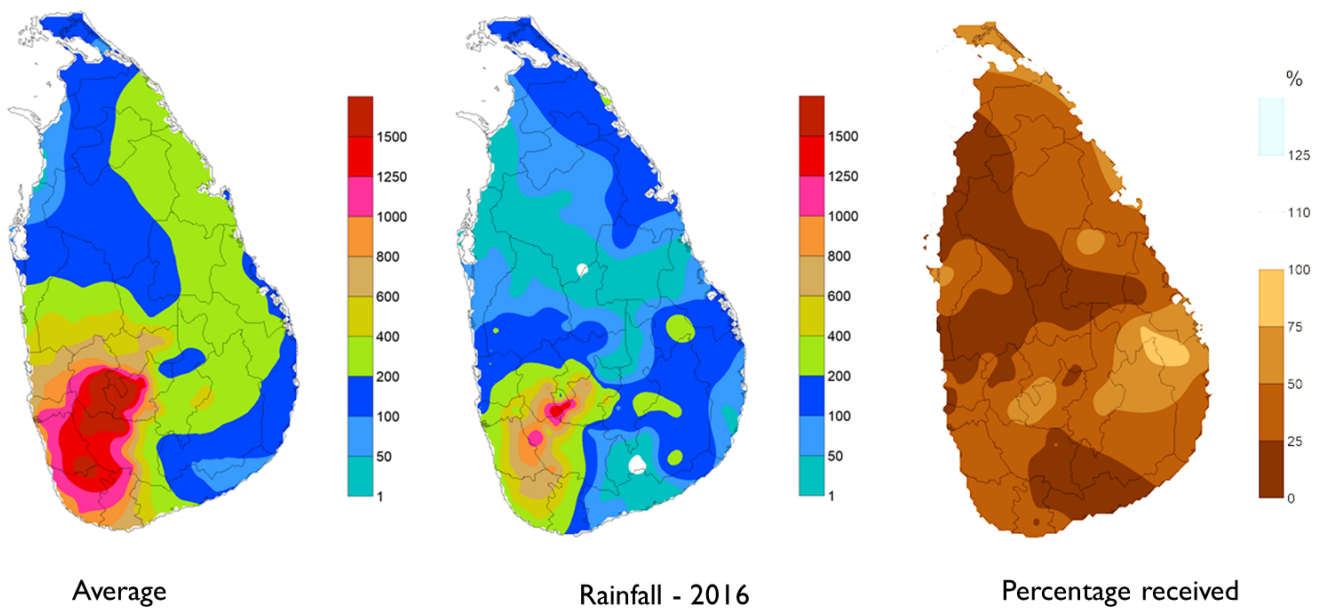
Access to drinking water has become a challenge in 22 out of 25 districts in Sri Lanka.

The National Disaster Relief Services Centre has allocated 42 million for drinking water distribution in 22 districts from September – December 2016.

Source: National Water Supply & Drainage Board

### 3. Weather outlook

**Figure 04: Total precipitation of South West Monsoon (June - September )2016**



**Source: Department of Meteorology, Ministry of Disaster Management, Sri Lanka**

The south-west monsoonal rain which usually accounts over 30% of annual rainfall was very much below normal in 2016. A significant part of Sri Lanka received only between 25-50% of the average rainfall.

Total rainfall in year 2016 was highly erratic. Regions, especially in the interior parts of the country, received below normal rains with an exceptional severe rain event in mid-May and a short spell of thunder-showers in November 2016.

