

Memorandum

seeking

ASSISTANCE FROM GOVERNMENT OF INDIA FOR DROUGHT RELIEF

2012-13

(Kharif & Rabi Season)



Submitted by
State Relief Commissioner &
Secretary
Department of Revenue and Disaster Management
Government of Kerala

23-02-2013

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CHAPTER 1: EXECUTIVE SUMMARY

1.1. INTRODUCTION

Indian Meteorological Department declared the onset of monsoon of 2012 on 5th June over Kerala. IMD in its first stage forecast of the South-West monsoon issued on 26th April predicted 47% probability of the monsoon rainfall to be normal (96 to 104 % of long period average). In its press release dated 27 July 2012, IMD reported that Kerala as a whole had a rainfall deficit of 39% from its long period average for the period of 1 June - 25 July. Based on the 'End of South West Monsoon Season report of IMD', Kerala was expected to be receiving 2040 mm of rainfall from June to September, while the actual received was only 1551 mm. Figure 1 shows the monthly rainfall map for the South West Monsoon of 2012 (2012 Southwest Monsoon Season, End of Seasons Report). Figure 2 shows the Actual vs Expected monsoon rainfall (June to December) received by Kerala from 2005 onwards. It is evident from the figure that it was during the 2012 monsoon season that Kerala received the lowest actual rainfall in the the last 8 years during the Monsoon season. For a state like Kerala, which depend heavily on rainfall and subsequently on surface water storage for meeting its drinking water, agricultural and electricity production, this deficit was alarming. Hence, the Kerala State Disaster Management Authority undertook proactive steps for drought risk reduction. A brief time line of the activities is given below.

1.2. TIME LINE OF ACTIVITIES UNDERTAKEN BY THE STATE GOVERNMENT

1.2.1. SITUATION ASSESSMENT AS ON 31 JULY 2012

The Hazard, Vulnerability and Risk Assessment (HVRA) Cell of the Kerala State Disaster Management Authority (KSDMA) analysed the daily rainfall data collected by IMD through the Integrated Agricultural Data Platform (IADP) from 68 rain gauges across Kerala. It was reported by the Cell in the end of July that majority of the State had a deficit of rainfall; 492 villages were severely drought prone (>50% deficit), 1070 villages were moderately drought prone (26-50% deficit), and 22 villages were drought prone (10-26% deficit) as per IMD criteria.

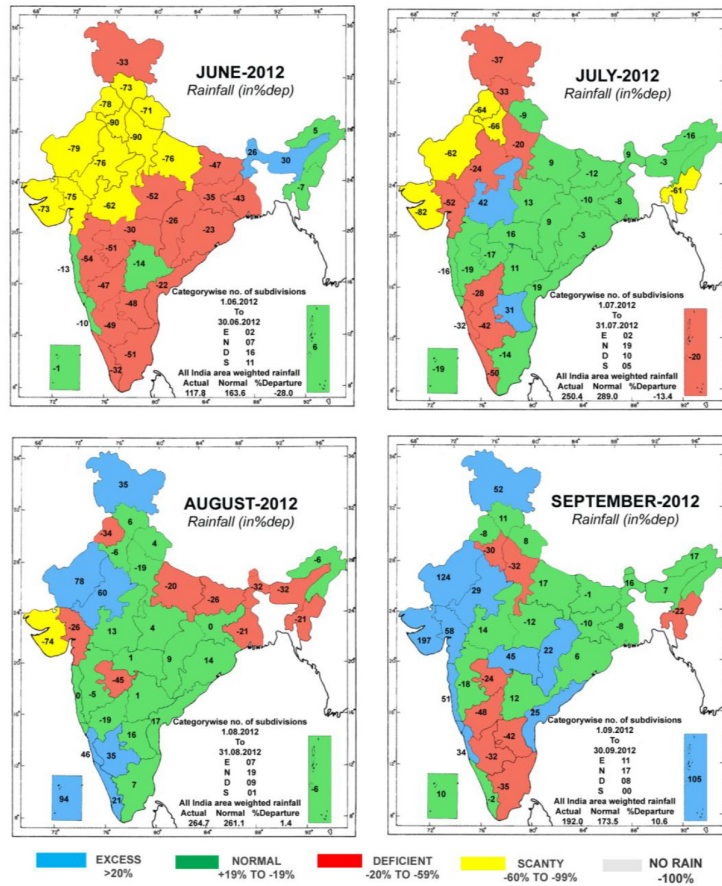


FIGURE 1: MONTHLY RAINFALL OVER INDIA DURING SOUTHWEST MONSOON 2012 (SOURCE: IMD)

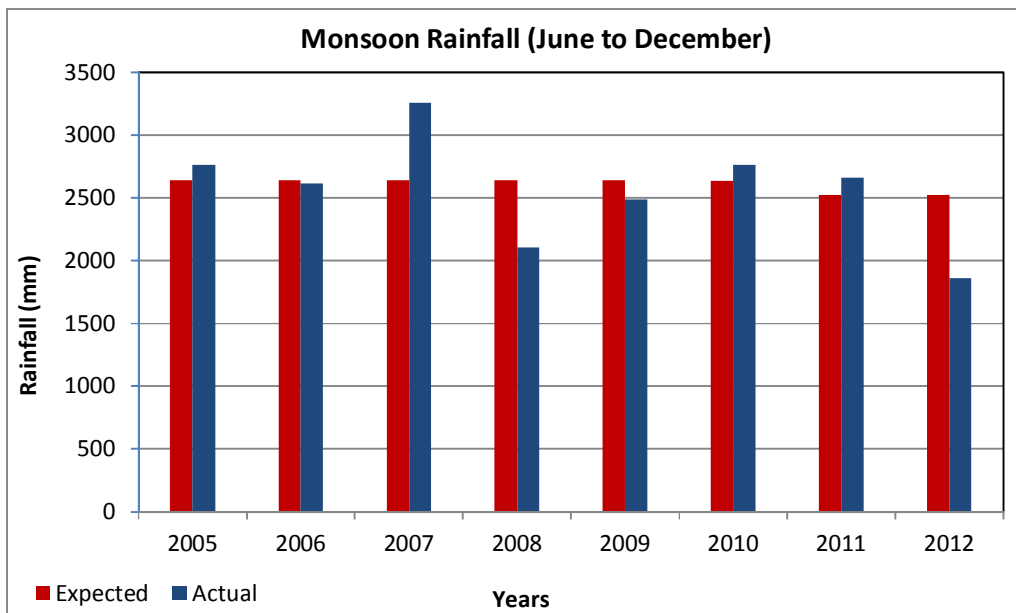


FIGURE 2: MONSOON RAINFALL (JUNE-DECEMBER) – ACTUAL VS EXPECTED (SOURCE: IMD)

1.2.2. MEETING OF KSDMA ON 6 SEPTEMBER 2012

The monsoon intensified since 31 July and the overall deficit dropped to 23% from the 32% as per the values till 5 Sep 2012 (IMD Daily Rainfall Statement issued on 5 September 2012). However, most of the reservoirs of the state showed a record low storage for the season.

The KSDMA under the Chairmanship of Honb'le Chief Minister met on 6 September and observed that if this trend continues the State would be heading towards severe drought. Based on available statistics pertaining to rainfall, reservoir levels and ground water, the Authority resolved to declare four (4) districts of the state as drought affected. After initiating drought risk reduction measures in these four districts, the Govt. of Kerala submitted a memorandum of Rs. 1995 crores to Govt. of India for assistance as sufficient funds were not available with the State Government to undertake massive drought risk reduction measures, particularly given the fact that the entire State was heading towards a drought if the North East Monsoon season too failed. An Inter Ministerial Team from Govt. of India visited the State between 16 and 20 October 2012 for assessing the damages. Based on the directions from this Inter Ministerial Team a revised memorandum was submitted to Govt. of India on 31 October 2012.

1.2.3. MEETING OF KSDMA ON 19 DECEMBER 2012

The rainfall deficit persisted and consequently the reservoir levels and ground water levels further depleted during the

North East Monsoon season.

The overall deficit for the

North East Monsoon season

which began on 1 October

2012 was 35% until 17

December 2012 (IMD Daily



FIGURE 3: MEETING OF THE KSDMA HELD ON 19 DECEMBER 2012

Rainfall Statement issued on 17 December 2012). Acute drinking water shortage began to be

reported from across the state. Irrigation water supply had to be regulated as reservoir storages were alarmingly at its lowest. This led to crop stress, and farmers at some places even had to burn the crop as they dried up beyond recovery. Unlike previous years when water shortage in the State is felt only in late March, this year drinking water supply had to be undertaken even during the monsoon season in districts such as Thiruvananthapuram.

The KSDMA met again under the Chairmanship of the Honb'le Chief Minister of Kerala on 19 December 2012 (Figure 3). The State as on December 2012, decided to declare all districts of Kerala as meteorologically drought affected as per the following criteria:

- **Rainfall** – As per *Page 5 of National Disaster Management Guidelines - Management of Drought, September 2010, published by National Disaster Management Authority, Govt. of India*, a year is classified as Severe Drought Year when the annual rainfall is deficient by 25-40% of normal or more. The expected rainfall from June to September (South West Monsoon) 2012 in Kerala was 23% deficient and the rainfall from October to December 17 was 35% deficient. Thus the overall deficiency was about 29% (Figure 4). Over 80% of the state was moderate to severely drought affected as evident from (Figure 5). This has reflected in water shortage for drinking and irrigation purposes. Considering the fact that only about 10% of the annual (hydrological year) rainfall is received from the summer showers between January to May, it was evident that the State was heading towards acute drought in the 2012-13 hydrological year.
- **Water level in reservoirs** – The water level in the major reservoirs were at record low which indicated that drinking water and irrigation water supply would be affected much earlier than usual (Figure 9). This criterion was used as per *Page 38 of the Manual for Drought Management, November 2009, published by Ministry of Agriculture, Govt. of India*.
- **Ground water level** – The ground water level was depleted by >4 m from its 5 year mean value in many blocks of the State as per the data from open wells of the State Ground Water

Departement. This criterion was used as per *Page 39 of the the Manual for Drought Management, November 2009, published by Ministry of Agriculture, Govt. of India* which states 'A decline of up to 4 m is a cause for concern and above 4 m is a stress situation'.

- **Price of essential commodities** – As the agricultural sector was hit by the drought situation, the price of various commodities in the open market went up in a short period of time. This demanded subsidy aid from Govt. of Kerala to regulate price hike in the open market through its Civil Supplies Department. This criterion was used as per *Page 55 of the the Manual for Drought Management, November 2009, published by Ministry of Agriculture, Govt. of India*.

1.3. IMMEDIATE MEASURES UNDERTAKEN BY STATE GOVERNMENT

- **6 Sep 2012** – KSDMA met and 4 districts were declared drought affected – Thiruvananthapuram, Kollam, Idukki and Wayanad
- **18 Sep 2012** - State Level Bankers Committee (SLBC) advised Lead District Managers to extend relief to borrowers in the 4 districts
- **31 Oct 2012** - Revised memorandum of Rs. 1995 crs submitted to Govt. of India
- **19 Dec 2012** – KSDMA met and all districts were declared drought affected
 - It was decided that a Minister will be given charge of each district and the District Collectors will convene an extended meeting of the District Disaster Management Authorities in the chairpersonship of the Minister in-charge of the district to discuss the various drought risk reduction measures to be undertaken
 - HVRA Cell was declared the State Drought Monitoring Cell and a competent officer was designated as State Nodal Officer for Drought Monitoring to concurrently monitor the evolving drought situation and coordinate the State level activities
 - All departments were given direction to utilize their plan funds first before seeking assistance from SDRF

- **26 Dec 2012** – An urgent Drought Risk Reduction Workshop was organized by the State Drought Monitoring Cell – Heads/Representatives of major line departments participated. This meeting brought out 26 recommendations for the District Collectors to follow for drought risk reduction (Given as Annexure 1)
- **28 Dec 2012** - Guidelines for SDRF utilization was evolved and they were communicated to all District Collectors
- **29 Dec 2012** – Directions were sent to District Collectors with formats for drought monitoring
- **1 Jan 2013** - Directions were sent to Ground Water Dept., Irrigation Dept. and KSEB with formats for weekly monitoring and reporting of water level status
- **4 Jan 2013** - Honb'le Minister for Revenue and DM conducted a video conference with all District Collectors and following directions were given:
 - Recommendations of the urgent workshop should be considered seriously
 - Water Availability to Hospitals and Schools shall be a priority
 - Bills and vouchers of spending from SDRF to be meticulously maintained
- **9 Jan 2013** - Dept. of Agriculture was directed to undertake loss estimation in the prescribed format
- **18 Jan 2013** – State Relief Commissioner reviewed the drought risk reduction activities of the District Collectors
- **21 Jan 2013** - District Collectors requested for a total of Rs. 383 crores for undertaking immediate drought relief
- **23 Jan 2013** - Special Cabinet Meeting on Drought wherein the State Relief Commissioner and the State Nodal Officer for Drought Monitoring were asked to present the status
 - Considering the request of the District Collectors, the Council of Ministers decided to allocate a total of Rs. 85 crores from SDRF to all districts for drought relief

- An additional amount of Rs. 79 crores and Rs. 13 crores was allocated to Dept. of Irrigation and Dept. of Ground Water respectively, from the State's own budget for undertaking urgent drought risk reduction measures
 - Decided to declare moratorium and waiver one year interest of agriculture loans issued by the banks under the State Government
 - Decided to publish a booklet for drought risk reduction for sensitizing the public
 - Decided to appeal to the SLBC to consider extending all possible relief to the farmers of the State
- **13 Feb 2013** - The working group of the Dept. of Disaster Management resolved to allocate Rs. 3.92 crores to districts for undertaking drought risk reduction campaigns in the grass root level, to upgrade the district and taluk control rooms and to use for any drought relief activities (discretionary funds) for which funds are not readily available from any other sources.

The district administration under the leadership of the Collectors has been instructed to implement all the decisions related to drought management on the ground. The Collectors are asked to monitor all the indicators of drought on the ground: collect data on rainfall on a daily basis from sources other than IMD that includes rain gauges maintained by private plantations and important water storages in the district and a weekly basis communicate the same to the State Disaster Management Authority. The Collectors are also asked to monitor all local information related to demand for relief employment, prices of food grains and the availability of fodder. All relief activities such as relief, employment, distribution of food grains, supply of drinking water and procurement and sale of fodder are coordinated by the District Collectors.

The District Collectors have already directed all the line departments at the district level to participate in drought management, prepare contingency plans and mobilize their staff and

resources. The technical departments have identified works and have prepared estimates so that there is adequate work on the shelf to provide relief employment in the drought-affected areas.

The District Collectors concurrently assess the situation related to scarcity of drinking water and fodder, and issue appropriate instructions regarding conservation of drinking water, supply of drinking water through tankers, repair of hand pumps, augmentation and minor repair of existing public water supply system, procurement and sale of fodder, and setting up of fodder depots and cattle camps.

As part of coordinating relief and mitigation activities, the District Disaster Management Authorities that are set up under the chairmanship of the Collector consisting of Panchayati Raj officials and the district officials meet frequently and review the progress of drought relief and mitigation measures in the district. The State/District disaster management authorities are made fully functional and the following actions have been taken/being taken to tackle the drought situation.

- The State Drought Monitoring Cell has convened a meeting of all Heads of the Departments and have evolved a consensus on 26 items to be addressed with priority by District Collectors for tackling the drought situation
- Meetings of District Disaster Management Authorities of concerned districts have been convened under the Chairmanship of the Minister in-charge of the District
- The Honb'le Minister for Revenue and Disaster Management and the Relief Commissioner is constantly reviewing the progress of the drought risk reduction activities undertaken by the districts
- State Drought Monitoring Cell is concurrently assessing the rainfall, ground water level and reservoir levels and is advising the State government regarding the situation on ground and measures needed from the State level to support the Districts in smooth implementation of Drought Risk Reduction activities

- District Collectors has developed a strategy for drought management in active consultation with all the participating district level heads of departments
- A contingency plan for drought management has been developed by all districts
- All the departments/agencies have prepared their own contingency plans
- Funds available with the Govt. of Kerala from various sources have been pooled and have been handed over to District Collectors for immediate relief activities

The State Drought Monitoring Cell requested all line departments to conduct loss estimates in sectors such as agriculture, animal husbandry, and power, and requested all District Collectors to compile the requirements for immediate relief needs such as provision of drinking water to the most affected population. On the basis of this assessment, it was decided by the State Government to submit an appeal to Government of India in addition to the Memorandum submitted in October 2012 seeking financial assistance as the losses were too high for the State alone to bear. Chapter 4 shows the drought losses and assistance required for drought risk reduction in the State.

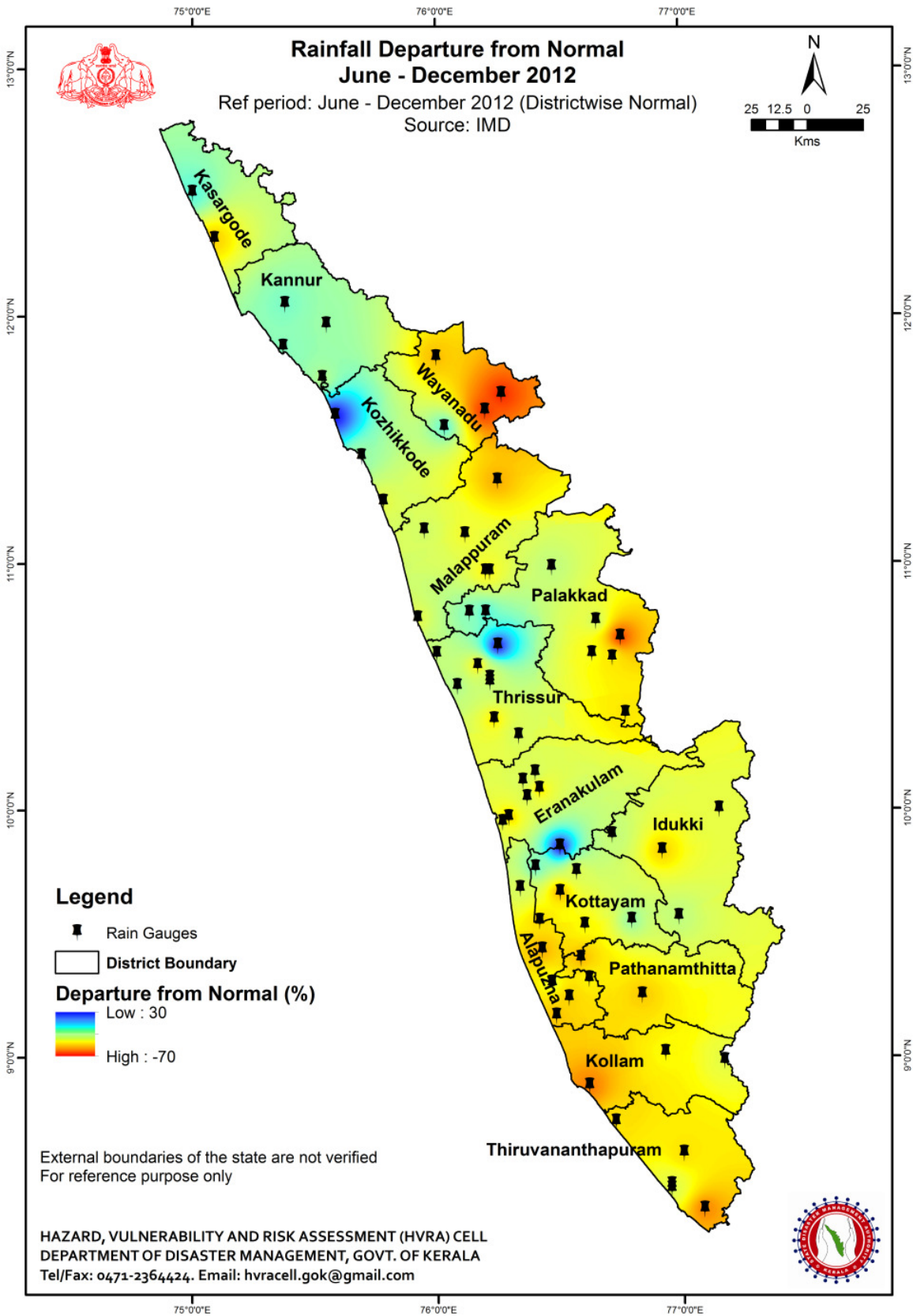


FIGURE 4: JUNE-DECEMBER 2012 RAINFALL DEPARTURE FROM SEASONAL NORMAL

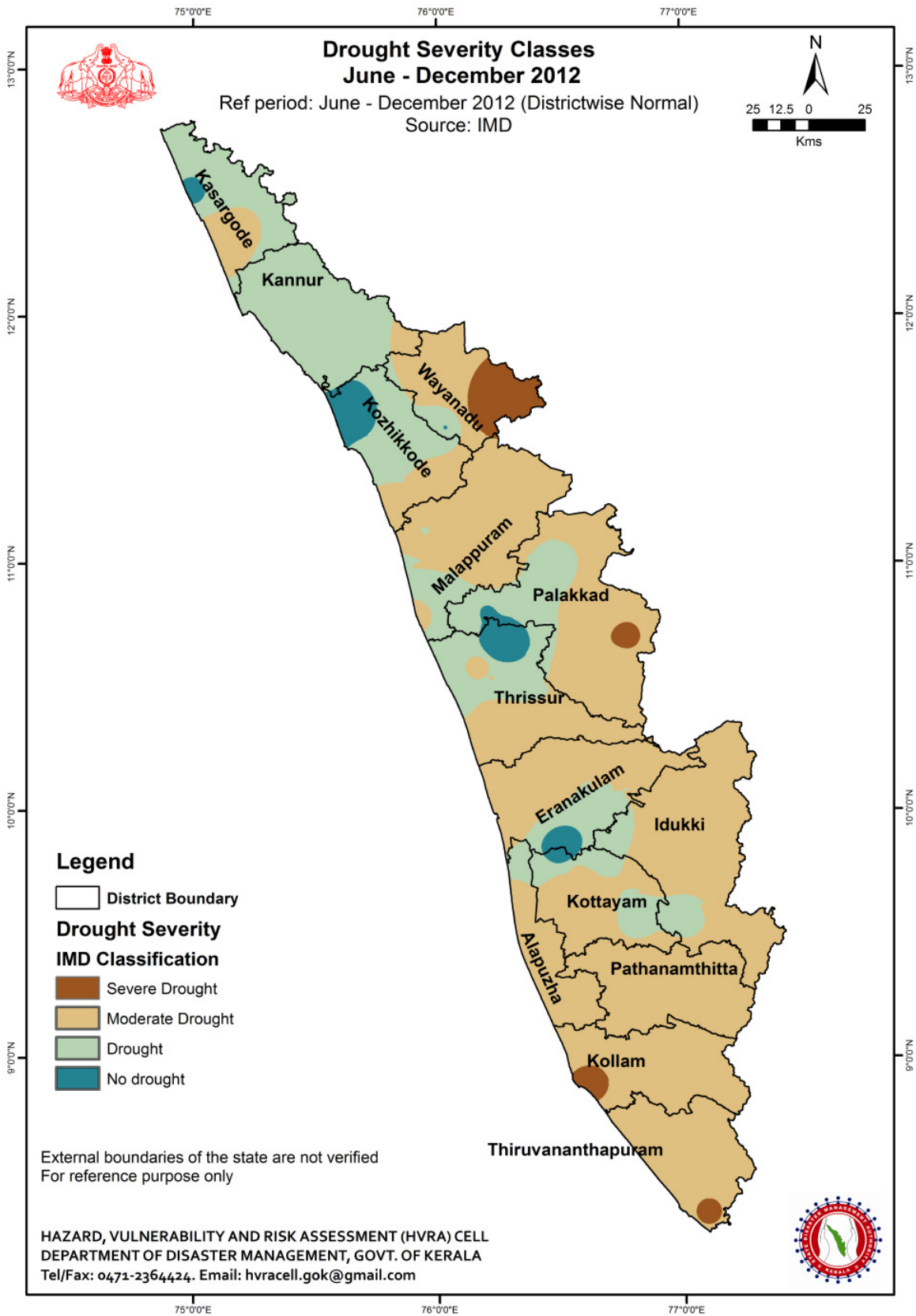


FIGURE 5: DROUGHT SEVERITY MAP

TABLE 1: TOTAL LOSS IN THE 2012-13 DROUGHT IN KERALA TILL FEBRUARY 2013

Sl. No.	Sector	Amount (Rs. in Lakhs)
1	Table 7: Cost of repair of local water supply schemes and drinking water supply through tankers	8457.79711
2	Table 8: Cost of short distance (500 m or less) drinking water pipeline extension	20287.68225
3	Table 9: Cost of temporary checkdams and repair of existing checkdams	8096.68282
4	Table 10: Cost of repair of hand pumps, tube wells and open wells	9690.4922
5	Table 11: Agricultural losses in the districts (Kharif & Rabi) 2012-13	581066.3
6	Table 12: Loss of animals/poultry due to drought	8.699
7	Table 13: Water supply in cattle camps	14
8	Table 14: Additional cost of medicines and vaccines	98
9	Table 16: Losses to the power sector due to drought	161090
Grand Total		
(Rs. Seven thousand eight hundred and eighty eight crore nine lakh sixty five thousand thirty four only)		788809.6534

TABLE 2: ASSISTANCE REQUESTED FROM GOVERNMENT OF INDIA AS PER SDRF NORMS
EXCLUDING THE CLAIM MADE IN THE MEMORANDUM SUBMITTED IN OCTOBER 2012

Sl. No.	Sector	Amount (Rs. in Lakhs)
1	Table 7: Cost of repair of local water supply schemes and drinking water supply through tankers	7709.846
2	Table 8: Cost of short distance (500 m or less) drinking water pipeline extension	10158.32225
3	Table 9: Cost of temporary checkdams and repair of existing checkdams	8096.68282
4	Table 10: Cost of repair of hand pumps, tube wells and open wells	9602.193
5	Table 11: Agricultural losses in the districts (Kharif & Rabi) 2012-13	13592.33
6	Table 12: Loss of animals/poultry due to drought	8.699
7	Table 13: Water supply in cattle camps	14
8	Table 14: Additional cost of medicines and vaccines	98
Grand Total (Rs. Four hundred and ninety two crore eighty lakhs seven thousand only)		49280.07

Thiruvananthapuram
21-02-2013

Kamalavardhana Rao IAS
Relief Commissioner & Secretary
Department of Revenue and Disaster Management

CHAPTER 2: AGRICULTURAL SCENARIO OF THE STATE

2.1. INTRODUCTION

The total geographic area of the State is 3886287 ha. The net area under cultivation in Kerala during the year 2010-11 was 2071507 ha, which occupies 53.30% of the total area in the State. The total cropped area was 2647461 ha during the year 2010-11. The current contributions of service sector, industrial sector and agricultural sector to State GDP are 69.7, 20.5 and 9.8 respectively. Table 3 provides a brief picture of the agricultural statistics of the state.

TABLE 3: AGRICULTURAL STATISTICS OF KERALA AT A GLANCE (2010-11)

Sl. No	Land use	Area (ha)
1	Forest	1081509
2	Land under miscellaneous tree crops	3690
3	Cultivable waste	91665
4	Fallow other than current fallow	51943
5	Current fallow	76028
6	Net area sown	2071507
7	Area sown more than once	575954
8	Total cropped area	2647461

The agricultural sector of Kerala is characterised by the following:

- Less area under food crops
- Predominance of perennial crops like coconut, rubber, spices tea, coffee, cashew etc.
- Predominance of small and marginal farmers (92%)
- Low level of productivity
- High cost of production
- High percentage of senile and old plantations
- **Highly sensitive to average annual rainfall**
- Low Per capita land - 0.12 ha
- High Labour Cost

Agricultural crops in the state are broadly classified as food crops and non-food crops. Food crops are cereals, millets, sugar crops, spices, condiments, fresh fruits, vegetables, etc. The major non-food crops are rubber, betel leaves, lemon grass, etc.



FIGURE 6: MAJOR CROPS AND GROWING AREAS OF KERALA

Table 4 shows the statistics related to principal crops produced in the state.

TABLE 4: AREA, PRODUCTION AND PRODUCTIVITY OF PRINCIPAL CROPS OF KERALA (2010-11)

Sl. No	Crops	Area (ha)	Production (MT)	Productivity (kg/ha)
1	Rice	213185	522739	2452
2	Pulses	3823	2908	760
3	Pepper	172182	45267	263
4	Ginger	6088	33197	5453
5	Turmeric	2391	6216	2600
6	Cardamom	41242	7935	192
7	Areca nut	99834	99909	1001
8	Banana	58671	483667	8244
9	Other plantations	49129	353772	7201
10	Cashew nut	43848	34752	793
11	Tapioca	72284	2360081	32650
12	Coconut	770473	5287	6862
13	Coffee	84931	65650	773
14	Tea	36965	57107	1545
15	Rubber	534230	770580	1442

CHAPTER 3: INCIDENCE AND SPREAD OF DROUGHT

3.1. SEASONS OF KERALA

Kerala state experiences three distinct seasons they being, the South West Monsoon (June-September), the North East Monsoon (October-December) and the Pre Monsoon (January-May). The Pre-Monsoon season is generally dry and receives only scanty rainfall. The South West Monsoon is the major rainfall contributor to the state, providing on an average 43% of the annual rainfall in southern districts and 83% of annual rainfall in the northern districts. The North East provides about 33% of the annual rainfall in southern districts and 9% of annual rainfall in the northern districts. The reliability of the expected rainfall in the South West Monsoon is about 96% while that of North East Monsoon is only about 40%. The hydrological year in the state begins on 1 June and ends on 31 May which is based on the long period average date of onset of South West Monsoon.

3.2. RAINFALL, RESERVOIR STORAGE AND GROUND WATER LEVEL DURING THE MONSOON SEASON OF 2012

IMD in its first stage forecast of the South-West monsoon issued on 26th April 2012 predicted 47% probability of the monsoon rainfall to be normal (96 to 104 % of long period average). Based on this prediction, all departments were instructed to prepare for a normal monsoon condition. However, the monsoon had a delayed start as it set in over Kerala only on 5th June. In its press release dated 27 July 2012, IMD reported that Kerala as a whole had a rainfall deficit of 39% from its long period average for the period of 1 June - 25 July. Expected rainfall from 1 June to 25 July for Kerala was 1255.1 mm while actual rainfall was only 760.9 mm (Weekly Press Release, IMD, 27 July 2012). This demanded a detailed investigation of the rainfall characteristics of Kerala for extracting indicators of impending drought.

3.2.1. OVERALL PERFORMANCE OF THE 2012 MONSOON SEASON (JUNE-DECEMBER)

Figure 7 shows the district wise rainfall departure from expected for the period from June to December 2012. It can be seen that 10 out of 14 districts have >25% deficit in rainfall and thus as per NDMA criteria these districts are facing Severe Drought.

3.2.2. PERFORMANCE OF THE 2012 SOUTH WEST MONSOON SEASON (JUNE-SEPTEMBER)

Following the criteria laid by IMD and the daily rainfall data collected by IMD as part of the Integrated Agricultural Data Platform (IADP) from 68 rain gauges, the rainfall deficit and actual rainfall received from 1 June 2012 - 31 July 2012 was mapped. It is in June and July that almost 70% of the rainfall during the South West Monsoon season is expected in the State.

Based on the analysis it was found that majority of the state was facing a significant deficit of rainfall by the end of July 2012; 492 villages were severely drought affected (>50% deficit), 1070 villages were moderately drought affected (26-50% deficit), and 22 villages were slightly drought prone (10-26% deficit). The deficit ranged from 32 to 80% from the long period normal for the season and this data has been reported in detail in the Memorandum submitted on 31 October 2012. The monsoon intensified since 31 July and the overall deficit dropped to 23% from the 32% as per the values till 5 Sep 2012 (IMD Daily Rainfall Statement issued on 5 September 2012). However, most of the reservoirs of the state showed a record low storage for the season.

The KSDMA under the Charimanship of Honb'le Chief Minister met on 6 September and observed that if this trend continues the State would be heading towards severe drought. Based on available statistics pertaining to rainfall, reservoir levels and ground water, the Authority resolved to declare four (4) districts of the state as drought affected.

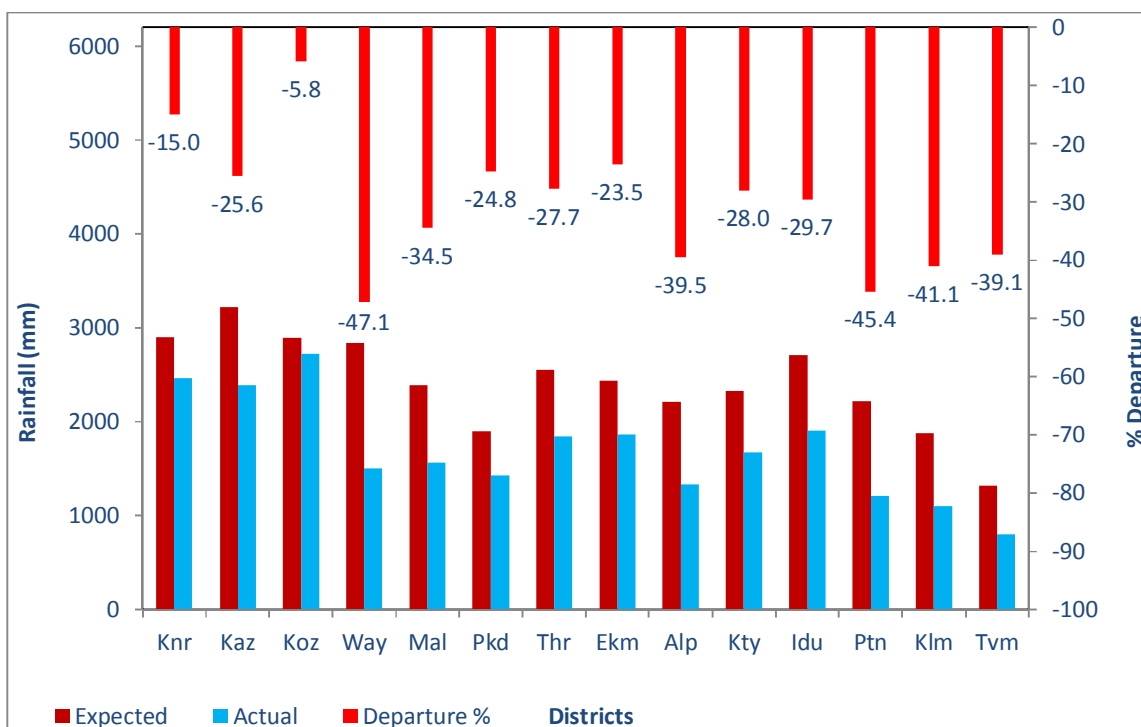


FIGURE 7: DISTRICT WISE ACTUAL VS EXPECTED RAINFALL AND DEPARTURE FROM NORMAL FROM JUNE TO DECEMBER 2012

Although the overall deficit was only 23%, the intra-district variability of rainfall and thereby the actual water availability in the respective districts cannot be deduced directly from this value. The departure of actual rainfall from normal rainfall at the 68 raingauges in the IADP network across Kerala for the period 1 June to 30 September 2012 is given in Table 5.