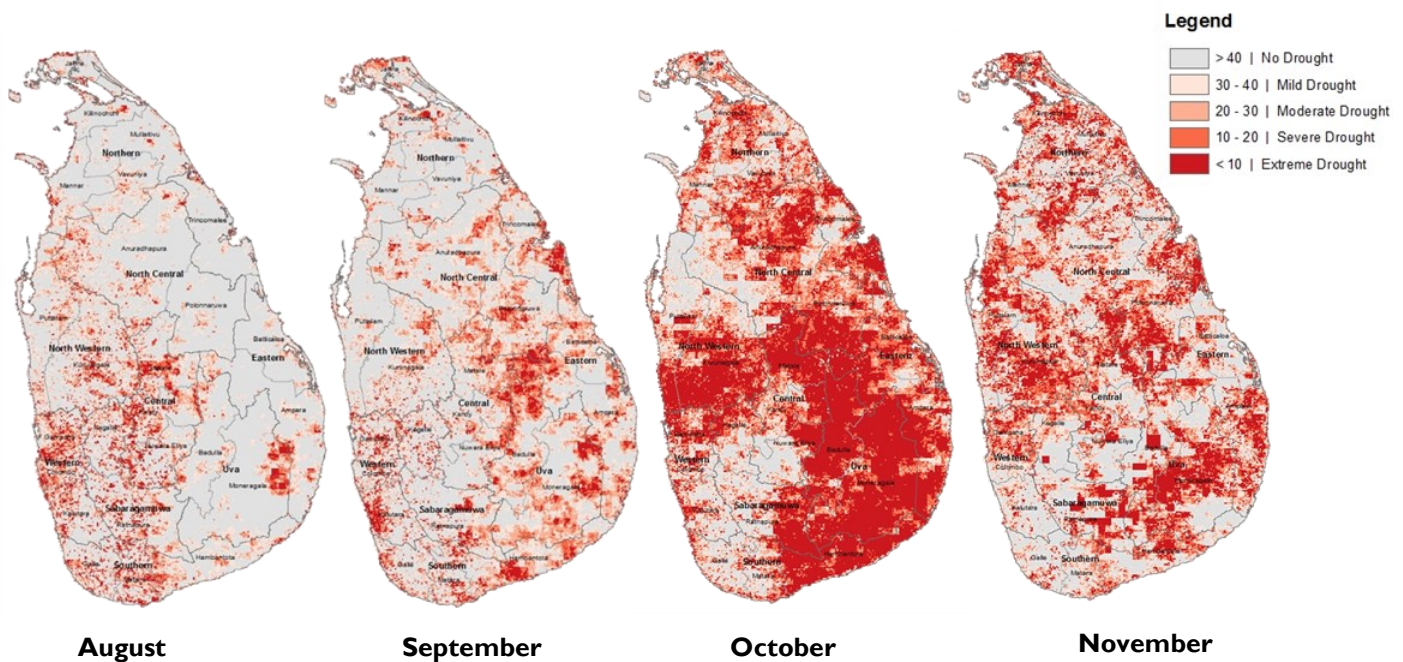
Most of the global model forecasts do not provide a clear forecast over Sri Lanka for December, January and February (DJF) season 2016/2017. The multi-model averages favor weak La Niña conditions during the Northern Hemisphere winter. Recent forecasts from some other models suggested neutral Indian Ocean Dipole (IOD) conditions during the December 2016 to February 2017. Weak La Nina conditions may affect the rainfall patterns in Sri Lanka during DJF with slightly above normal rainfall during latter part of DJF season.

Considering global model forecasts and prevailing weak La Nina conditions, DJF rainfall is likely to be **NORMAL** for Sri Lanka. However, even if the country receives average rains in the months of January and February 2017, it is highly unlikely that the current drought situation will improve until March 2017.



## 4. Agricultural impact and crop situation

**Figure 05: Vegetation Health Index, Aug– Nov 2016**



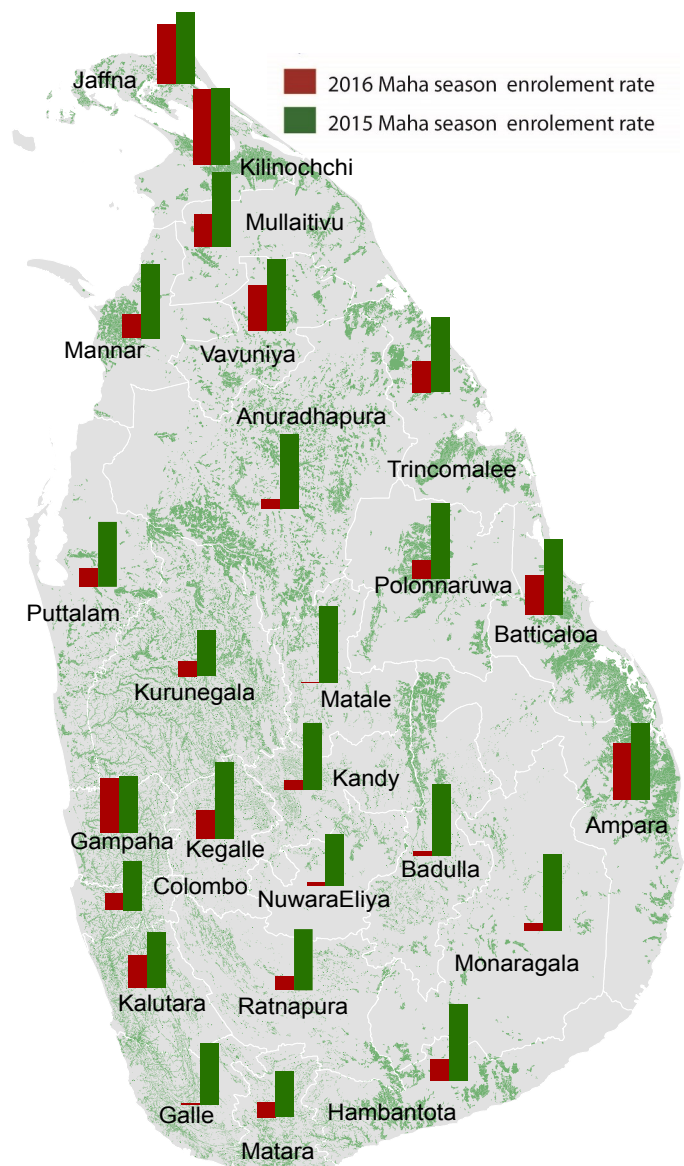
**Figure 06: Current paddy cultivation enrolment in the Maha season 2016/17– End of November**