TABLE 5: 1 JUNE TO 30 SEPTEMBER 2012 ACTUAL RAINFALL (MM) AND DEPARTURE (%) FROM NORMAL (MM)

ID	Station	District	Normal RF	Actual RF	Departure %
1	Kannur	Kannur	2652.1	2255.7	-14.95
2	Taliparamba	Kannur	2669.6	2351.2	-11.93
3	Thalasserry	Kannur	2652.1	2148.7	-18.98
4	Irikkur	Kannur	2669.6	2163	-18.98
5	Hosdurg	Kasaragod	2979.9	1741.2	-41.57
6	Kudulu	Kasaragod	2979.9	2764.2	-7.22
7	Kozhikode	Kozhikode	2363.1	1739.1	-26.41
8	Vadakara	Kozhikode	2832.3	3235.0	14.22
9	Quilandy	Kozhikode	2612.9	2063.1	-21.04
10	Mananthavady	Wayanad	2091	1317.6	-36.99
11	Vythiri	Wayanad	3172.7	2284.3	-28
12	Ambalavayal	Wayanad	3172.7	782.6	-75.33
13	Kuppady	Wayanad	2091	685.3	-67.22
14	Nilambur	Malappuram	2005.6	1117.5	-44.28
15	Manjeri	Malappuram	2130.4	1411.0	-33.77
16	Perinthalmanna	Malappuram	2130.4	1372.6	-35.57
17	Ponnani	Malappuram	2046.1	1404.5	-31.36

18	Angadippuram	Malappuram	2130.4	1360.0	-36.16
19	Karipur AP	Malappuram	2130.4	1622.8	-23.83
20	Palakkad	Palakkad	1394.4	1161.9	-16.67
21	Mannarkad	Palakkad	1698.9	1188.7	-30.03
22	Ottappalam	Palakkad	1758.8	2058.6	17.05
23	Alathur	Palakkad	1435.8	1040.5	-27.53
24	Chittur	Palakkad	1394.4	514.4	-63.1
25	Kollengode	Palakkad	1435.8	874.6	-39.09
26	Pattambi	Palakkad	1758.8	1439.4	-18.16
27	Thrithala	Palakkad	1758.8	1433.4	-18.5
28	Parambikulam	Palakkad	1435.8	845.2	-41.13
29	Thrissur	Thrissur	2249.1	1744.6	-22.43
30	Kodungallur	Thrissur	2224.6	1478.4	-33.54
31	Irinjalakuda	Thrissur	2218.7	1385.7	-37.54
32	Vadakkancherry	Thrissur	1995	1365.0	-31.57
33	Kunnamkulam	Thrissur	2046.1	1619.1	-20.869
34	Chalakydy	Thrissur	2300.2	1478.7	-35.71
35	Enamackel	Thrissur	2218.7	1837.2	-17.19
36	Vellanikkara	Thrissur	2224.6	1636.6	-26.43
37	Kochi AP	Ernakulam	2074	1219.8	-41.19
38	Aluva	Ernakulam	2141.9	1518.2	-29.12
39	Piravom	Ernakulam	2074	2207.9	6.45
40	Perumbavur	Ernakulam	1987.1	1245.6	-37.32
41	CIAL Kochi	Ernakulam	2074	1376.9	-33.61
42	Ernakulam South	Ernakulam	2074	942.6	-54.55
43	Alappuzha	Alappuzha	1830.5	1103.4	-39.72
44	Kayamkulam	Alappuzha	1391.8	962.0	-30.88
45	Mavelikkara	Alappuzha	1731.2	985.1	-43.09
46	Cherthala	Alappuzha	1764.3	1258.4	-28.67
47	Mancompu	Alappuzha	1830.5	969.7	-47.03
48	Haripad	Alappuzha	1837	1118.7	-39.10
49	Chengannur	Alappuzha	1920.8	998.2	-48.03
50	Kottayam	Kottayam	1830.5	1133.6	-38.07
51	Vaikom	Kottayam	1830.5	1664.9	-9.05
52	Kumarakom	Kottayam	1830.5	978.5	-46.54
53	Kozha	Kottayam	1830.5	1238.4	-32.35
54	Kanjirappally	Kottayam	1830.5	1420.6	-22.39
55	Peermade	Idukki	3104.5	1939.0	-37.54
56	Thodupuzha	Idukki	3104.5	1577.0	-49.20
57	Munnar	Idukki	2771.8	1589.0	-42.67
58	Idukki	Idukki	3104.5	1324.8	-57.32
59	Thiruvalla	Pathanamthitta	1713.8	911.3	-46.82
60	Konni	Pathanamthitta	1716.2	929.6	-45.83
61	Kollam	Kollam	1266.5	613.9	-51.52
62	Aryankavu	Kollam	1271.5	814.0	-35.98
63	Punalur	Kollam	1458.3	805.4	-44.77
64	Trv City	Thiruvananthapuram	855.7	503.6	-41.15
65	Trv AP	Thiruvananthapuram	818.1	604.8	-26.07

66	Nedumangad	Thiruvananthapuram	830.1	377.0	-54.58
67	Neyyattinkara	Thiruvananthapuram	715.2	328.0	-54.14
68	Varkala	Thiruvananthapuram	1137.9	496.3	-56.38

From the above data it was evident that the districts of Thiruvananthapuram (43%), Kollam (40%) and Wayanad (50%) was facing significant rainfall deficit and Pathanamthitta (39%) and Alappuzha (38%) were in line subsequently. Figure 8A shows the rainfall departure from normal for the period from 1 June to 30 September 2012. It can be seen that majority of the State had a deficit of rainfall.

3.2.3. PERFORMANCE OF THE 2012 NORTH EAST MONSOON SEASON (OCTOBER-DECEMBER)

The rainfall deficit persisted and consequently the reservoir levels and ground water levels further depleted during the North East Monsoon season. The overall deficit for the North East Monsoon season which began on 1 October 2012 was 35% until 17 December 2012 (IMD Daily Rainfall Statement issued on 17 December 2012). The departure of actual rainfall from normal rainfall at the 68 raingauges of the IADP network across Kerala for the period 1 October to 31 December 2012 is given in Table 6.

TABLE 6: 1 OCTOBER TO 31 DECEMBER 2012 ACTUAL RAINFALL (MM) AND DEPARTURE (%) FROM NORMAL (MM)

ID	Station	District	Normal RF	Actual RF	Departure %
1	Kannur	Kannur	322	260.2	-19.19
2	Taliparamba	Kannur	322	209.6	-34.91
3	Thalasserry	Kannur	322	192.5	-40.21
4	Irikkur	Kannur	322	276	-14.29
5	Hosdurg	Kasaragod	316	96.5	-69.46
6	Kudulu	Kasaragod	316	183.7	-41.87
7	Kozhikode	Kozhikode	387	287.3	-25.76
8	Vadakara	Kozhikode	387	471	21.71
9	Quilandy	Kozhikode	387	364.4	-5.84
10	Mananthavady	Wayanad	306	215.3	-29.64
11	Vythiri	Wayanad	306	265	-13.39
12	Ambalavayal	Wayanad	306	209.6	-31.50
13	Kuppady	Wayanad	306	247	-19.28
14	Nilambur	Malappuram	412	124.6	-69.75
15	Manjeri	Malappuram	412	189	-54.13
16	Perinthalmanna	Malappuram	412	208.2	-49.46
17	Ponnani	Malappuram	412	283	-31.31
18	Angadippuram	Malappuram	412	164.1	-60.16
19	Karipur AP	Malappuram	412	286.4	-63.83

20	Palakkad	Palakkad	386	219	-43.26
21	Mannarkad	Palakkad	386	286.4	-25.80
22	Ottappalam	Palakkad	386	325.4	-15.69
23	Alathur	Palakkad	386	195.2	-49.43
24	Chittur	Palakkad	386	181.9	-52.87
25	Kollengode	Palakkad	386	277	-28.23
26	Pattambi	Palakkad	386	315.7	-18.21
27	Thrithala	Palakkad	386	217	-43.78
28	Parambikulam	Palakkad	386	297	-23.05
29	Thrissur	Thrissur	437	208.5	-52.29
30	Kodungallur	Thrissur	437	359.4	-17.76
31	Irinjalakuda	Thrissur	437	213.6	-51.12
32	Vadakkancherry	Thrissur	437	261	-40.27
33	Kunnamkulam	Thrissur	437	346.4	-20.73
34	Chalakydy	Thrissur	437	370.7	-15.17
35	Enamackel	Thrissur	437	193.8	-55.65
36	Vellanikkara	Thrissur	437	230.3	-47.29
37	Kochi AP	Ernakulam	451	489.3	8.6
38	Aluva	Ernakulam	451	265.3	-41.18
39	Piravom	Ernakulam	451	823	82.48
40	Perumbavur	Ernakulam	451	245.3	-45.61
41	CIAL Kochi	Ernakulam	451	412	-8.64
42	Ernakulam South	Ernakulam	451	402.5	-10.75
43	Alappuzha	Alappuzha	529	170.9	-67.69
44	Kayamkulam	Alappuzha	529	192.2	-63.66
45	Mavelikkara	Alappuzha	529	229	-56.71
46	Cherthala	Alappuzha	529	347.5	-34.31
47	Mancompu	Alappuzha	529	173.6	-67.18
48	Haripad	Alappuzha	529	344.9	-34.80
49	Chengannur	Alappuzha	529	326.8	-38.22
50	Kottayam	Kottayam	494	320.7	-35.08
51	Vaikom	Kottayam	494	391.4	-20.77
52	Kumarakom	Kottayam	494	275.5	-44.23
53	Kozha	Kottayam	494	417.8	-15.43
54	Kanjirappally	Kottayam	494	501.3	1.47
55	Peermade	Idukki	522	173.6	-66.74
56	Thodupuzha	Idukki	522	496.9	-4.81
57	Munnar	Idukki	522	290.2	-44.41
58	Idukki	Idukki	522	236.4	-54.71
59	Thiruvalla	Pathanamthitta	570	255.5	-55.18
60	Konni	Pathanamthitta	570	309.2	-45.75
61	Kollam	Kollam	590	197.9	-66.46
62	Aryankavu	Kollam	590	476.4	-19.25
63	Punalur	Kollam	590	381.8	-35.29
64	Trv City	Thiruvananthapuram	479	390.7	-18.44
65	Trv AP	Thiruvananthapuram	479	333.2	-30.44
66	Nedumangad	Thiruvananthapuram	479	399.2	-16.66
67	Neyyattinkara	Thiruvananthapuram	479	260	-45.72

68	Varkala	Thiruvananthapuram	479	261.5	-45.71
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Figure 8B shows the rainfall departure from normal for the period from 1 October to 31 December 2012. Note that the deficit of rainfall is more towards the Southern Districts which aggravated the situation as it is normally the Southern Districts that benefits from the North East Monsoon rainfall.

3.2.4. RESERVOIR STORAGE AT THE END OF MONSOON SEASON (JUNE-DECEMBER)

The rainfall deficits lead to initiate an assessment of the water level status in the major reservoirs of the State. Most of the reservoirs of the state showed a record low storage for the season. Figure 9 shows the storage status in the hydro-electric and multi-purpose project reservoirs of Kerala in comparison with the 5 year mean water level for the month of September. It is evident from Figure 9 that when the water storage was supposed to be at or near the maximum, especially in major reservoirs such as Idukki, Kakki and Kallada, the water storage was substantially below the 5 year mean. The situation has only further aggravated since then.

3.2.5. GROUND WATER STORAGE AT THE END OF MONSOON SEASON (JUNE-DECEMBER)

Ground water level data from open wells were assessed to identify any draw-down. Maps pertaining to the ground water draw-down with respect to the mean derived from available data were prepared (Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, Figure 15 and Figure 16). The maps are only pictorial representations of the departure. Kannur and Kollam showed the highest and most wide spread ground water draw-down during the monsoon season measuring to a maximum of about 12 m and 10 m from normal at some open wells, respectively.

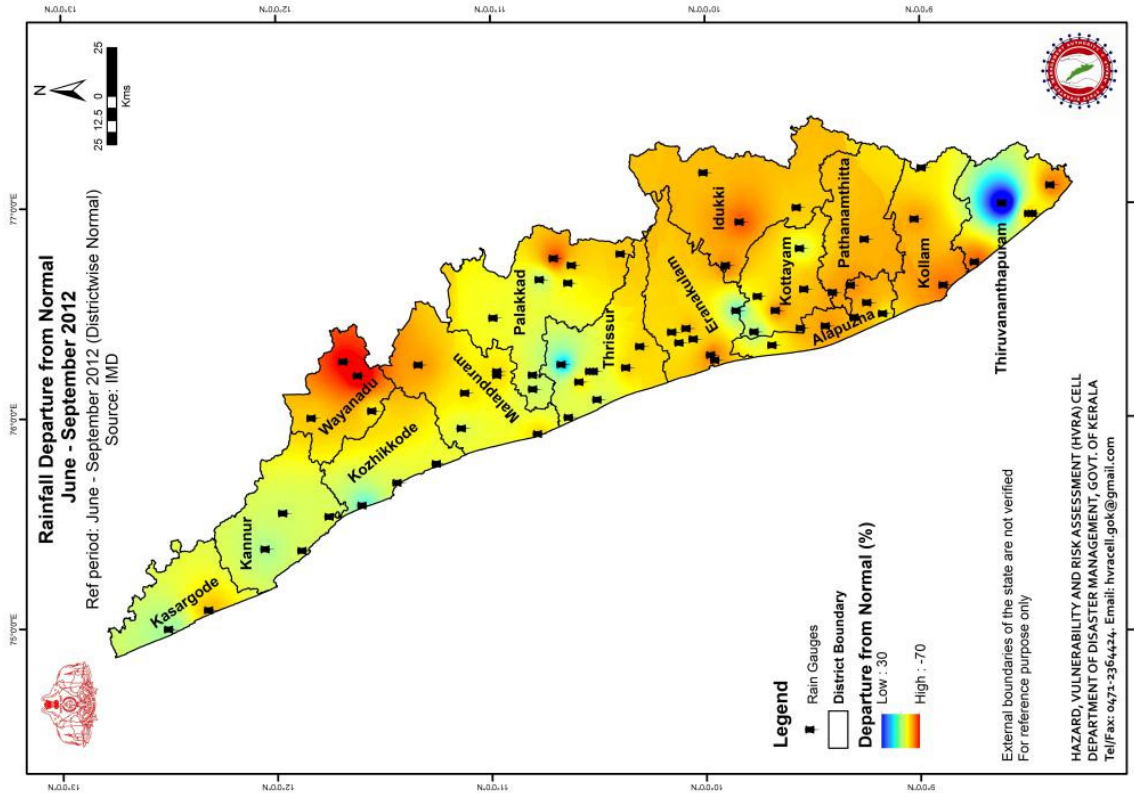
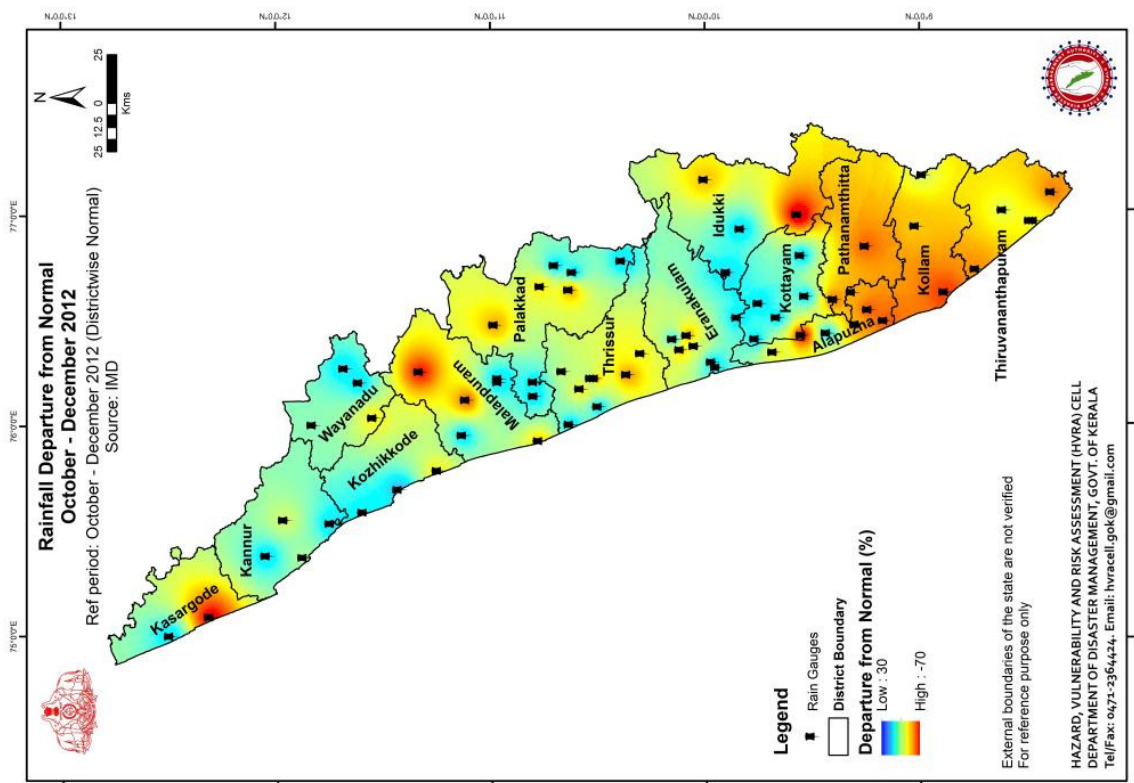


FIGURE 8: A) JUNE-SEPTEMBER AND B) OCTOBER-DECEMBER 2012 SEASONAL RAINFALL DEPARTURE FROM NORMAL

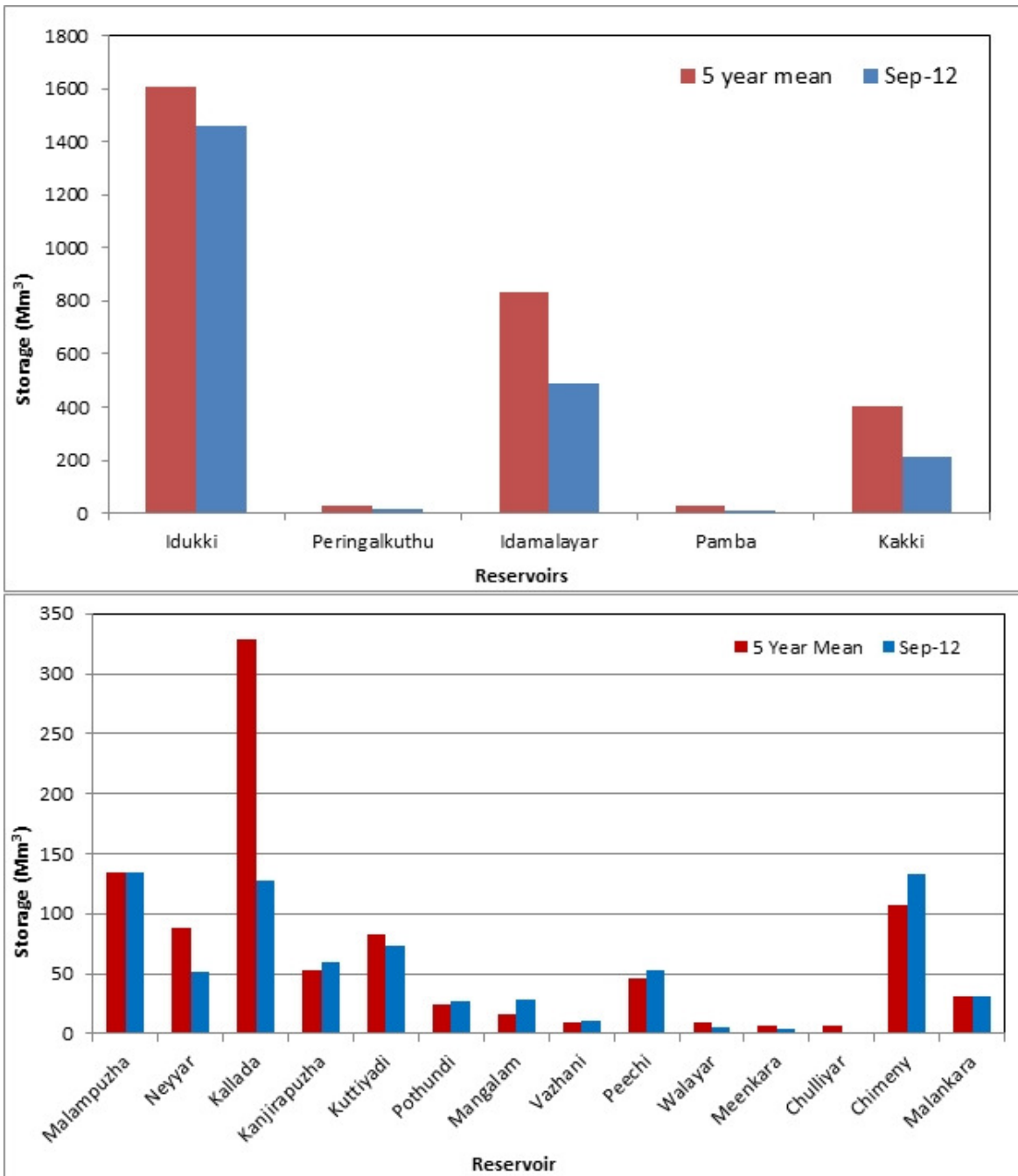


FIGURE 9: STORAGE AS ON SEPTEMBER 2012 IN THE HYDRO-ELECTRIC AND MULTI-PURPOSE PROJECT RESERVOIRS OF KERALA IN COMPARISON WITH THE 5 YEAR MEAN WATER LEVEL FOR THE MONTH OF SEPTEMBER

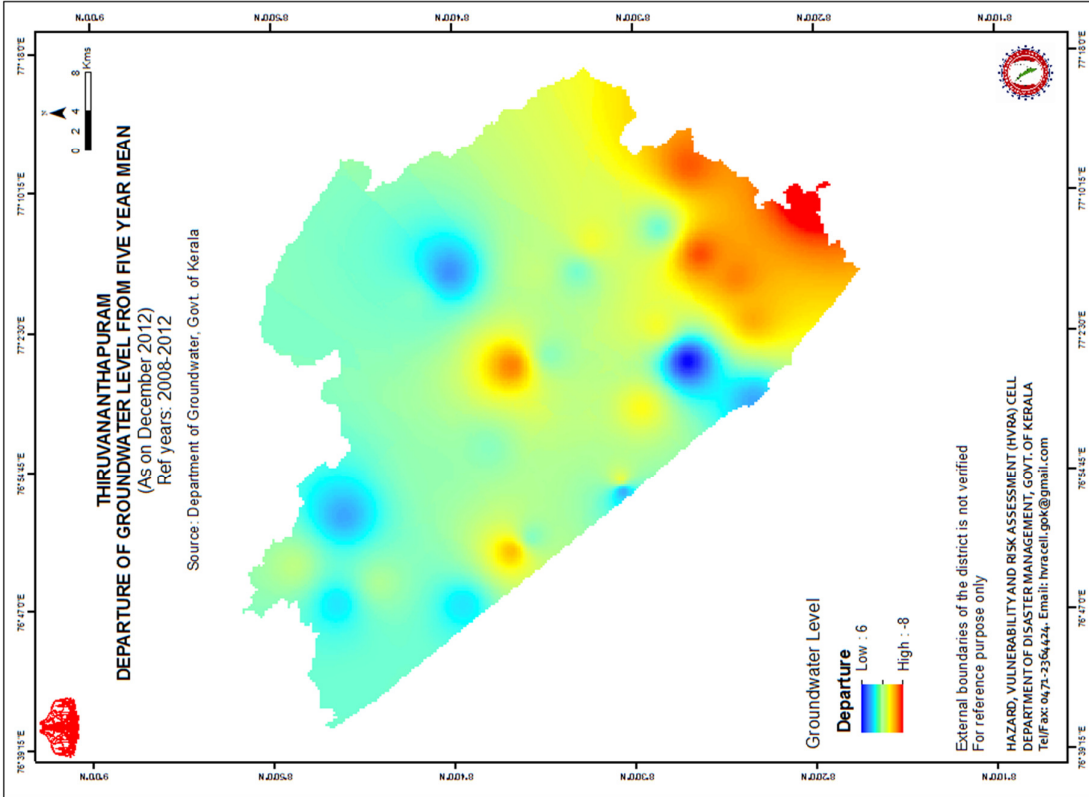
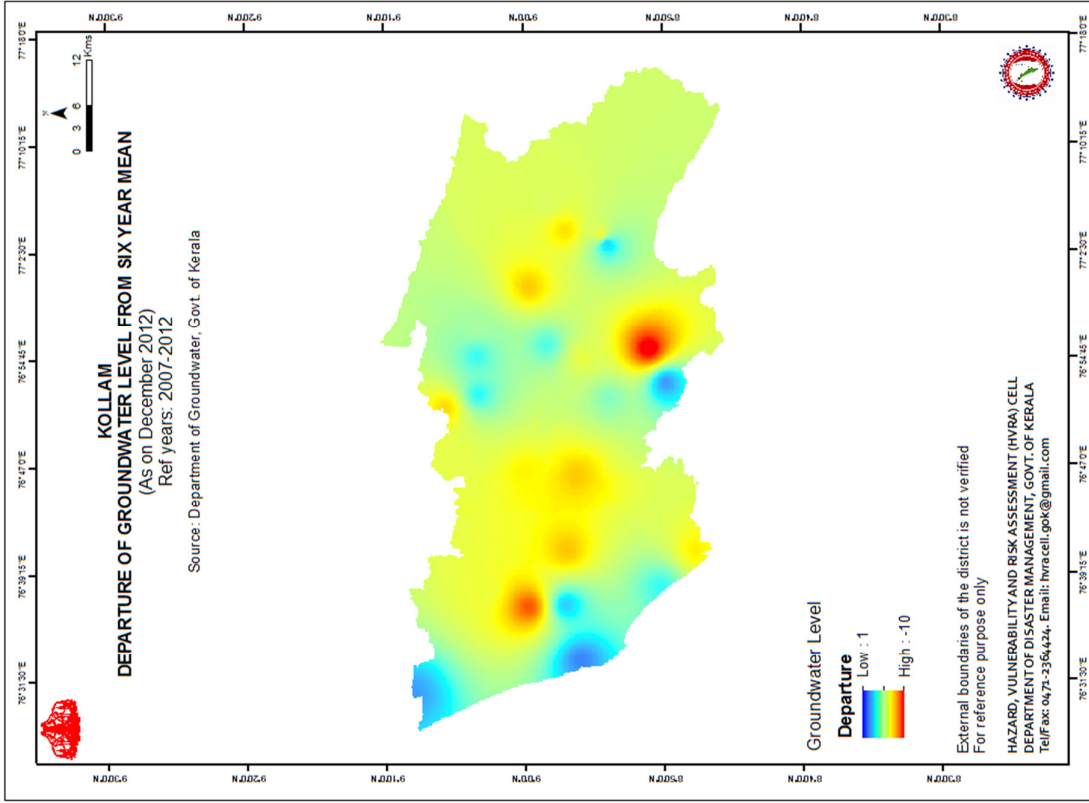


FIGURE 10: GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – THIRUVANANTHAPURAM & KOLLAM

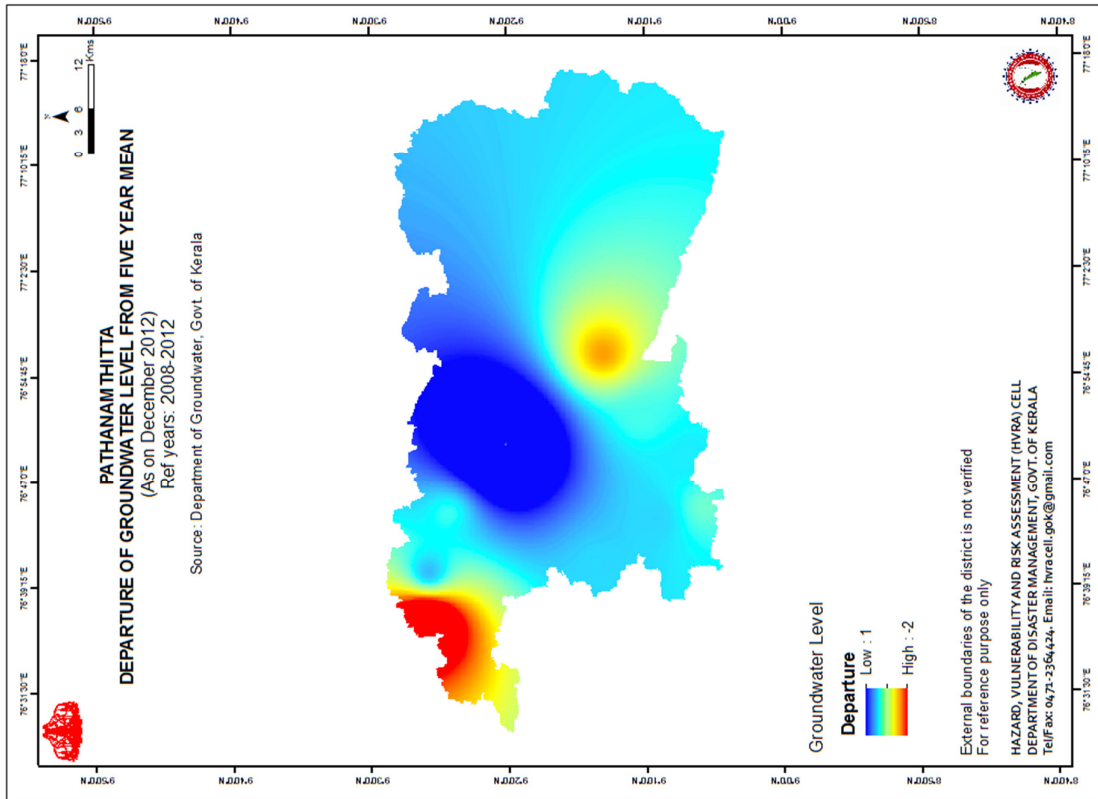
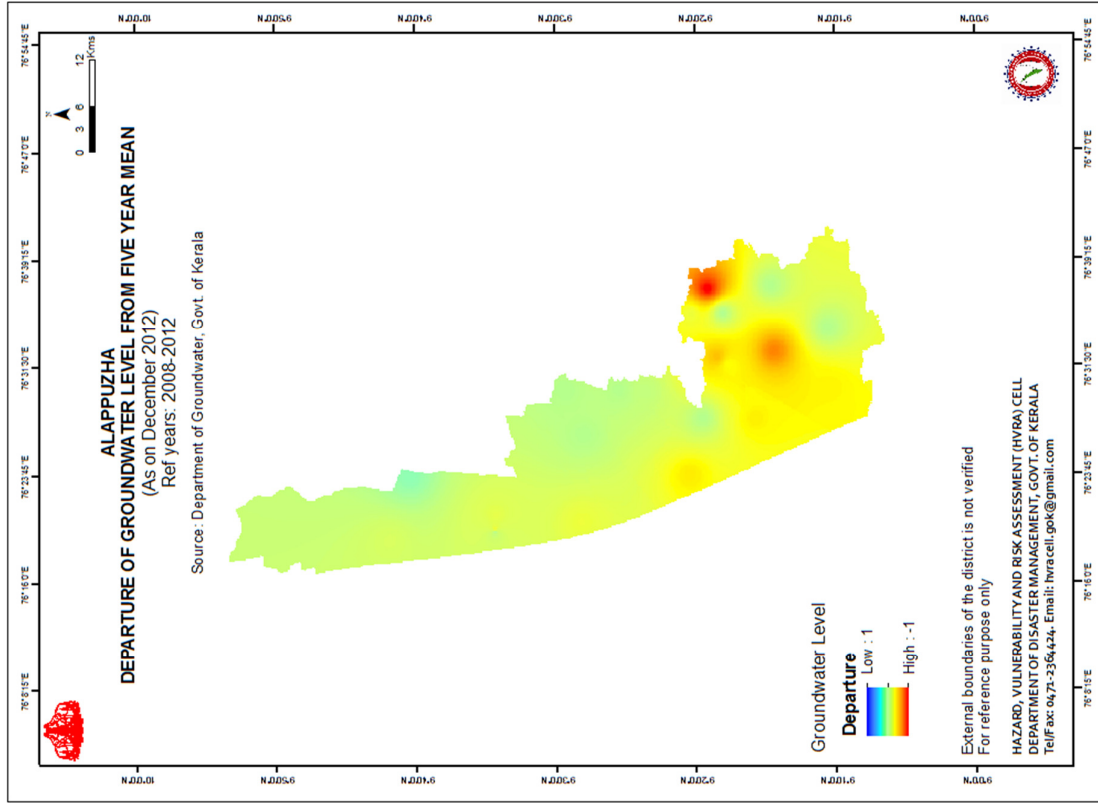


FIGURE 11:- GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – PATHANAMTHITTA & ALAPPUZHA

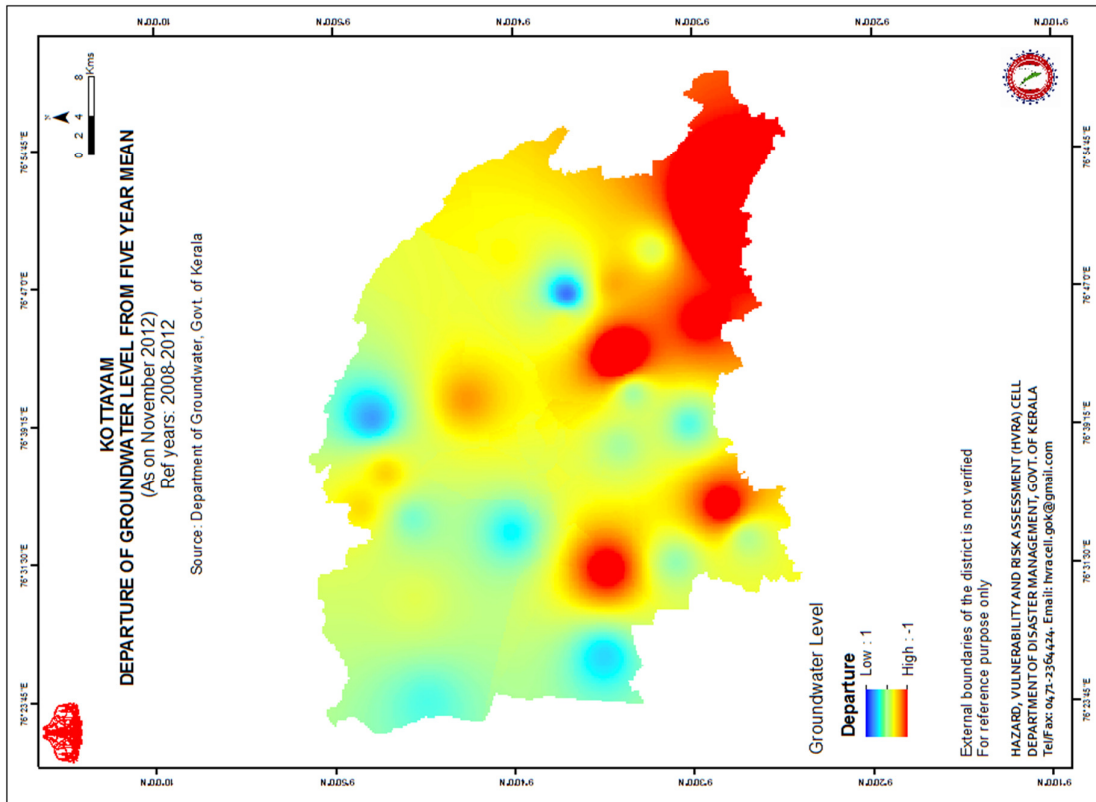
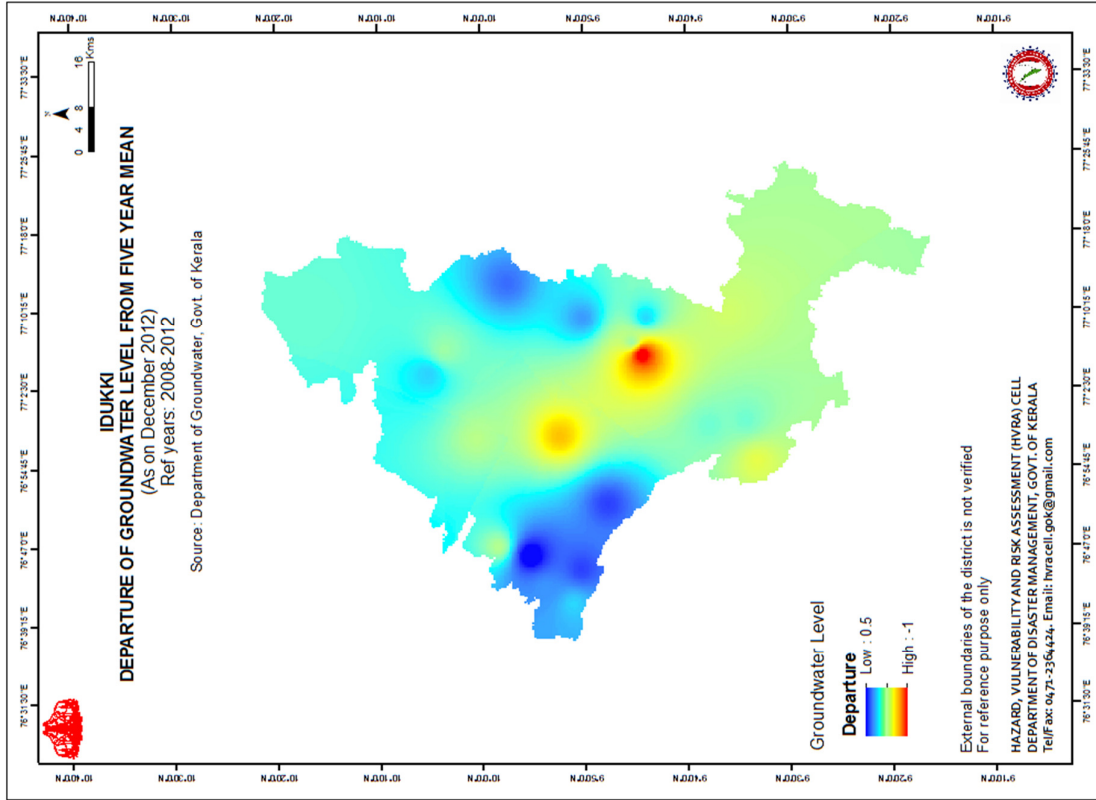


FIGURE 12: GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – KOTTAYAM & IDUKKI