The vegetation health index (figure 05) highlights the lingering effect of the August – October drought despite recovering rainfall patterns. With the rainfall received in November, the situation showed some temporary improvements.

The total water availability in the major reservoirs is only 29% of its total capacity. As a result of the limited water availability, only 35% (281,910 ha) of the planned land extent (804,838 ha) has been cultivated as of end of November 2016. The current rate remains the lowest enrolment rate reported for last thirty years period.

There is very limited opportunity for increasing the cultivation extent as the planting season has already passed.

Importantly, out of the top-five rice producing districts representing over 50% of the country's rice production— four districts have not reached 35% of area under cultivation (Anuradhapura, Polonnaruwa, Kurunegala and Hambantota). During a normal season, the average cultivated area is 80-90% of its total cultivable paddy lands.



**Source: Department of Agriculture**

## Other Field Crops (OFCs) and Vegetables

The total extent planned for OFC cultivation is approximately 156,280 ha for the Maha season. Of concern, however, is that as of end November, only 44% of land was brought under cultivation for OFC.

Furthermore, the cultivation of cowpea, red onion, potato and gingerly remains below 20% which is worrisome. The Government needs to assess the current market supply of these products and prepare a immediate contingency plan for meeting the national demand for these food types specially during the 2017 season. Unusual price hikes and non-availability of some of these food items in the market could be expected towards April– May 2017.

However, the drought has yet not impacted seriously on vegetable production . As a result the wholesale and retail prices of most of the vegetable varieties are less than the same period of last year.

## 5. Current capacity of irrigation

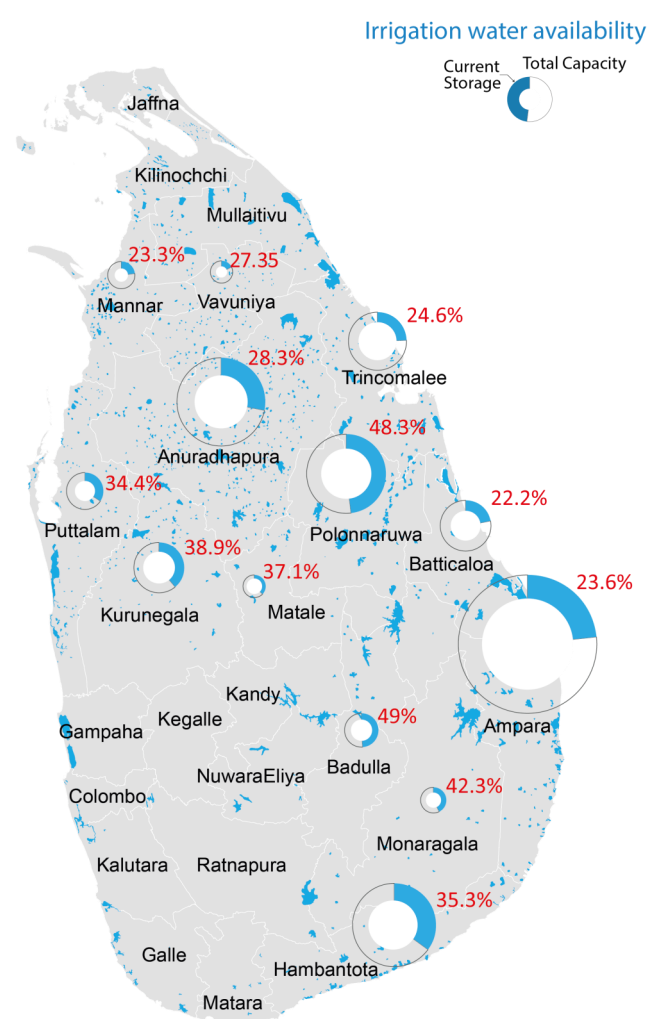
As of 22nd December 2016, the total water supply reported in 73 major reservoirs was reported at only 29% of the total capacity of 3593 MCM. Generally, the cultivation in Maha season requires approximately 2,220 MCM of irrigation water. In other words, the reservoirs carry only less than 50% of water required for Maha cultivation is actually available.