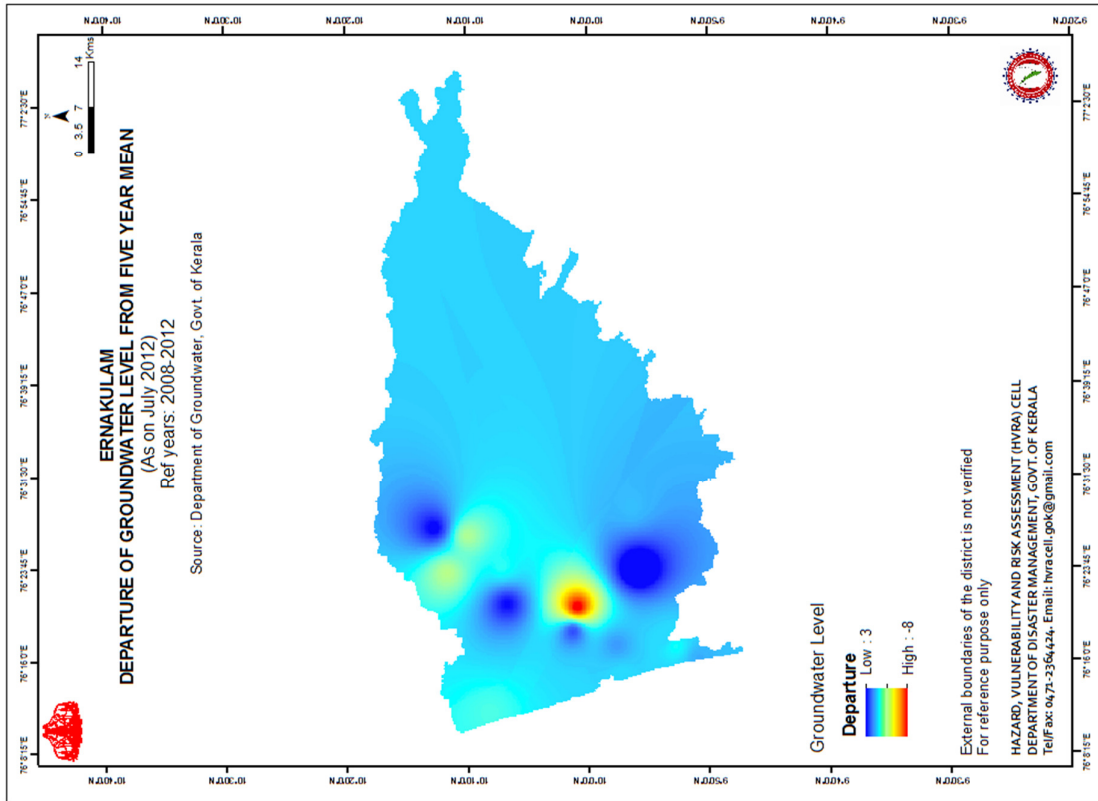
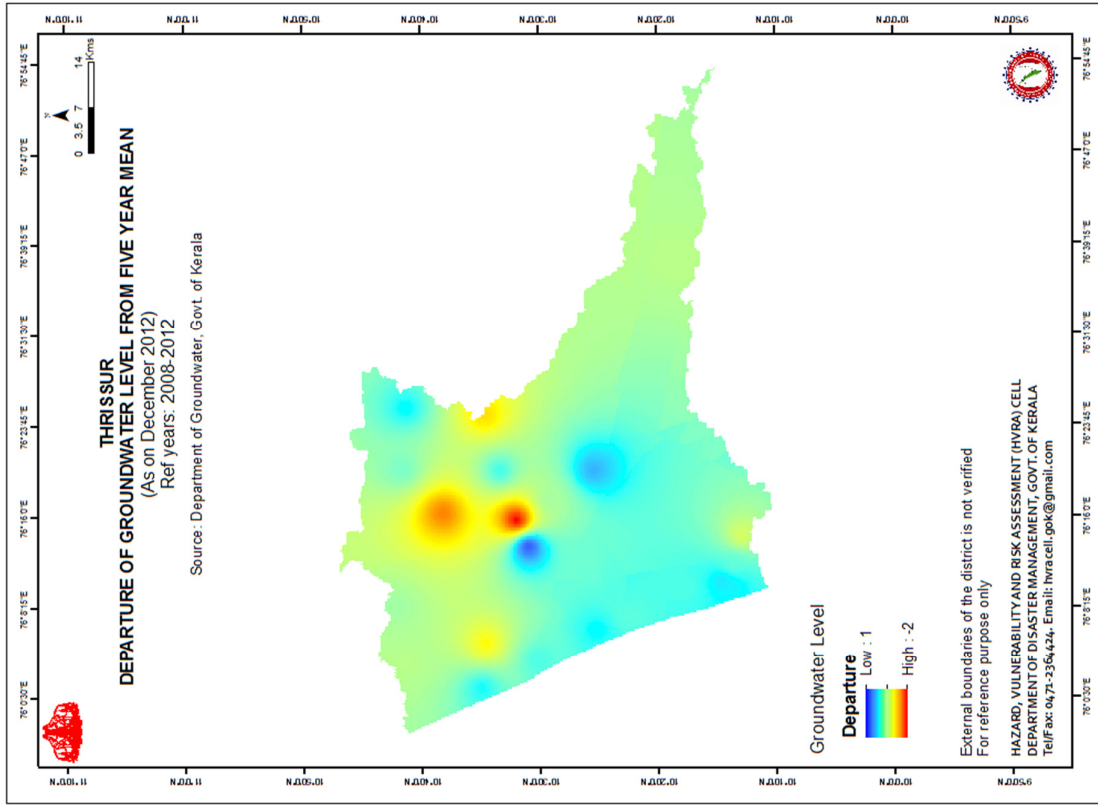


FIGURE 13: GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – ERNAKULAM & THIRISSUR

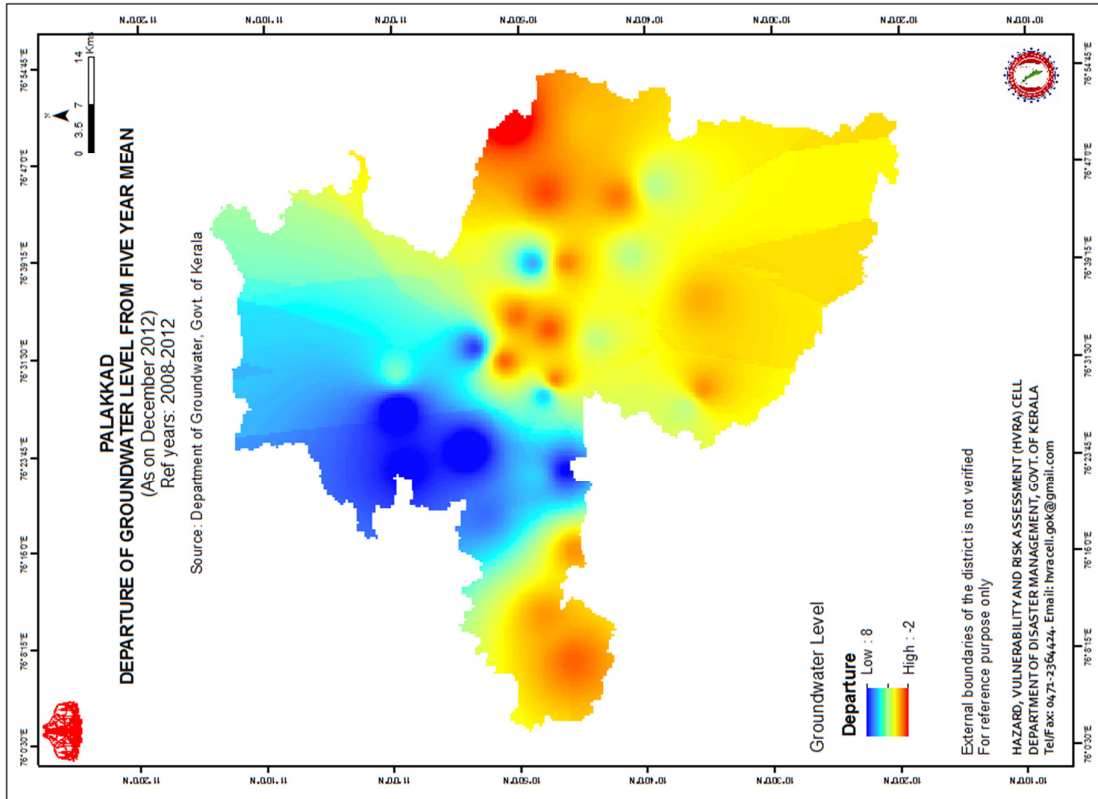
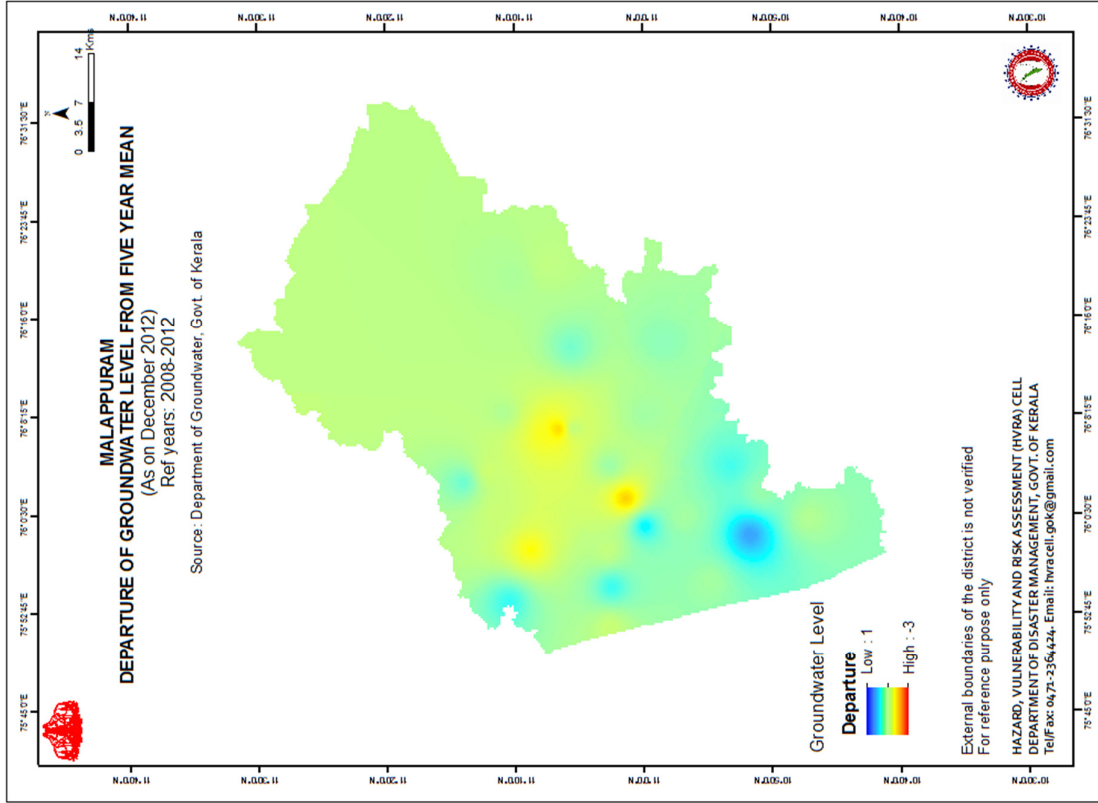


FIGURE 14: GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – PALAKKAD & MALAPPURAM

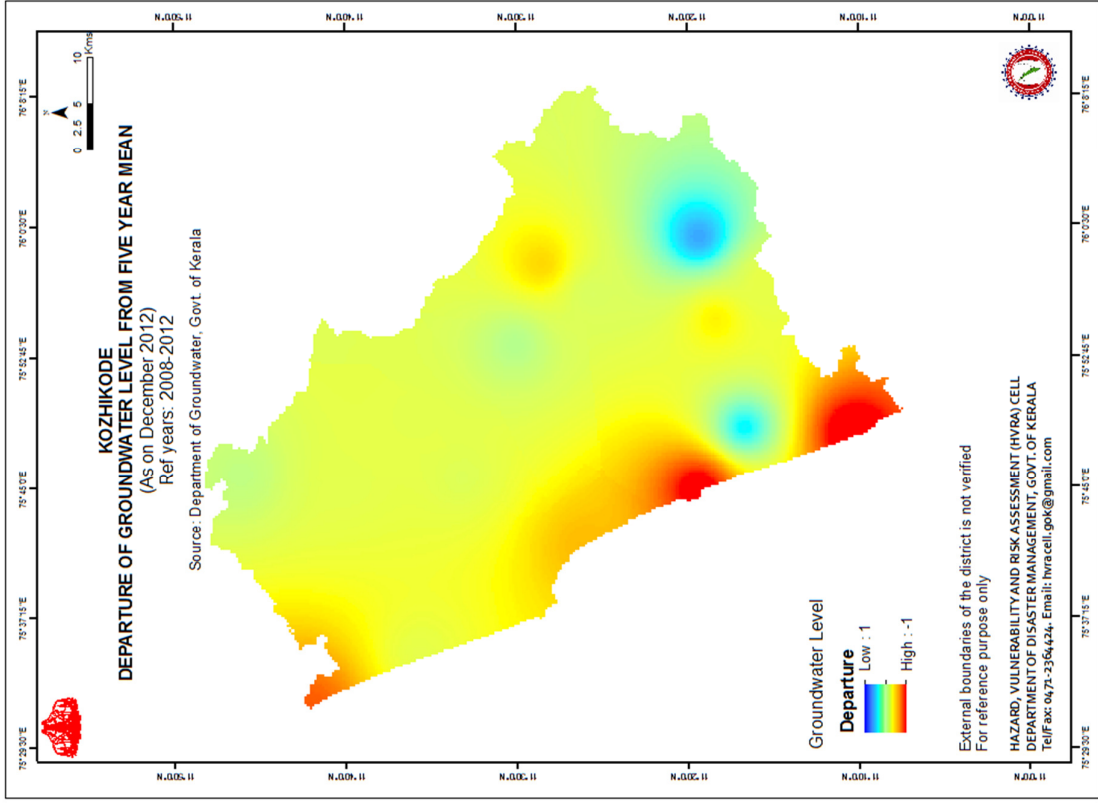
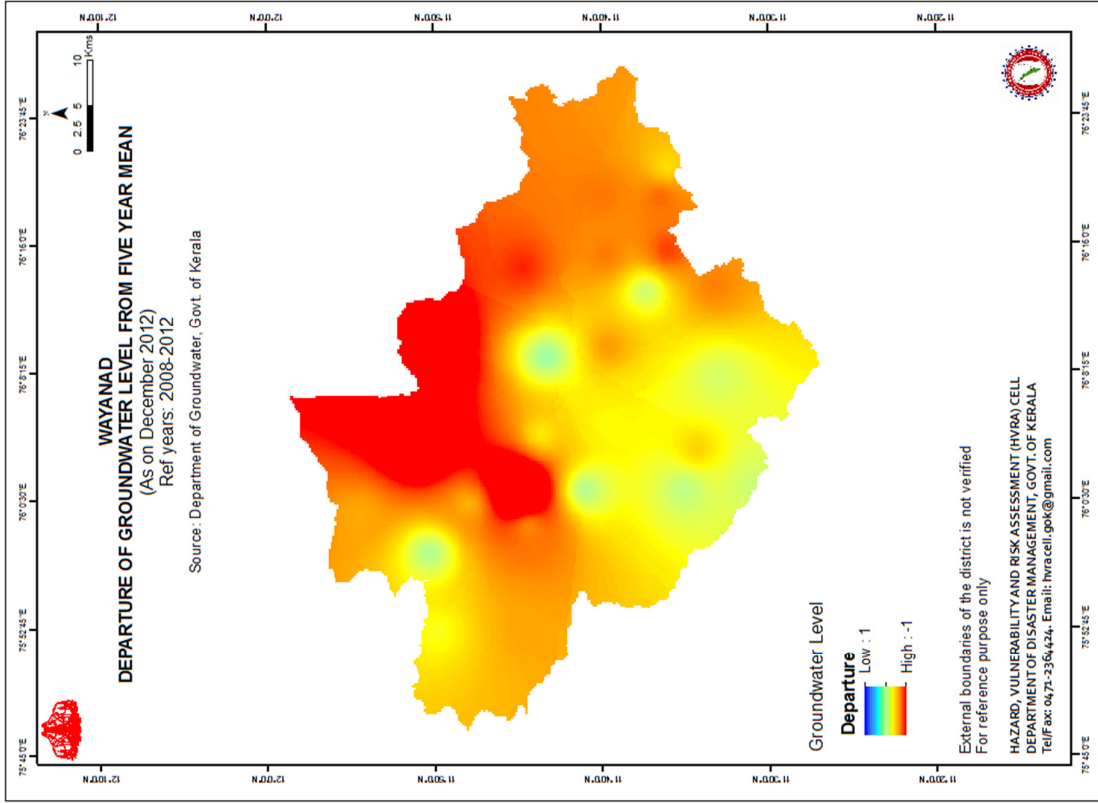


FIGURE 15: GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – KOZHIKODE & WAYANAD

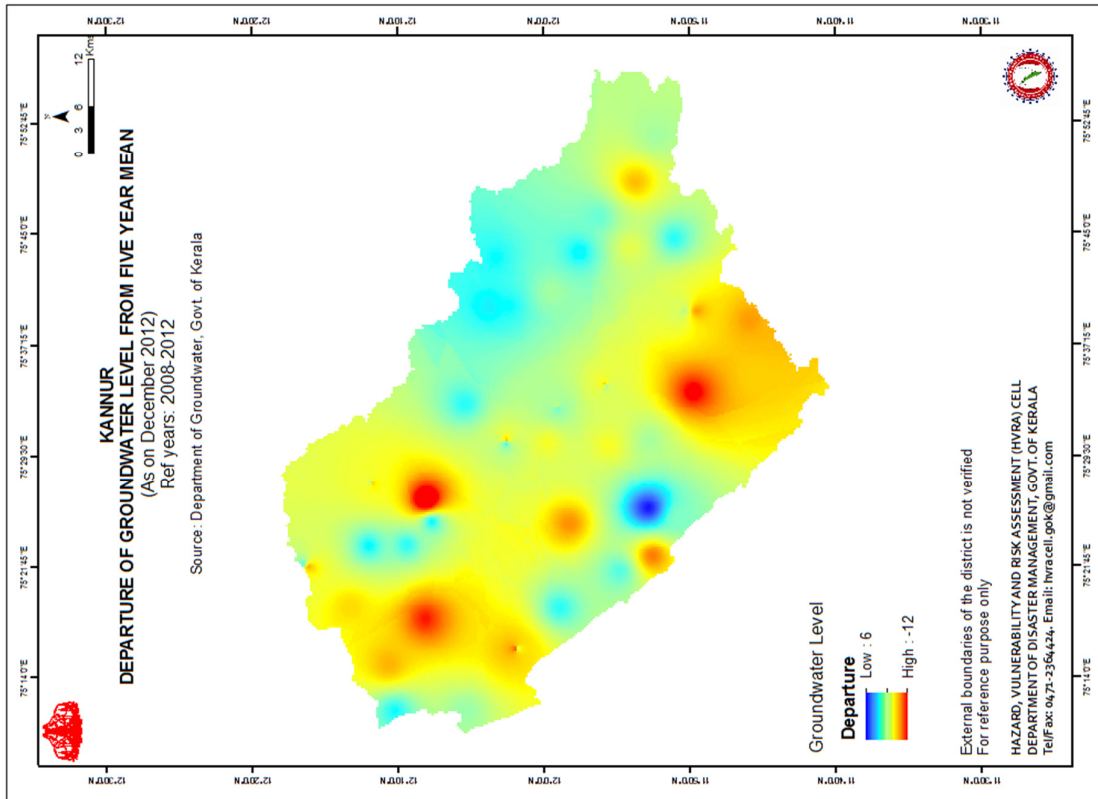
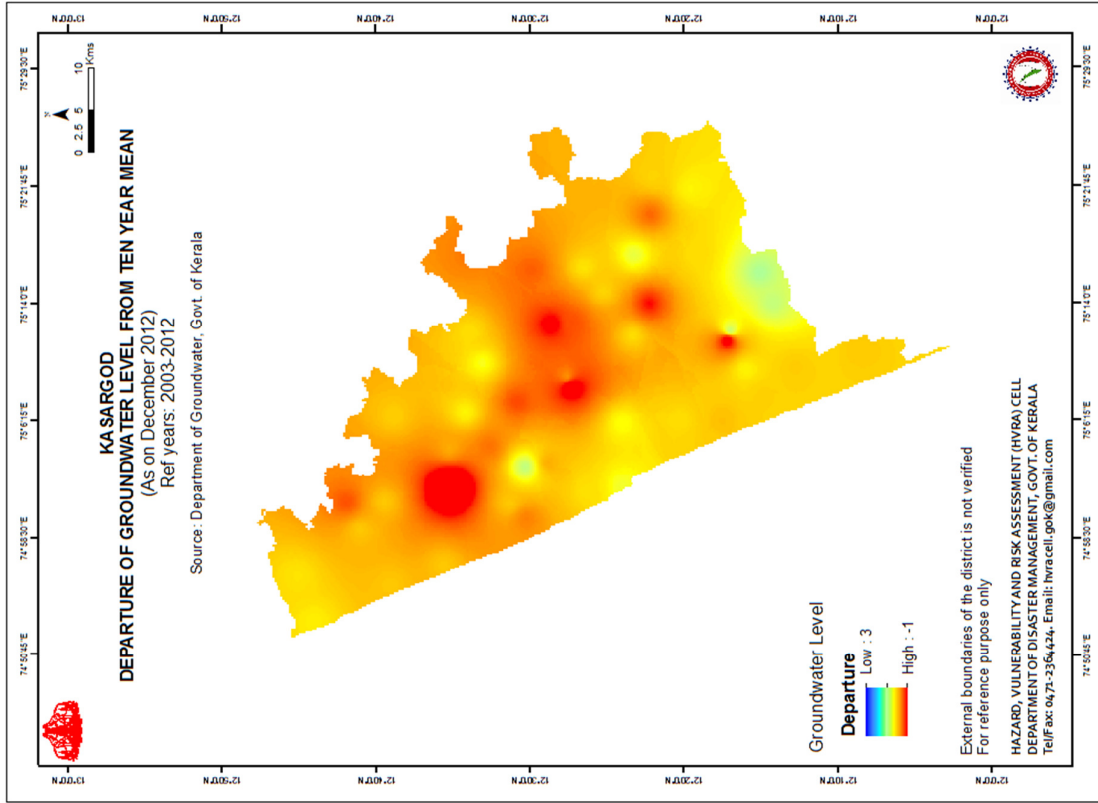