Also the water supply for 220 medium scale reservoirs is also reportedly at 30% of capacity.

For the Yala season in 2017, the carry over capacity of the reservoirs should exceed 50% of their total capacity to plan for a successful crop. Given the current water levels and normal rainfall forecasts for the months of January to April 2017, there is a significant risk that agricultural production will also be a challenge in the Yala 2017 season.

With the current estimated carry over capacity, only 200,000 ha of paddy lands which is approximately 50% of the total cultivable lands in a normal Yala season is expected to be cultivated in the 2017 Yala.

**Figure 07: Reservoir water status - 22 Dec 2016**



Source: Department of Irrigation



## 6. Affected population

The situation reports of DMC have stated that more than 915,000 people have been affected by the prevailing drought. Small scale paddy farmers, agricultural daily-labours and other agricultural livelihood holdings are the most affected livelihood groups.

North-western, North-central, Uva and Southern provinces are reported as the most affected provinces. DS Divisions (DS) in Polonnaruwa (Welikanda, Lankapura, Dimbulagala, Medirigiriya), Moneragala (Medagama, Bibile), Mannar (Musali), Puttalam (Vanathavilluwa), Kurunegala (Rasnayakepura), Trincomalee and Ampara (Mahawewa) and Hambanthota (Katuwana) have been seriously affected.

Lack of access to drinking water, lack of seeds for replantation for Maha season and planting in Yala season are the major consequences faced by the communities in the affected regions.

People in the affected regions are at risk of increasing indebtedness and reduced affordability as a result of increase in cost of diet. The situation is expected to be aggravated due to expected yield losses in the Maha season and the forthcoming Yala season.

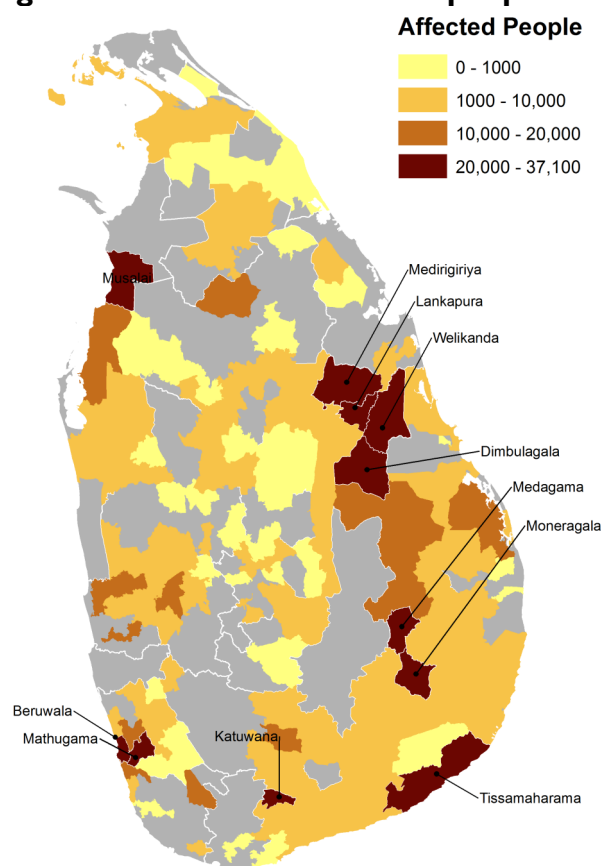
Figure 9 shows the most vulnerable population (at divisional level) exposed to the ongoing drought.