FIGURE 16: GROUND WATER LEVEL – DEPARTURE FROM LONG PERIOD NORMAL – KANNUR & KASARGODE

3.3. IMMEDIATE RELIEF MEASURES UNDERTAKEN BY STATE GOVERNMENT

- **6 Sep 2012** – KSDMA met and 4 districts were declared drought affected – Thiruvananthapuram, Kollam, Idukki and Wayanad
- **18 Sep 2012** - State Level Bankers Committee (SLBC) advised Lead District Managers to extend relief to borrowers in the 4 districts
- **31 Oct 2012** - Revised memorandum of Rs. 1995 crs submitted to Govt. of India
- **19 Dec 2012** – KSDMA met and all districts were declared drought affected
 - It was decided that a Minister will be given charge of each district and the District Collectors will convene an extended meeting of the District Disaster Management Authorities in the chairpersonship of the Minister in-charge of the district to discuss the various drought risk reduction measures to be undertaken
 - HVRA Cell was declared the State Drought Monitoring Cell and a competent officer was designated as State Nodal Officer for Drought Monitoring to concurrently monitor the evolving drought situation and coordinate the State level activities
 - All departments were given direction to utilize their plan funds first before seeking assistance from SDRF
- **26 Dec 2012** – An urgent Drought Risk Reduction Workshop was organized by the State Drought Monitoring Cell – Heads/Representatives of major line departments participated. This meeting brought out 26 recommendations for the District Collectors to follow for drought risk reduction (Given as Annexure 1)
- **28 Dec 2012** - Guidelines for SDRF utilization was evolved and they were communicated to all District Collectors
- **29 Dec 2012** – Directions were sent to District Collectors with formats for drought monitoring
- **1 Jan 2013** - Directions were sent to Ground Water Dept., Irrigation Dept. and KSEB with formats for weekly monitoring and reporting of water level status

- **4 Jan 2013** - Honb'le Minister for Revenue and DM conducted a video conference with all District Collectors and following directions were given:
 - Recommendations of the urgent workshop should be considered seriously
 - Water Availability to Hospitals and Schools shall be a priority
 - Bills and vouchers of spending from SDRF to be meticulously maintained
- **9 Jan 2013** - Dept. of Agriculture was directed to undertake loss estimation in the prescribed format
- **18 Jan 2013** – State Relief Commissioner reviewed the drought risk reduction activities of the District Collectors
- **21 Jan 2013** - District Collectors requested for a total of Rs. 383 crores for undertaking immediate drought relief
- **23 Jan 2013** - Special Cabinet Meeting on Drought wherein the State Relief Commissioner and the State Nodal Officer for Drought Monitoring were asked to present the status
 - Considering the request of the District Collectors, the Council of Ministers decided to allocate a total of Rs. 85 crores from SDRF to all districts for drought relief
 - An additional amount of Rs. 79 crores and Rs. 13 crores was allocated to Dept. of Irrigation and Dept. of Ground Water respectively, from the State's own budget for undertaking urgent drought risk reduction measures
 - Decided to declare moratorium and waiver one year interest of agriculture loans issued by the banks under the State Government
 - Decided to publish a booklet for drought risk reduction for sensitizing the public
 - Decided to appeal to the SLBC to consider extending all possible relief to the farmers of the State
- **13 Feb 2013** - The working group of the Dept. of Disaster Management resolved to allocate Rs. 3.92 crores to districts for undertaking drought risk reduction campaigns in the grass root level,

to upgrade the district and taluk control rooms and to use for any drought relief activities (discretionary funds) for which funds are not readily available from any other sources.

The district administration under the leadership of the Collector has been instructed to implement all the decisions related to drought management on the ground. The Collectors are asked to monitor all the indicators of drought on the ground: collect data on rainfall on a daily basis from sources other than IMD that includes rain gauges maintained by private plantations and important water storages in the district and on a weekly basis communicate the same to the State Disaster Management Authority. The Collectors are also asked to monitor all local information related to demand for relief employment, prices of food grains and the availability of fodder. All relief activities such as relief, employment, distribution of food grains, supply of drinking water and procurement and sale of fodder are coordinated by the District Collectors.

The District Collectors have already directed all the line departments at the district level to participate in drought management, prepare contingency plans and mobilize their staff and resources. The technical departments have identified works and have prepared estimates so that there is adequate work on the shelf to provide relief employment in the drought-affected areas.

The District Collectors concurrently assess the situation related to scarcity of drinking water and fodder, and issue appropriate instructions regarding conservation of drinking water, supply of drinking water through tankers, repair of hand pumps, augmentation and minor repair of existing public water supply system, procurement and sale of fodder, and setting up of fodder depots and cattle camps.

As part of coordinating relief and mitigation activities, the District Disaster Management Authorities that are set up under the chairmanship of the Collector consisting of Panchayati Raj officials and the district officials meet frequently and review the progress of drought relief and mitigation measures in the district. The State/District disaster management authorities are made

fully functional and the following actions have been taken/being taken to tackle the drought situation.

- The State Drought Monitoring Cell has convened a meeting of all Heads of the Departments and have evolved a consensus on 26 items to be addressed with priority by District Collectors for tackling the drought situation
- Meetings of District Disaster Management Authorities of concerned districts have been convened under the Chairmanship of the Minister in-charge of the District
- The Honb'le Minister for Revenue and Disaster Management and the Relief Commissioner is constantly reviewing the progress of the drought risk reduction activities undertaken by the districts
- State Drought Monitoring Cell is concurrently assessing the rainfall, ground water level and reservoir levels and is advising the State government regarding the situation on ground and measures needed from the State level to support the Districts in smooth implementation of Drought Risk Reduction activities
- District Collectors has developed a strategy for drought management in active consultation with all the participating district level heads of departments
- A contingency plan for drought management has been developed by all districts
- All the departments/agencies have prepared their own contingency plans
- Funds available with the Govt. of Kerala from various sources have been pooled and have been handed over to District Collectors for immediate relief activities

The State Drought Monitoring Cell requested all line departments to conduct loss estimates in sectors such as agriculture, animal husbandry, and power, and requested all District Collectors to compile the requirements for immediate relief needs such as provision of drinking water to the most affected population. On the basis of this assessment, it was decided by the State

Government to submit an appeal to Government of India in addition to the Memorandum submitted in October 2012 seeking financial assistance as the losses were too high for the State alone to bear. Following chapter shows the drought losses and assistance required for risk reduction.

CHAPTER 4: DROUGHT LOSSES AND RISK REDUCTION MEASURES

4.1. WATER RESOURCE MANAGEMENT

Water resource management in the drought-affected areas is one of the most critical tasks of relief operations. Since water is a basic need for human and cattle population, supply of drinking water on a steady basis is the most important responsibility for Government at all levels. It requires diverse measures such as augmentation of water supply, rationing of water use, preservation of water and efficient utilization and management of water resources, in both urban and rural areas. Provision of water and its use is the most important yardstick for judging the effectiveness of relief operations.

The State Government has issued special orders for distribution of drinking water in water tankers, repairs and augmentation of all the existing water supply schemes. This includes piped water supply scheme, electrical pumps fitted on bore-wells, hand pumps, wells and any other sources of drinking water.

The District Collectors have directed the Tahsildars to visit the affected areas and draw up Taluk-wise lists of villages in which drinking water scarcity has already developed or likely to arise. The list of these problem villages was counterchecked through the Sub-Divisional Officers and other district officers from the relevant departments and based on their report the Collector have then finalized the list of villages. On the basis of this information, the District Collectors have prepared contingency plans for provision of drinking water in all the villages that are likely to face a water scarcity. The District Collectors have already started supply of drinking water through tankers. The District Collectors have prepared a Taluk-wise list of all the water supply schemes in the district which need repairs. A district-level campaign is being organized for repairing all the hand pumps and electricity pumps fitted on bore-wells. The Collectors are asked to provide funds for immediate repairs to water supply schemes, hand pumps, and bore-wells through the State Disaster Response Fund.

The contingency plan includes the following:

- Supply of drinking water through water tankers where drinking water scarcity is felt
- Any piped water supply scheme, which is already under execution in any of these villages, should be completed expeditiously
- Piped water supply, temporary piped water supply, or bore-wells already constructed in any of the villages which are non-functional should be made functional by undertaking necessary repairs or renovation
- If an existing bore-well can provide enough water to the village by installation of a power pump, the district administration should take immediate measures to install such pumps

4.2. ENSURING DRINKING WATER IN THE DISTRICTS

The Collectors have taken immediate measures to supply water through tankers to the villages in the drought-affected districts and have also sanctioned projects for repair and augmentation of existing micro-water supply schemes. The Government tankers are deployed for the supply of drinking water and apart from this, private tankers are also hired as Government tankers are inadequate for ensuring uninterrupted supply of drinking water to the affected villages. Note that drinking water supply requirements will reach its peak during the months of March, April and May. Annexure 2 provides the details of the drought relief works undertaken by the respective district collectorates.

4.2.1. AUGEMENTATION/ REPAIR OF MICRO WATER SUPPLY SCHEMES AND DRINKING WATER SUPPLY

In order to ensure clean drinking water locally to the public, Collectors have sanctioned/requested for sanction of projects to augment or repair existing micro-water supply schemes. Such works were given priority in areas where the source was sufficient and the facility needed on minimal interventions to cater to the local needs. Drinking water supply through tankers was promoted only in places where no locally repairable or augmentable source was available. Table 7 shows the required cost for undertaking these activities, the amount that has

been expended, amount that was claimed in the Memorandum submitted to Govt. of India in October 2012 and the new claim made herein.

TABLE 7: COST OF REPAIR OF LOCAL WATER SUPPLY SCHEMES AND DRINKING WATER SUPPLY THROUGH TANKERS

Sl. No	District	Amount Required	Amount Expended	Claimed in actuals in October 2012	New Claim
1	Thiruvananthapuram	764.93828	580.43828	451	313.93828
2	Kollam	2060	298.09755	285.05148	1774.94852
3	Pathanamthitta	87.57	8.775	Nil	87.57
4	Alappuzha	Nil	2.0965	Nil	2.0965
5	Kottayam	273.7	96.92541	Nil	273.7
6	Idukki	1520.9	74.89206	13.99613	1506.90387
7	Ernakulam	166.85	3.85	Nil	166.85
8	Thrissur	358.974	37.515	Nil	358.974
9	Palakkad	1007.64375	189.79	Nil	1007.64375
10	Malappuram	300.89868	25	Nil	300.89868
11	Kozhikode	727.5094	1.396	Nil	727.5094
12	Wayanad	1000	40.11279	Nil	1000
13	Kannur	165.863	27.056	Nil	165.863
14	Kasargode	22.95	Nil	Nil	22.95
Total		8457.79711	1385.94459	750.04761	7709.846

All values in lakhs

4.2.2. PIPELINE EXTENSION

Wherever local sources were not available, but pipelines of public water supply schemes were passing within a buffer of 500 m, priority was given to extend these pipelines to clusters of households where drinking water scarcity was being felt. Table 8 shows the cost of short distance drinking water pipeline extension.

TABLE 8: COST OF SHORT DISTANCE (500 M OR LESS) DRINKING WATER PIPELINE EXTENSION

Sl. No	District	Amount Required	Amount Expended	Claimed in October 2012	New Claim
1	Thiruvananthapuram	13083.91	4.25	9372.65	3711.26
2	Kollam	270.78574	145.43574	125.35	145.43574
3	Pathanamthitta	605.29	221.48	Nil	605.29
4	Alappuzha	450.9115	246.813	Nil	450.9115
5	Kottayam	973.77	62.15	Nil	973.77
6	Idukki	127.22	Nil	127.22	Nil
7	Ernakulam	1891.78006	491.72531	Nil	1891.78006
8	Thrissur	624.04	77.126	Nil	624.04
9	Palakkad	525.30495	194.6145	Nil	525.30495
10	Malappuram	568.26	131.9249	Nil	568.26
11	Kozhikode	Nil	Nil	Nil	Nil
12	Wayanad	594.46	7.24	504.14	90.32
13	Kannur	430.45	Nil	Nil	430.45
14	Kasargode	141.5	Nil	Nil	141.5
Total		20287.68225	1582.75945	10129.36	10158.32225

All values in lakhs

4.2.3. TEMPORARY CHECKDAMS, REPAIR OF CHECKDAMS AND DESILTING OF PONDS AND TANKS

Even though the State of Kerala is blessed with 44 rivers, the rivers are small, whether considered in terms of length, breadth or annual stream flow. Out of the total rivers of Kerala, Chaliyar, Bharathapuzha, Periyar, and Pamba are relatively medium rivers, each more than 160 Km long. Even though the average annual rain fall in Kerala is the highest among the states of India of the order of 3055 mm, most of the rain water flows to the sea is unharnessed due to the steep terrain and rivers play a great role in carrying the flood flows to the sea.

The rivers of Kerala are too small that even the largest of them cannot find a place among the major Indian rivers. The largest river of Kerala, the Periyar has a catchment area of only less than 8% of the catchment area of the river Cauvery, which itself is considered to be a small river in India. The rivers flow fast, because of the hilly nature of the terrain and the short distance between the mountains and the sea. The rivers of Kerala have no deltas. Because of the small size, these rivers are more susceptible to environmental onslaughts.

In recent years the State is facing a trend of decreasing rainfall especially in the extreme Southern districts like the capital city of Thiruvananthapuram. The entire State will be experiencing incidence of drought in the coming months primarily due to weather anomalies and detrimental anthropogenic activities and land use practices. Also the annual rainfall especially in South Kerala is found decreasing. The State experiences seasonal drought every year during the summer. The summer water scarcity arises even in the years of normal rainfall. The decreasing rainfall over the State, late onset of monsoon and break in the monsoon rains may lead to drought situations in the State. This may adversely and directly affect the agriculture/cultivation of crops, acute water shortage which may even lead to famine. The change in the rainfall pattern, changes in the land and water management practices catalyzed with the special topographic features of the State is reducing the fresh water availability of the State during the summer season.

Droughts will have large dimension of social, economic and environmental impacts. Most of the irrigation projects in our State were constructed over a period of 30 years and these require constant maintenance and repairs for the effective functioning and optimum utilization of the water resources. Also, it is found necessary to concentrate on small and medium irrigation schemes since taking up and implementation of major irrigation projects is found to be practically difficult due to environment and land acquisition problems. In order to prevent severe drought in the State, first of all it is necessary to increase the existing storage capacity of the reservoirs in order to accumulate the monsoon water. For this it is necessary to carry out the revamping of the major and medium irrigation projects in the State including the de-silting of the reservoirs. Figure 17 shows the record low water level of Anathodu dam with catchment in Idukki district in August 2012. Dams, in general, were constructed to store the water in the rainy season and to release it in a controlled manner for irrigation, water supply and power generation. Construction of small dams/check dams for monsoon storage, raising of storage level of existing dams to accommodate more water and de-silting of existing dams to increase storage capacity can be effectively carried out to face acute water shortage in the State. Removal of silt and sediments from the reservoirs will help to accommodate excess water during monsoon seasons for controlling floods and to utilize this excess storage during the summer months.

Also construction of check dams/partially submerged barriers can be constructed in the river course at various places for storing excess water than required for irrigation purposes. The role of minor irrigation is quite significant and it occupies a prominent position in the Irrigation map of Kerala, due to its advantages over the other types of Irrigation. Tanks have been the main source of irrigation in many parts of Kerala for centuries. The hydrological characteristic of the monsoon in Kerala necessitated the creation of storage facilities to hold the monsoon rainwater and utilize it later.

Anathodu Reservoir, August 2012



FIGURE 17: SITUATION OF ANATHODU RESERVOIR, PATHANAMTHITTA AS IN AUGUST 2012

With extraordinary engineering, managerial, and social skills, an extensive system of rainwater harvesting structures comprising of tanks and ponds had been built and maintained by the people for centuries. Many of these multiple use structures were the nerve centers for sustenance and livelihood of the rural communities. The tank rehabilitation had been aimed to increase agricultural production. The pond is recognized as having at least four different functions in irrigated agriculture - water conservation, soil conservation, flood control and protection of ecology of the surrounding area. The State will have to face acute water shortage and drought during the rest of the year and in the succeeding year and hence the storage capacity of the tanks and ponds are to be increased by removal of accumulated silt. The Irrigation Department has evolved the following short term mitigation measures to tackle the drought situation in the State. The district administrations through the district officers of KWA and Dept. of Irrigation have initiated construction and repair of checkdams and desilting of ponds and tanks. These works are undertaken to hold maximum runoff water to create temporary flooding in the stream with arrangements to drain water at suitable intervals. Such embankments depend on the slope of the nalla or off-stream and the quantity of water expected to flow. The impounding of water facilitates percolation of water into deeper soil and makes it possible to bring under cultivation the land under the bed of the nallas. The water released from these bunds is free from silt and very low in velocity and thus unable to cause erosion. Thus, water can be utilized optimally. Further, in order to capture and hold all available summer rains, ponds and tanks that were silted-up during the monsoon season permitted to be desilted. This was permitted to ensure that local ground water table is replenished through the ponded runoff and rain water.

The particulars of drought relief works already been undertaken/being undertaken by the Kerala Water Authority and Dept. of Irrigation in drought affected areas and the expenditure being incurred is given in Table 9.

TABLE 9: COST OF TEMPORARY CHECKDAMS AND REPAIR OF EXISTING CHECKDAMS

Sl. No	District	Amount Required	Amount Expended	New Claim
1	Thiruvananthapuram	1920.34	Nil	1920.34
2	Kollam	3070.642	Nil	3070.642
3	Pathanamthitta	516.3	12.26	516.3
4	Alappuzha	11.5	1	11.5
5	Kottayam	477.03	62.15	477.03
6	Idukki	378	3.57	378
7	Ernakulam	344.392	54.45	344.392
8	Thrissur	714.202	24.3585	714.202
9	Palakkad	335.89	17.17	335.89
10	Malappuram	256.16	56.97192	256.16
11	Kozhikode	15.93682	7.8545	15.93682
12	Wayanad	22.49	22.49	22.49
13	Kannur	26.6	Nil	26.6
14	Kasargode	7.2	Nil	7.2
Total		8096.68282	262.2749	8096.68282

All values in lakhs

4.2.4. REPAIR OF HAND PUMP/TUBE WELL/OPEN WELL

Where ever existing hand pumps, tube wells and open wells were available that needed only minor repair to be made fully functional, the district officers of the Ground Water Department were asked to undertake the work with immediate effect such that drinking water is ensured locally to clusters of households. The Ground Water Department had, in the districts prepared a meticulous scheme for the repair of hand pumps, tube wells, open wells etc. to undertake this task and funds were sanctioned for undertaking this task. Table 10 shows the cost of undertaking this activity in all districts of the State.

TABLE 10: COST OF REPAIR OF HAND PUMPS, TUBE WELLS AND OPEN WELLS

Sl. No	District	Amount Required	Amount Expended	Claimed in October 2012	New Claim
1	Thiruvananthapuram	3288.55	38.45	4.1	3284.45
2	Kollam	1109.28812	146.47848	12.33	11079.96
3	Pathanamthitta	295.83	96.29134	Nil	295.83
4	Alappuzha	768.655	118.51225	Nil	768.655
5	Kottayam	221.45	62.77771	Nil	221.45
6	Idukki	188.808	28.01338	71.86969	116.9383
7	Ernakulam	766.63	70.22198	Nil	766.63
8	Thrissur	147.93	9.111	Nil	147.93
9	Palakkad	274.7833	109.1097	Nil	274.7833
10	Malappuram	646.5366	101.90792	Nil	646.5366
11	Kozhikode	44.45458	44.45458	Nil	44.45458
12	Wayanad	912	49.01275	Nil	912
13	Kannur	506.1666	68.69788	Nil	506.1666
14	Kasargode	519.41	72.6605	Nil	519.41
Total		9690.4922	1015.699	88.29969	9602.193

All values in lakhs

4.3. LOSSES IN AGRICULTURE AND HORTICULTURE SECTORS

The Agriculture Officers in all districts have undertaken a field-to-field survey to assess the damages to crops due to the current, evolving drought situation in the State. The survey did not confine itself to the norms laid out by the Govt. of India for seeking assistance, as the the effects of this drought will not be felt directly this year's yield in many crops. The IMD in its drought outlook released in the month of December shows mild to moderate aridity (Figure 18) in parts of Kerala which is very unusual in the month on December. Aridity is indicative of moisture stress of growing plants and possible poor yield. The Department also anticipates the following effects to the principal crops of the State.

Paddy: Paddy is the major crop affected in the drought that witnessed considerable reduction in area in almost all districts. In general the Virippu crop has been delayed. The dry spell along with increase in temperature will also cause a significant decrease in productivity. The rice productivity will be severely affected due to the dry condition coupled with high temperature during the critical stage of tiller

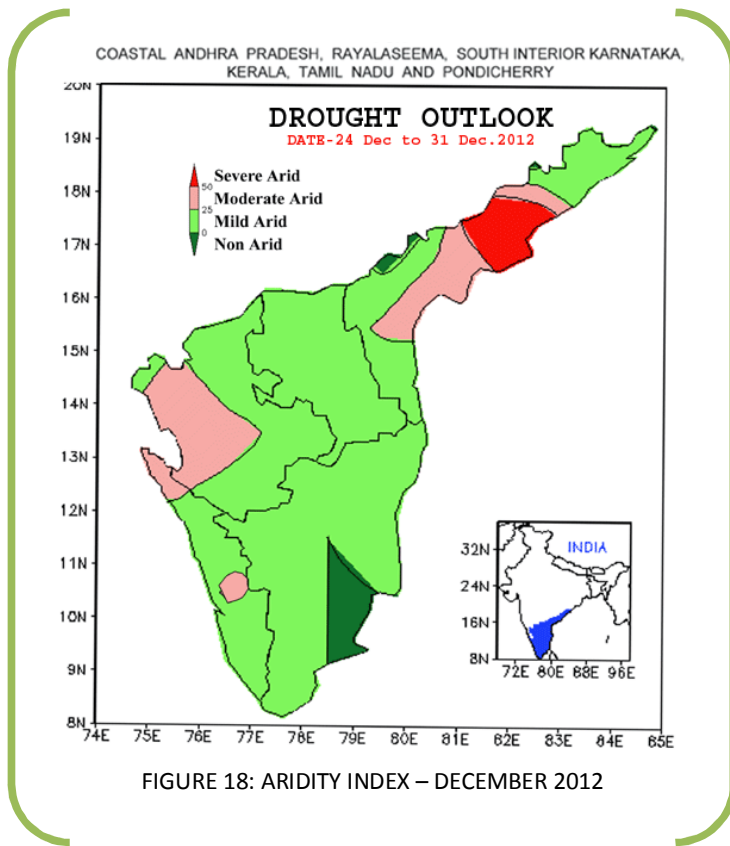


FIGURE 18: ARIDITY INDEX – DECEMBER 2012

initiation. Further yield reduction is estimated as the dry spell and scanty rainfall will be continued during the pinnacle initiation stage. It is estimated that there could be 35-40% decline in the rice productivity in the State. Another problem faced by many of the districts is the high acidity in the paddy fields due to the decrease in rainfall. Excessive weed growth is also reported in many

districts due to the scarcity of water. Further, the delayed first crop will delay the second crop also.

Coconut: Moisture stress is felt in all the districts with low fertilizer consumption result in button shedding and immature nut fall.

Banana: The dry spell has resulted in splitting of banana stem and reduction in bunch size.

Pepper: Erratic berry setting and shortened spike length are noticed. 25 to 35 % reduction in yield is expected owing to deficit rainfall.

Vegetables: The rainfall deficit has affected the vegetable crops to a considerable extent, especially the cool season vegetables cultivated in Idukki District. There is considerable reduction in vegetable area as the rainfall has been delayed.

Annexure 3 shows the details of the crops losses in the prescribed performa. Table 11 shows the losses incurred in each district and the assistance sought for each district.

TABLE 11: AGRICULTURAL LOSSES IN THE DISTRICTS (KHARIF & RABI) 2012-13

Sl. No	District	Total Area Affected (ha)	No. of farmers affected	Estimate Loss (in lakhs)	Assistance Requested (in lakhs)	Claim as per SDRF norms (in lakhs)*	Claimed in October as per SDRF norms (in lakhs)	New Claim as per SDRF norms (in lakhs)
1	Tvm	29935	26644	90389.4	31701.3	1831.54	1816.12	15.42
2	Klm	11925.11	7312	4256.294	1628.761	929.0066	0.3066	928.7
3	Ptn	27422	3252	50672.5	1809.985	2187.76	Nil	2187.76
4	Alp	34266	7550	30715.5	9295.625	30.834	Nil	30.834
5	Kty	5267	752	7506.8	2576.7	396.02	Nil	396.02
6	Idu	15079	3565	22757.9985	8025.286	869.74	69.74	800
7	Ekm	50	127	120.5	52.5	4	Nil	4
8	Tsr	23040	1250	39118.5	13655.88	1736.15	Nil	1736.15
9	Pkd	6779972	24973	112218.4	39409.81	5235.8932	Nil	5235.8932
10	Mlp	22127	864	39617.6	14220.85	1632.88	Nil	1632.88
11	Kzd	3500	436	6118.25	2141.188	279.9	Nil	279.9
12	Wyd	63929	38125	176601.55	57357.99	3967	3700	267
13	Knr	427.5	153	171	42.75	10.17	Nil	10.17
14	Ksd	1020	728	802	250.1	67.6	Nil	67.6
Total		305787.3	115731	581066.3	182168.7	19178.4938	5586.1666	13592.33

*All values in lakhs; *Details given in Annexure 3*

4.4. RELIEF MEASURES IN ANIMAL HUSBANDRY SECTOR

The Department of Animal Husbandry is monitoring the availability of fodder, fodder prices, fodder cultivation, availability of water for fodder cultivation etc. in the State.

The following Drought relief measures are being organized:

- Increasing supply of fodder by redeployment of fodder from surplus districts
- Farms to get surplus fodder
- Fodder cultivation encouraged and incentives provided through Government schemes
- Fodder depots set up and the prices fixed at levels, which farmers can buy
- Cattle camps set up through the Government, NGOs and cooperative societies
- Water supply arranged for cattle camps
- Vaccination and other health measures organized for cattle

Details of expenses incurred/being incurred for the same is given in Table 12, Table 13 and Table 14.

TABLE 12: LOSS OF ANIMALS/POULTRY DUE TO DROUGHT

Sl. No	District	Cow/Buffallo @16400/animal	Goat @1650/animal	Birds @37/animal	Total (in lakhs)
1	Tvm	0.656	0.165	0.037	0.858
2	Klm	0.82	0.0825	0.074	0.9765
3	Ptn	0.328	0.0825	0	0.4105
4	Idu	0.82	0.0825	0	0.9025
5	Mlp	0.49	0	0	0.49
6	Wyd	1.312	0.0825	0.037	1.4315
7	Pkd	1.64	0.165	0.185	1.99
8	Knr	1.312	0	0	1.312
9	Ksd	0.328	0	0	0.328
Total		7.708	0.66	0.333	8.699

TABLE 13: WATER SUPPLY IN CATTLE CAMPS

Sl. No	District	Panchayaths	Month of supply	No. of camps/sites opened for water supply to animal	Cost of water supply to the sites
1	Tvm	45	Jan to May 2013	20	0.5
2	Klm	38	Jan to May 2013	20	0.5
3	Ptn	57	Jan to May 2013	20	0.5
4	Alp	46	Jan to May 2013	20	0.5
5	Kty	58	Jan to May 2013	20	0.5
6	Idu	43	Jan to May 2013	20	0.5
7	Ekm	69	Jan to May 2013	20	0.5
8	Tsr	49	Jan to May 2013	20	0.5
9	Pkd	76	Jan to May 2013	20	0.5
10	Mlp	53	Jan to May 2013	20	0.5

11	Kzd	49	Jan to May 2013	20	0.5
12	Wyd	51	Jan to May 2013	20	0.5
13	Knr	63	Jan to May 2013	20	0.5
14	Ksd	24	Jan to May 2013	20	0.5
Total					14.00

*All values in lakhs; *Details given in Annexure 3*

TABLE 14: ADDITIONAL COST OF MEDICINES AND VACCINES

Sl. No	District	Panchayaths	Month of supply	No. of cattle/goat given medicines and vaccination	Cost of water supply to the sites
1	Tvm	78	Nov to May 2013	268923	7.0
2	Klm	69	Nov to May 2013	271881	6.0
3	Ptn	44	Nov to May 2013	121760	7.0
4	Alp	39	Nov to May 2013	140640	6.0
5	Kty	61	Nov to May 2013	188618	6.0
6	Idu	49	Nov to May 2013	199158	6.0
7	Ekm	55	Nov to May 2013	254965	10.0
8	Tsr	68	Nov to May 2013	239005	6.0
9	Pkd	79	Nov to May 2013	291406	10.0
10	Mlp	48	Nov to May 2013	249211	7.0
11	Kzd	39	Nov to May 2013	157488	6.0
12	Wyd	65	Nov to May 2013	116847	7.0
13	Knr	56	Nov to May 2013	1626	7.0
14	Ksd	32	Nov to May 2013	1315	7.0
Total				2739932	98.0

All values in lakhs

4.5. DETAILS OF LOSSES INCURRED BY POWER SECTOR

The inflow received at the KSEB reservoirs was less by 40% of the anticipated inflow due to failure of south-west monsoon. The details of the inflow expected and the reduction in inflow due to failure of monsoon is detailed below. Table 15 shows the reduction in inflow due to failure of monsoon.

TABLE 15: REDUCTION OF INFLOW DUE TO FAILURE OF MONSOON

Month	Inflow expected (MU)	Inflow received (MU)	Reduction (MU)	% reduction
Jun-12	755.86	340.07	415.79	55.01
Jul-12	1513.72	726.85	786.87	51.98
Aug-12	1320.06	893.79	426.27	32.29
Sep-12	892.58	744.06	148.52	16.64
Oct (upto 6th)	309.00	109.00	200.00	64.72
Total	4791.22	2813.78	1977.44	41.27

The hydel generation targeted during the current year was about 6993 MU. As against the same, hydel generation possible would be as low as 5382.10 MU, resulting in a reduction of 1610.9 MU during the current financial year. The month wise details are given below. In order to meet the

reduction in hydel generation due to failure of monsoon, KSEB has been procuring energy from costly thermal sources upto Rs 14.00 per unit. At an average rate of Rs 10/unit, the additional liability on KSEB would be about Rs 1610.90 crore due to the failure of monsoon. These losses are for the entire state and cannot be separated for each district. Table 16 shows the reduction in power generation due to drought. Table 16 provides the details of the losses incurred by KSEB due to drought.

TABLE 16: LOSSES TO THE POWER SECTOR DUE TO DROUGHT

Month	Targeted generation (MU)	Actual/anticipated (MU)	Reduction in energy (MU)	Estimate Cost for purchase of power (in Lakhs)
(1)	(2)	(3)	(4)= (2)-(3)	@Rs. 10/unit
Apr-12	621.2	550.6	70.6	7060
May-12	631.9	662.9	-31.1	-3110
Jun-12	495.4	502.6	-7.3	-730
Jul-12	519.3	423.3	95.9	9590
Aug-12	581.8	425.3	156.5	15650
Sep-12	598.4	500.4	98.1	9810
Oct-12	603.8	310.0	293.8	29380
Nov-12	525.1	330.0	195.1	19510
Dec-12	554.9	372.0	182.9	18290
Jan-13	566.0	403.0	163.0	16300
Feb-13	570.4	406.0	164.4	16440
Mar-13	725.0	496.0	229.0	22900
Total	6993.0	5382.1	1610.9	161090

ANNEXURE 1: RECOMMENDATIONS OF URGENT WORKSHOP ON DROUGHT PREVENTIVE MEASURES, 26 DECEMBER 2012, HELD IN IMG, THIRUVANANTHAPURAM

Organized by Institute of Management in Government (IMG) in collaboration with the Hazard Vulnerability and Risk Assessment Cell (HVRAC), Kerala State Disaster Management Authority, Govt. of Kerala at IMG, Thiruvananthapuram

The State Disaster Management Authority on 19 December 2012 declared Kerala as drought-affected following a review of the rainfall received during the two monsoon seasons this year and also field-level reports, which spoke of the impending crop loss and drinking water scarcity. The Hazard Vulnerability and Risk Assessment Cell were asked to monitor the evolving drought and advise the government in advance about the steps that had to be initiated. As soon as drought is declared in the state, it is mandatory for the State Government to prepare guidelines for immediate drought relief at district level. While priority should be for water conservation, harvesting works, minor irrigation works, water rationing etc. the do's and don'ts in case of drought risk reduction needs interdepartmental consensus.

In order to discuss the above issues, and to draw out guidelines on the immediate short term measures necessary to be taken, a workshop of all concerned departments is essential. It also needs to be kept in mind that now we are only in the month of December. Unless mitigating measures are taken right now, the situations of the coming months would become worse.

The following are the topics for discussion:

1. Details of loss based on the CRF guidelines – sector wise
2. Relief assistance to be released including availability of funds.
3. Guidelines for immediate drought measures to be taken department wise and sector wise.
4. Submission of Memorandum to Government of India – required data department wise.
5. Drought Management plan in the State.

The workshop was chaired by Dr. Nivedita P. Haran IAS, Director IMG. Prof. Dr. Keshav Mohan, Director ILDM extended a warm welcome to all attendees. The meeting was attended by:

1. Dr. K.B Valasalakumari IAS (Rtd), Executive Director, Kudumbashree
2. Mr. Ashok Kumar Singh IAS, Managing Director, Kerala Water Authority
3. Mr. S. Jaleel, Spl. Secretary, Local Self Government, Govt. Secretariat
4. Mrs. Sarojani K.T, Director, Dairy Development Department
5. Dr. K.G Suma, Director, Animal Husbandry Department
6. Mr. John Mathai, Scientist G, Centre for Earth Science Studies
7. Dr. S. Venugopalan Nair, Deputy Director, Animal Husbandry Department
8. Mr. K.S Madhu, Superintending Engineer, Ground Water Department
9. Mrs. B. Krishna Kumari, Joint Director, Agriculture Department
10. Mr. G. Anil Kumar, Superintending Engineer, Irrigation Department
11. Prof. Dr. Keshav Mohan, Director, Institute of Land and Disaster Management
12. Mr. Terrance Antony, PA to Superintending Engineer, Irrigation Department
13. Mrs. Anjana M, Assistant Commissioner (DM) & Assistant Secretary, KSDMA
14. Mr. Ajith Chacko, State Project Officer, GoI-UNDP DRR, KSDMA

15. Mr. Shine A. Haq, Section Officer, DMD (Revenue K), Govt. Secretariat
16. Dr. Sekhar L. Kuriakose, Head (Scientist), HVRA Cell, KSDMA, ILDM

The meeting recommended the following for District Collectors to consider and implement if deemed necessary:

1. Priority should be for drinking water to public, drinking water to domestic animals and agriculture
2. Stress should be on Reduce, Reuse and Recycle water
3. Identify the villages and panchayaths that are under drought stress
4. All departments should prepare a drought risk reduction plan before January 15th and the same shall be submitted to the District Collectors for monitoring the implementation. The progress made in each project by the respective department shall be included in the weekly reports of the District Collectors that are forwarded to the HVRA Cell.
5. Enumerate fresh water yielding ponds, wells and natural tanks (chirakal) with the help of Kudumbashree Neighbourhood Groups
6. Ponds, wells and tanks that are currently dry shall be de-silted, but those with some amount of fresh water should not be de-silted. The implementation of ponds restoration programme (RRR programme) initiated shall be based on this and Collectors shall ensure this.
7. Ensure that that community owned ponds, wells and fresh water lakes are kept clean and no sewerage systems or drainages should be allowed to drain into such water bodies and rivers. Kudumbashree Neighbourhood Groups may be used for ensuring the protection
8. Public should be made aware and motivated to avoid directly using perennial and natural water sources such as ponds, fresh water lakes, community wells and open wells for swimming, bathing, bathing animals etc.
9. Kudumbashree CDSs may be asked to conduct the first level quality check of the fresh water in ponds, wells and lakes. Jananidhi may train and equip the CDSs to do this.
10. Ponds, wells and lakes that do not pass the first level quality check should be checked by the district KWA water quality laboratories and necessary purification works should be taken up by KWA.
11. KWA shall attempt to operationalize the mobile Reverse Osmosis Plants not later than by January 31st.
12. KWA should ensure that the 29 coastal Reverse Osmosis Plants are functional within 2.5 months.
13. Prevention of salinity ingress and capture of summer showers in the rivers should be taken up as propriety. Temporary check dams using sand bags may be constructed for the purpose at places identified as necessary by the Irrigation Department in consultation with Water Authority
14. Local Self Governments may open water kiosks with simple water storage structures (Plastic Tanks) in places deemed necessary for drinking water rationing. KWA should supply water and the concerned panchayaths should regulate the rationing.