People who live in the most drought impacted areas and who are amongst the poorest in the country are considered the most vulnerable. The disruption of agricultural farming activities may impose a much larger impact on their income and livelihood compared to their counterparts due to their low resilience.

Priority areas that need close monitoring in the coming months are identified in the figure 10, by considering Standardized Precipitation Index, poverty prevalence, number of affected people and current sources of drinking water.

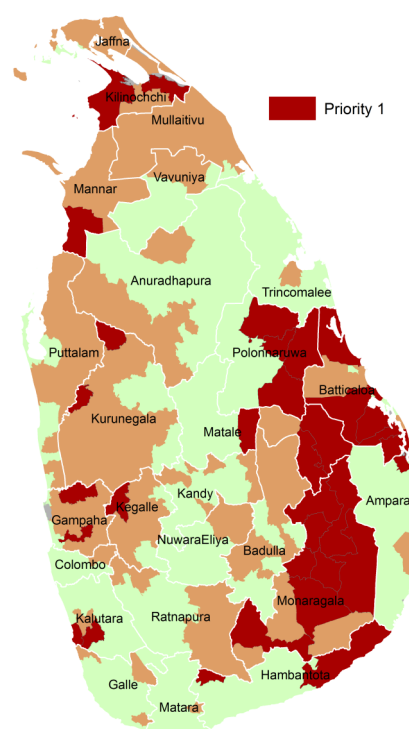
Priority 1 areas should be highly considered in the development of monitoring/surveillance systems and drought response options by relevant agencies.

**Figure 08: Number of affected people**



**Source: National Disaster Relief Services Centre (NDRSC) and Disaster Management Centre (DMC)**

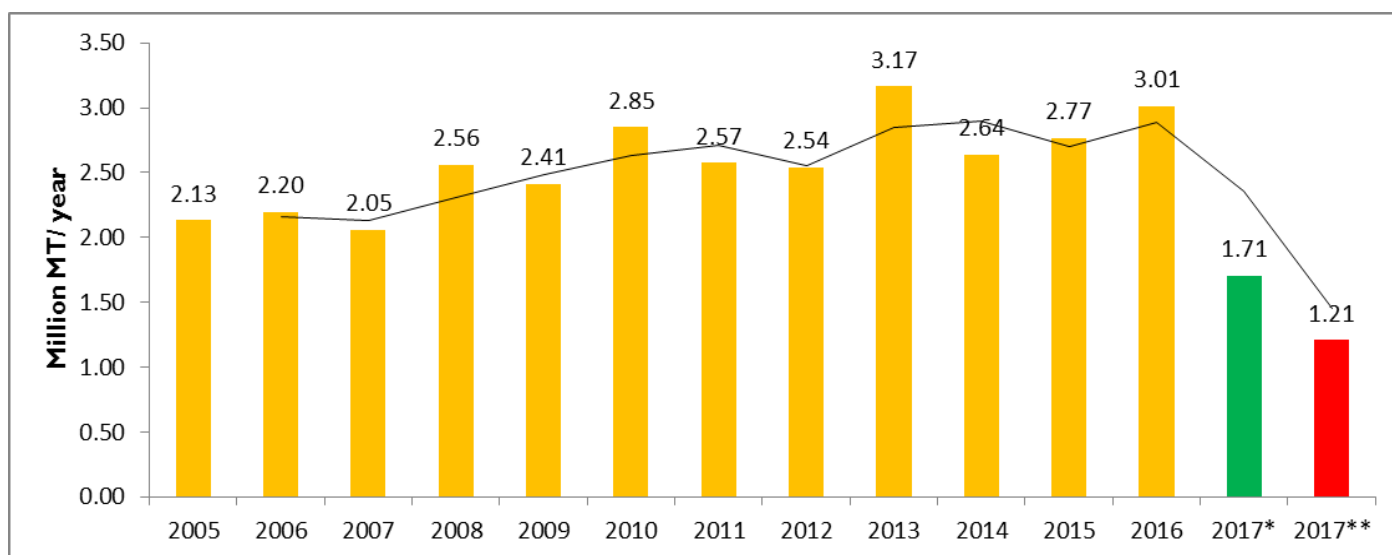
**Figure 09: Priority areas for early response**



**Note:** Priority areas will be updated based on incoming data, field verifications and sensitivity analysis conducted in the first week of January 2016.

## 7. Crop forecast

**Figure 10: Rice production trends for last ten years**



**2017\* - Best case scenario      2017\*\* - Worst case scenario**

**Each year production = same year Yala + previous year Maha**

Total forecasted production in year 2017 is far below the average in contrast with last ten year's average annual rice production. The best-case scenario will have a deficit of 0.6 MN MT of total national rice demand (2.3 MN MT). If the Yala 2017 is also going to be affected, the total production will be significantly lower and expected a deficit of 1.1 MN MT.

### Assumptions:

#### \* Best-case scenario:

- Total extent cultivated in the Maha 2016/17 remain as same as 35% out of total planned extent.
- Yala 2017 will be cultivated at full extent will be same as in year 2016 Yala and zero yield losses reported.
- Rice per capita consumption Kg/year/person – 110.2
- Total rice requirement year 2016 – 2.3 Million MT
- Rice requirement/ month 191,574MT

#### \*\* Worst-case scenario:

- Total extent cultivated in the Maha 2016/17 will experience a significant yield loss.
- Only 50% of the potential irrigable paddy lands will be cultivated in Yala 2017
- Yield losses are also expected resulting less than 50% of paddy production compared to a normal year.

Even though 2015/16 Maha season resulted in one of the highest harvest during the last ten years., a rice deficit is expected towards the end of the Maha season 2016/17 in particular from mid May to end July 2017.

In order to minimize the impact of the expected failure of the Maha 2016/17 season, remedial actions should be taken to prioritize the production of required seeds paddy for the Yala 2017 season. Moreover, wet-zone arable paddy lands should be cultivated in Yala 2017 in order to offset the water deficit in the dry zone irrigated zones.



# Recommendations

## Short-term recommendations - up to six months

Issue	Action/ Response option	Responsible Agencies
Lack of capacity to supply water for drinking & domestic purposes	<ul style="list-style-type: none"> <li>In addition to the 4,336 water tanks distributed by National Disaster Relief Services Centre (NDRSC) earlier, additional 2,000 tanks to be procured and distributed to the required districts.</li> <li>DMC has distributed 175 water tanks.</li> <li>73 water bowzers have been placed in 22 districts by NDRSC and 26 bowzers (tractor and lorry) have been placed by DMC.</li> <li>In order to further strengthen the response, 88 tractor and lorry bowzers should be procured to fill the gaps in water distribution by NDRSC and DMC.</li> </ul>	<p>Ministry of Disaster Management (MDM)</p> <p>Ministry of City Planning and Water Supply Ministry of National Policies and Economic Affairs National Disaster Relief Services Centre (NDRSC)</p> <p>Disaster Management Centre (DMC)</p>
Improvement of the capacity for supply of drinking water	<ul style="list-style-type: none"> <li>Construction of 400 productive boreholes to extract groundwater for existing water supply schemes as supplementary sources or bowser points.</li> <li>Repair and rehabilitation of existing 1,000 public hand pump fitted deep wells located within the rural areas</li> <li>Construction of 200 hand pump wells in remote villages.</li> </ul> <p><b>Note: : Refer Supplement I consisting of detailed recommendations of National Water Supply and Drainage Board.</b></p>	<p>Ministry of City Planning and Water Supply</p> <p>National Water Supply &amp; Drainage Board (NW&amp;SDB)</p>
Significant drops in the paddy cultivation enrolment rate in <b>Maha</b> season 2016/17	<ul style="list-style-type: none"> <li>Water use efficiency should be improved. Distribution of water should be managed in careful manner.</li> <li>Plans should be formulated immediately to meet the seed requirements for <i>Yala 2017</i> with higher focus of promoting the drought tolerant and short-term paddy varieties.</li> <li>Crop diversification methods such as planting Maize, Green gram, Cowpea, Peanuts and recommend for inter-seasonal cropping.</li> <li>Farmers should be supported with agricultural inputs for cultivating in arable lands in the wet zone.</li> <li>Renovation of agro-wells need to be prioritized for feeding livestock and water supply for additional upland crops.</li> <li>Production of drought tolerant crops such as drumstick and drought tolerant tubers such as Kiri-Habarala (<i>Xanthosoma sagittifolium</i>) should be promoted among home gardens.</li> <li>Sowing techniques such as parachute technique and paddy planting machines should be promoted in <i>Yala 2017</i>.</li> <li>Compensation schemes should be provided to the small and medium scale farmers who had crop damages or missed <i>Maha 2016/17</i> and cultivation in <i>Yala 2017</i> through existing safety-nets and other insurance programs.</li> </ul> <p><b>Note: : Refer Supplement II consisting of detailed recommendations of Ministry of Agriculture</b></p>	<p>Ministry of Agriculture</p> <p>Ministry of Irrigation &amp; Water Resources Management</p> <p>Ministry of Parliamentary reforms and Mass Media</p> <p>Ministry of Finance</p> <p>Department of Agriculture</p> <p>Department of Irrigation</p> <p>Department of Agrarian Development</p>