15. District Officers of Ground Water Department should enumerate all hand pumps and bore wells. They shall list out those that can be repaired and those that are beyond repair. At least 100 hand pumps and bore wells in every district shall be repaired and made useful by methods deemed appropriate by the GWD by February 10th.
16. Ensure that Ground Water Department receives necessary funding from the SDRF as per the provisions of the SDRF guidelines
17. Ground water extracting industries may be urged to reduce the extraction by at least 50% and Collectors may look into the necessity in consultation with Ground Water Department.
18. Canal irrigation should be restricted where ever necessary and the decision to release water from reservoirs for irrigation should be done in concurrence with the agriculture department, ground water department and water authority. Ground Water department should identify a local ground water level threshold below which irrigation should release water through canals. If water level is above the threshold, Irrigation department should give priority to conserve available water for drinking purposes.
19. Animal Husbandry and Dairy Development Department should identify areas with stress for water availability for animals and water for cleaning bulk coolers of primary diary co-operatives. Concerned departments should in consultation with KWA ensure that water is available for animals, if necessary at a common pool identified for the purpose.
20. Fresh potable water shall not be used for washing motor vehicles, especially water supplied through public water supply system
21. Public may be urged to recycle water, for example water used in kitchen may be used for watering garden plants
22. The Director of Public Instruction (DPI) should direct schools to hold special school assemblies to sensitize students on the drought situation and reducing, reusing and recycling water
23. ILDM should draft a set of do's and don'ts in simple Malayalam for public awareness generation and circulation via neighbourhood groups and in schools
24. KSDMA should with the help of mass media, undertake drought risk reduction campaigns across the state
25. Ministers in charge of the respective districts may be requested to hold a detailed press meeting after the district level drought mitigation meeting so that the message reaches the masses
26. Long term drought mitigation measures should be considered by the respective departments when they prepare their annual plans

ANNEXURE 2: DETAILS OF DROUGHT RELIEF WORKS INITIATED BY THE DISTRICTS

SUBMITTED AS A SEPARATE VOLUME

ANNEXURE 3: LOSSES TO AGRICULTURAL CROPS IN KEALA AS PER NORMS

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Calculation of assistance for agricultural input subsidy (Drought)- SMF-KHARIF & RABI-2012 as on 12.2.2013													
Sl. No.	Name of affected district	Total agricultural area affected (in ha.)	Total agricultural area where crop loss is >50%	Out of (4) area belonging to SMF			Assistance sought for different categories of crops (Rs. in lakhs)			Total assistance sought (Rs. In lakh)			
				Rainfed	Irrigated	Perennial	Rsinfed	Irrigated	Perennial				
		3	4	5A	5B	5C	6A	6B	6C	7 (6A+6B+6C)			
1	Thiruvananthapuram	29935	24461	2404	257	21800	7212000	1542000	174400000	183154000			
2	Kollam	11925.11	11925.11		1250.11	10675	0	7500660	85400000	92900660			
3	Alappuzha	34266	811.4	595	216.4		1785000	1298400	0	3083400			
4	Pathanamthitta	27422	27422		300	27122	0	1800000	216976000	218776000			
5	Kottayam	5267	5267	423.6	110	10630.4	1270800	660000	85043200	86974000			
6	Idukki	15079	11164			50	0	0	400000	400000			
7	Ernakulam	23040	22205	205	1500	20500	615000	9000000	164000000	173615000			
8	Thrissur	67799.72	67231.72	125	6819.72	60287	375000	40918320	482296000	523589320			
9	Palakkad	22127	20909	722	187	20000	2166000	1122000	160000000	163288000			
10	Malappuram	3500	3500		5	3495	0	30000	27960000	27990000			
11	Kozhikode	63929	57900	12900	1000	44000	38700000	6000000	352000000	396700000			
12	Wayanad	427.5	226.2	113.1	113.1		339300	678600	0	1017900			
13	Kannur	1020	1020	240	100	680	720000	600000	5440000	6760000			
14	Kasargode	305787.33	254092.43	17727.7	13125.33	223239.4	53183100	78751980	1785915200	1917850280			

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ANNEXURE 3 (B)

DISTRICT WISE AGRICULTURAL CROP DAMAGE CAUSED BY DROUGHT IN KERALA DURING KHARIF - 2012

Sl. No.	Name of the District	Kharif-2012		Total area affected by drought during Kharif, 2012 (Ha)	Total area affected by drought with >50% crop damage from the affected area (Ha)			Area affected by SF&MF with >50% crop damage (out of the >50% crop damage area) (Ha)			Area affected by other than SF/MF with >50% crop damage (out of the >50% crop damage area) subject to ceiling of 1 Ha/farmer(Ha)			Area affected by other than SF/MF with >50% crop damage (out of the >50% crop damage area) subject to ceiling if 1 Ha/farmer(Ha)			Area affected by SF&MF under sericulture (Ha)		
		Target (Ha)	Coverage upto (Ha)		Irrigated	Rainfed	Perennials	Irrigated	Rainfed	Perennials	Irrigated	Rainfed	Perennials	Irrigated	Rainfed	Perennials	Eri.	Mulberry, Tussar	Muga
1	TVM	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
2	KLM	1510	904	904	5.11	904													
3	IDKI	916	420	10	10		10	5.11											
4	WYND	10955	9820	2054	2054	2054			2054										


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ANNEXURE 3 (B)

Sl. No.	Name of District	RABI 2012		Total area affected by drought during Rabi 2012 (Ha)	Total area affected by drought with >50% crop damage from the total affected area(ha)											Area affected by SF & MF with > 50 % crop damage (out of the >50% crop damage area) (ha)				Area affected by other than SF & MF with > 50 % crop damage (out of the >50% crop damage area) subject to ceiling of 1 ha/farmer (ha)				Area affected by other than SF & MF with > 50 % crop damage (out of the >50% crop damage area) subject to ceiling if 1 Ha/farmer (Ha)				Area affected by SF/MF under		
		Target (ha)	Coverage upto (ha)		Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Mulber	Tussar	Muga					
		3	4		6	7	8	9	10	11	12	13	14	15	16	17	18	19												
1	Thiruvananthapuram	1425	1211	427	257																									
2	Kollam	3000	1820	1245	1245																									
3	Alappuzha	39250	35896	23550	305	176.4																								
4	Pathanamthitta	3300	3041	100																										
5	Kottayam	8000	7557	1267																										
6	Idukki	950	295	50																										
7	Ernakulam	4508	3456																											
8	Thrissur	18180	16255	890	55	0																								
9	Palakkad	49278	45265	6413	0	6413																								
10	Malappuram	8000	6350	1300	707	177																								
11	Kozhikode	2749	900																											
12	Wayanad	10271	9254	9254																										
13	Kannur	3176	2850	427.5	105																									
14	Kasarode	1757	1342	240	240																									
	Total	53844	135572	45163.5	1412	18789																								

Sd/-

For Director of Agriculture

ANNEXURE 3 (C)

AGRICULTURAL CROPWISE DAMAGE BY DROUGHT IN KERALA DURING KHARIF - 2012 (Area in Ha)

Sl. No.	Name of the Crop	Kharif-2012		Total area affected by drought during kharif, 2012 (ha)			Total area affected by drought with >50% crop damage from the total affected area (Ha)			Area affected by SF&MF with >50% crop damage (out of the >50% crop damage area) (Ha)			Area affected by other than SF&MF with >50% crop damage (out of the >50% crop damage area) subject to ceiling of 1 Ha/farmer(Ha)			Area affected by other than SF&MF with >50% crop damage (out of the >50% crop damage area) in case of successive calamity irrespective of the size of his holdings being large limited to 2 ha/ farmer (Ha)O			Area affected by SF&MF under sericulture (Ha)	
		Target (Ha)	Coverage upto (Ha)	Irrigated	Rainfed	Perinnials	Irrigated	Rainfed	Perinnials	Irrigated	Rainfed	Perinnials	Irrigated	Rainfed	Perinnials	Irrigated	Rainfed	Perinnials	Er.	Muga
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
TVM	Paddy	1510	904	904		904														
KLM	Paddy	1217	561	511	511			511												
IDKI	Paddy	916	420	10	10			10												
WND	Paddy	10955	9820	2054		2054			2054											


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ANNEXURE 3(C)
CROPWISE AGRICULTURE DAMAGE BY DROUGHT IN KERALA DURING RABI - 2012

Sl. No.	Name of District	*	RABI 2012		Total area affected by drought during Rabi 2012 (ha)	Total area affected by drought with >50% crop damage from the total affected area (ha)			Area affected by SF & MF with > 50% crop damage (out of the >50% crop damage area) (ha)			Area affected by other than SF & MF with > 50% crop damage (out of the >50% crop damage area) (ha)					
			Target (ha)	Coverag e up to (ha)		Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial			
															6	7	8
1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Thiruvananthapuram	Paddy	1425	1211	427		257										
2	Kollam	Paddy	3000	1820	1245		1245			257							
3	Alappuzha	Paddy	39250	35896	23550	305	176.4		305	176.4							
4	Pathanamthitta	Paddy	3300	3041	100												
5	Kottayam	Paddy	8000	7557	1267		1267			1267							
6	Idukki	Paddy	950	295	50												
7	Ernakulam	Paddy	4508	3456													
8	Thrissur	Paddy	18180	16295	890	55			55								
9	Palakkad	Paddy	49278	45265	6413	0	6413			6413							
10	Malappuram	Paddy	8000	6390	1300	707	177		707	177			6413				
11	Kozhikode	Paddy	2749	900													
12	Wayanad	Paddy	10271	9254	9254		9254			9254							
13	Kannur	Paddy	3176	2850	427.5	105.1			105.1								
14	Kasargode	Paddy	1757	1342	240	240			240			240					
			153844	135572	45163.5	1412	18789		1412	18789		240	6413				

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ANNEXURE 3 (E)

DISTRICT WISE HORTICULTURE CROP DAMAGE BY DROUGHT IN KERALA DURING KHARIF - 2012														(Area in Ha)		
Sl. No.	Name of the District	Kharif - 2012		Total area affected by drought during kharif, 2012 (Ha)	Total area affected by drought with >50% crop damage from the total affected area (Ha)			Area affected by SF&MF with >50% crop damage (out of the >50% crop damage area) (Ha)			Area affected by other than SF/MF with >50% crop damage (out of the >50% crop damage area) subject to ceiling if 1 Ha/farmer(Ha)			Area affected by other than SF/MF with >50% crop damage (out of the >50% crop damage area) in case of successive calamity irrespective of the size of his holdings being large limited to 2 ha/ farmer (Ha)O		
		Target (Ha)	Coverage upto (Ha)		Irrigated	Rainfed	Perinials	Irrigated	Rainfed	Perinials	Irrigated	Rainfed	Perinials	Irrigated	Rainfed	Perinials
1	TVM	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2	KLM	78951	28604	23300		1500	21800		1500	21800						
3	IDK	212340	1825	1154	100	423.6	630.4	100	423.6	630.4						
4	WYND	65876	46946	46496	1000	1946	44000	1000	1946	44000						


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ANNEXURE 3 (E)

DISTRICTWISE HORTICULTURECROP DAMAGE CAUSED BY DROUGHT IN KERALA DURING RABI - 2012 (Area I Ha)

Districts	RABI 2012		Total area affected by drought with >50% crop damage from the total affected area (ha)	Area affected by SF & MF with > 50 % crop damage (out of the >50% crop damage area) (ha)			Area affected by other than SF & MF with > 50 % crop damage (out of the >50% crop damage area) subject to ceiling of 1 ha/farmer (ha)			Area affected by other than SF & MF with > 50 % crop damage (out of the >50% crop damage area) in case of successive calamities irrespective of the size of his holdings being large limited to 2 ha/farmer (ha)			Area affected by SF/MF under sericulture (ha)				
	Targetted (ha)	Coverage up to (ha)		Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Rainfed	Irrigated	Perennial	Tussar	Muga			
1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Thiruvananthapuram																	
Kollam	9107	6088	675		675			675			675						
Alappuzha	65508	65614	10386														
Pathanamthitta	99338	99338	1680														
Kottayam																	
Idukki	123367	2430															
Ernakulam																	
Thrissur																	
Palakkad	105499	88200	1170	125	372	105	125	372	105								
Malappuram	15220	8600	780	15	10		15	10									
Kozhikode																	
Wayanad	145519	144519	5675														
Kannur																	
Kasargode																	
Total	563558	414789	20366	140	1057	105	140	1057	105		675					18	19

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ANNEXURE 3 (F)

CROPWISE DAMAGE ON HORTICULTURE CROPS CAUSED BY DROUGHT IN KERALA DURING KHARIF - 2012 (Area in Ha)

Sl. No.	Name of the Crop	Kharif-2012		Total area affected by drought during kharif, 2012 (ha)	Total area affected by drought with >50% crop damage from the total affected area (Ha)			Area affected by SF&MF with >50% crop damage (out of the >50% crop damage area) (Ha)			with >50% crop damage (out of the >50% crop damage area) subject to ceiling of 1 Ha/farmer(Ha)		
		Target (Ha)	Coverage upto (Ha)		Irrigated	Rainfed	Perinials	Irrigated	Rainfed	Perinials	Irrigated	Rainfed	Perinials
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Trivandrum	Cocnut	71376	23420	23420			19320			19320			
	Pepper	4902	3380	3380			2480			2480			
	Vegetable	2673	1804	1804		1500				1500			
Total		78951	28604										
IDUKKI	Vegetable	6073	505	505	45	310		45	310				
	Banana	2541	88.7	88.7	33.45	55.25		33.45	55.25				
	Sugarcane	2201	600.95	600.95	21.5	58.45		21.5	58.45				
	cocoa	7537	112	112			112						112
	pepper	85739	144	144			144						144
	coffee	12780	47	47			47						47
	cardamum	33083	263	263			263						263
	Arecanut	2753	24	24			24						24
	coconut	17189	8	8			8						8
	Rubber	39679	2	2			2						2
	Nutmug	2054	27	27			27						27
	Clove	711	3.4	3.4			3.4						3.4
Total		212340	1825.05										
Wayanad	Ginger	2446	1200	1200		1200						1200	
	Banana	8318	1746	1746	1000	746		1000	746				
	Peppr	34000	32000	32000			32000						32000
	Arecanut	10862	10862	10862			10862						10862
	coconut	10250	1138	1138			1138						1138
Total		65676	46946										


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ANNEXURE 3 (F)

District	Name of Crop	RABI 2012			Total area affected by drought during Rabi 2012 (ha)	Total area affected by drought with >50% crop damage from the total affected area (ha)			Area affected by SF & MF with > 50 % crop damage (out of the >50% crop damage area) subject to			Area affected by other than SF & MF with > 50 % crop damage (out of the >50% crop damage area) in case of							
		Target (ha)	Coverage up to (ha)	3		4	5	6	7	8	9	10	11	12	13	14	15	16	17
Kollam	Banana	6237	4324		350		350												
	Vegetables	2870	1764		325		325												
	Total	9107	6088		675		675												
	Pepper	4270	4270		100														
	Rubber	72101	72101		800														
	Coconut	12822	12822		60														
Pathanamthitta	Banana	6901	6901		400														
	Vegetable	1361	1361		150														
	Tubercrops	1824	1824		150														
	Betelvine	59	59		20														
	Total																		
Alappuzha	Coconut	52868	52868		5000														
	Tuber crop	5000	5000		5000														
	Vegetables	2140	2200		220														
	Banana	5500	5546		166														
	Total																		
	Pepper	87264	53231		540														
	Banana	8184	7285		50														
Idukki	Vegetables	7541	6114		560														
	Cardamom	32723	42853		755														
	Coffee	12915	10890		150														
	Nutmeg	2234	1599		5														
	Sugarcane	2174	1100		320														
Malappuram	Total																		
	Pepper	2750	2750		39														
	Arecanut	22980	22980		8														
	Vegetable	2950	1150		58		5	5	5										
	Banana	8920	6250		717		10	5	10	5									
	Tapioca	3350	1200		5														
Total						15	10	15	10										

ANNEXURE 4: STATUS OF EXPENDITURE FROM CALAMITY RELIEF FUND

Status of Expenditure from Calamity Relief Fund		Rs. in Crores
1	Opening Balance in CRF/SDRF account (both SDRF /NDRF) as on 01-04-2012	154.1479
2	SDRF releases during the year 2012-13(Central share & State share)	
	1 st installment of current year(54.19+18.065)	72.2500
	2 nd installment of current year if any	Nil
3	Interest accrued on investment made out of CRF/SDRF	Nil(Action being taken to credit the interest in SDRF account)
4	NDRF releases during the year 2012-13,credited,if any	Nil
5	Total funds available in CRF/SDRF account(1+2+3+4)	226.3979
6	Expenditure incurred in conformity with approved items & norms of CRF/SDRF on notified calamities other than flood/landslides during 2011-12	
	Avalanches	0.00
	Cloud Burst	0.00
	Cyclone	0.00
	Drought	85.00
	Earthquake	0.00
	Tsunami	0.00
	Fire	0.00
	Hailstorm	0.00
	Pest Attacks	0.00
7	Expenditure incurred on training during 2012-13	Nil
8	Expenditure incurred on procurement of Search and Training equipments during 2012-13	6.1500
9	Expenditure incurred on instant floods during 2012-13	112.5979
10	Expenditure incurred on instant landslides during 2012-13	Nil
11	Total expenditure incurred on all calamities (6+7+8+9+10)	203.7479
12	Balance available in SDRF account(5-11)	22.65