Lack of water for domestic consumption	<ul style="list-style-type: none"> <li>Conduct a public awareness campaign to promote conservation of water as much as possible and to adopt rain water harvesting methods such as domestic tanks, ponds &amp; pathas.</li> <li>Take immediate actions to control river pollution and discharge of effluents to the drinking water sources</li> </ul>	Ministry of Agriculture Ministry of Parliamentary reforms and Mass Media Ministry of Disaster Management Department of Agrarian Development
Food deficit & price hikes	<ul style="list-style-type: none"> <li>Import of essential food items as appropriate.</li> <li>If the rice prices are reaching Alert for Price Spikes (ALPS), lift the import barriers to promote the importation by private rice importers up to 400,000MT within year the 2017.</li> <li>Identified households are to be provided with either dry rations or cash for a considerable period</li> <li>Introduce cash for work or food for work among vulnerable and food insecure households</li> <li>Minimize post-harvest losses</li> <li>Generate awareness to reduce food wastage.</li> <li>If the vegetable prices are increased above normal, tax concessions should be provided for the importation of lentils and potato.</li> </ul>	Ministry of Rural Economy Ministry of Industries and Commerce Ministry of Finance Ministry of Agriculture Ministry of Disaster management Ministry of National Policies and Economic Affairs Ministry of Parliamentary reforms and Mass Media
Challenges in meeting the national power demand	<ul style="list-style-type: none"> <li>Execute public awareness campaigns to promote efficient use of energy and water</li> <li>Impose measures to reduce the water and energy usage within public institutions.</li> </ul> <p><i>* Note: Refer Supplement III consisting of detailed recommendations of Ministry of Power &amp; Energy</i></p>	Ministry of Power & Energy Ministry of Parliamentary reforms and Mass Media Ministry of Public Administration and management

## Long-term recommendations

Issue	Action/ Response option	Responsible Agencies
Difficulties in producing downscale seasonal forecasting	<ul style="list-style-type: none"> <li>Weather and climate forecasting capabilities in medium and long range of the Department of Meteorology should be enhanced.</li> <li>Integrated drought monitoring system should be in operation.</li> <li>Current studies on river basins to be incorporated into long-term planning.</li> <li>Establishment of drought risk reduction forum spear headed by the Ministry of Disaster Management</li> </ul>	Ministry of Disaster Management Disaster Management Centre Ministry of Agriculture Ministry of Irrigation Ministry of Finance Department of Meteorology Department of Agriculture



Inadequate water harvesting systems	<ul style="list-style-type: none"> <li>• Establishment of tank eco-systems in every potential tank especially in the dry zone through ongoing projects.</li> <li>• Renovation of existing tank cascade systems and irrigation infrastructure.</li> <li>• Establishment of additional dedicated reservoirs for drinking water in strategic locations.</li> <li>• Promote rain water harvesting for domestic and agricultural use; i.e. domestic, rain water harvesting tanks, Ponds &amp; Pathas.</li> </ul>	Ministry of Agriculture Ministry of Irrigation & Water Resources Management Ministry of Finance Ministry of National Policies and Economic Affairs Department of Agrarian development
Inadequate readiness among communities for climate adaptation	<ul style="list-style-type: none"> <li>• Promote research under drought risk reduction</li> <li>• Promote climate adaptation and resilience building activities against natural disasters</li> <li>• Promote climate smart agriculture</li> <li>• Promote organic farming and in-situ domestic crop production systems</li> <li>• Make rainwater harvesting mandatory in the dry zone and urban areas</li> </ul>	Ministry of Agriculture Ministry of Environment Ministry of Disaster Management Ministry of Irrigation & Water Resources Management Ministry of Science, Technology and Research Ministry of National Policies and Economic Affairs Department of Agriculture
Food shortage in the local markets	<ul style="list-style-type: none"> <li>• Development of strategic grain reserve systems for paddy and other crops storage</li> <li>• Introduce food processing systems</li> <li>• Establish direct farmer markets with food certifications</li> </ul>	Ministry of Rural Economic Affairs Ministry of National Policies and Economic Affairs Ministry of Science, Technology and Research Ministry of Agriculture
Inadequate risk transfer mechanisms	<ul style="list-style-type: none"> <li>• Crop insurance schemes should be promoted among farming communities</li> </ul>	Ministry of Agriculture
Strengthening the regulation on water management	<ul style="list-style-type: none"> <li>• Impose regulations and establish monitoring mechanisms for effective water distribution.</li> <li>• Establish a system to strengthen the coordination for water management among the related agencies.</li> </ul>	Ministry of Irrigation Ministry Agriculture Ministry of Mahaweli & Environment Ministry of Power & Energy Ministry of Disaster Management
Challenges in meeting the increased demand for energy	<ul style="list-style-type: none"> <li>• Promote renewable energy systems</li> <li>• Incentives for promotion of solar energy systems</li> </ul>	Ministry of Power & Energy

# Annex I: Methodology

This assessment report was developed using the WFP's 72 hour approach( a needs assessment a system introduced by the VAM team WFP Regional Bureau for Asia Pacific) which is being currently introduced to the agencies under the Ministry of Disaster Management of Sri Lanka.

## **The Remote Sensing Analysis (RSA)**

Remote sensing data were collected using MOD13A3 vegetation indices from MODIS satellite data - USGS Earth Resources Observation and Science (EROS) Center, and the climate hazards infrared precipitation with stations (CHIRPS) from University of California - Santa Barbara. RSA was mainly conducted to analyse the meteoroidal and agricultural droughts. Meteorological drought: the actual rainfall in an area is significantly less than the climatological mean of that area, it's explained as a meteorological drought. In order to explain the meteorological drought, key three indicators were analysed. i.e. rainfall anomaly: a measure of lack of rainfall in a period compared to the average, Standardized Precipitation Index (SPI) a normalized index representing the probability of occurrence of an observed rainfall amount when compared with the rainfall climatology over a long-term period. Negative SPI values represent rainfall deficit, whereas positive SPI values indicate rainfall surplus and Number of days since last rain: The count of the most recent days since a day had rain.

Agricultural drought: A situation when the rainfall and soil moisture are inadequate during the crop growing season to support healthy crop growth to maturity, causing crop stress and wilting. Agricultural drought is explained using Vegetation Health Index (VHI): represents overall vegetation/crop health. VHI was calculated using a combination of Vegetation Condition Index (VCI) and Temperature Condition Index (TCI). The VCI is constructed using the Enhanced Vegetation Index (EVI). EVI is used instead of NDVI as it is more sensitive to changes in areas having high biomass, it reduces the influence of atmospheric conditions on vegetation index values, and it corrects for canopy background signals. The VHI is effective enough to be used as proxy data for monitoring vegetation health, drought, moisture, thermal condition, etc.

The classifications were made using international standards used by World Meteorological Organization (WMO) and United States Drought Monitor (<http://droughtmonitor.unl.edu>) for SPI and National Oceanic and Atmospheric Administration (NOAA) for VHI.

The secondary data review, seasonal forecasting and modelling were calculated using the information reported under key thematic areas of food security, agriculture and water for drinking by all respective technical Ministries and line agencies. The secondary data was mainly collected at the national and district levels. Drought affected household were identified as those facing difficulty in meeting their domestic/ drinking water requirements and/or if a households had lost their crops or livelihood (income) due to the drought. From the secondary data, the severity of the overall incidence of drought and the major affected areas were identified.

The identification of the population mostly at risk is an overlay analysis of geographic impact-Standard Precipitation Index and economic vulnerability-poverty rate. It is in line with the 72hr assessment approach that the World Food Programme has been working on together with the Ministry of Disaster Management and its agencies of Sri Lanka.



## Contributors

This report is produced by the joint efforts from the Ministry of Disaster Management and World Food Programme and other technical Ministries/ agencies who represented the technical team convened with the guidance of Hon. Minister of Disaster Management of Sri Lanka. The remote sensing analysis was primarily conducted by Benny Istanto, GIS & Remote Sensing Specialist, WFP Regional Bureau for Asia.

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